THE EUROPEAN ENVIRONMENT

STATE AND OUTLOOK 2010

CONSUMPTION AND THE ENVIRONMENT

European Environment Agency

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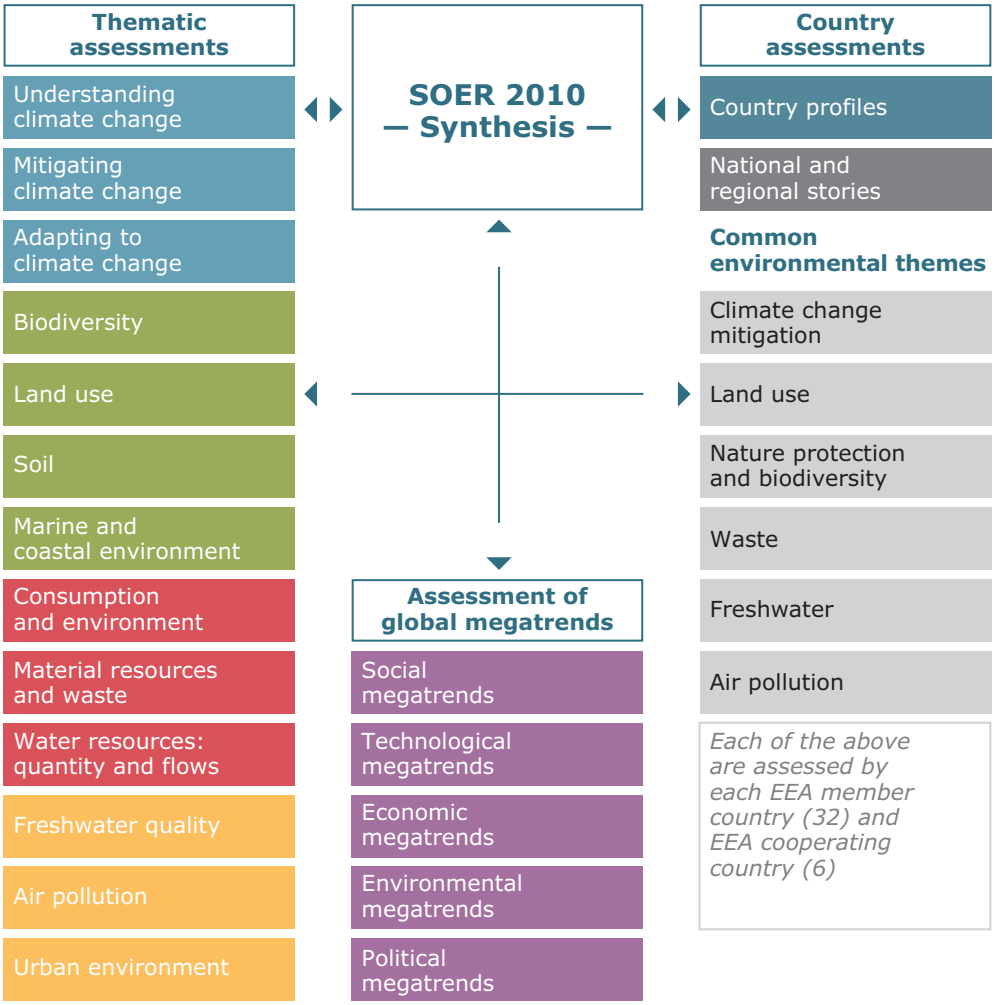

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Consumption and the environment

Summary

The consumption of goods and services in EEA member countries is a major driver of global resource use — and associated environmental impacts. Growth in global trade is resulting in an increasing share of environmental pressures and impacts from European consumption taking place beyond Europe. Food and drink, housing, mobility and tourism are responsible for a large part of the pressures and impacts caused by consumption in the EU. Achieving significant reductions in environmental pressures and impacts will require changing private and public consumption patterns, to supplement gains achieved through better technology and improved production processes.

Drivers and pressures

Consumption is shaped by an array of complex, interrelated factors such as demographics, income and prices, technology, trade, policies and infrastructure, as well as social, cultural and psychological factors. Production activities across economic sectors, including extractive industries, agriculture, energy, transport and manufacturing, are directly responsible for the majority of the environmental impacts caused by the economy. However, it is private and public consumption that are the fundamental causal factors and drivers of change in production activities.

Consumption leads to the direct creation of environmental pressures from the use of products and services, for example, through driving a car or heating a house with fossil fuels. Of greater magnitude, however, are the indirect pressures that are created along the production chains of the goods and services consumed, including, for example, food, clothing, furniture or electricity. Both direct and indirect pressures result in environmental impacts, in particular, global warming, biodiversity degradation, soil sealing and air and water pollution. Since an increasing share of the final and intermediate goods consumed in Europe is imported, a growing proportion of impacts caused by our consumption takes place in other parts of the world. The average environmental footprint (an indicator of pressures from consumption) per person in EEA member countries is about double the available biocapacity (an indicator of land which is biologically productive) of those countries.

An EEA analysis of nine EU Member States (representing 268 million of the EU's total 501 million people) has found that the majority of key environmental pressures caused by total national consumption can be allocated to eating and drinking, housing and infrastructure, and mobility. These three broad consumption areas are estimated to have contributed approximately two-thirds of consumption-related material use, greenhouse gas emissions, acidifying emissions and ozone precursor emissions.

The reasons for these high shares are that food and drink, housing and mobility are the areas which Europeans spend most on and at the same time the areas with the highest pressures per euro spent. Tourism is a fourth area causing high and growing environmental impacts, both within the EU and elsewhere.

A major reason why consumption negatively affects the environment and causes an over-use of resources is because the costs to society of environmental and resource degradation are not fully reflected in the prices of goods and services. Thus, many goods are relatively cheap even though they cause major harm to the environment, ecosystems or human health.

The need for sophisticated policy packages

A culture of high and continuously growing levels of consumption, generally associated with well-being and success, has evolved in western European countries for decades, and EU-12 Member States and the western Balkan countries are rapidly catching up.

Large differences in environmental pressures from consumption, even between households with equal income levels, indicate a considerable potential for more

sustainable consumption patterns through shifting choices towards more sustainable alternatives. Examples include: shifting from car use to collective transport, cycling and walking; and choosing high quality and eco-labelled products and energy-efficient housing solutions. Secondly, additional income could be channelled towards products and services with relatively low environmental pressures such as communication, education and sustainable leisure activities.

Europe will be better equipped to achieve sustainable consumption patterns by developing and implementing sophisticated policy packages. These would include regulatory and voluntary instruments, providing sustainable infrastructure, technological support, consumer education and information, and green public procurement (the purchase of goods, services and public works by governments). A critical element of such policy packages could be provided by ecological tax reform, where the burden of taxation is shifted from labour to environmentally damaging activities.

The framework conditions should enable business and consumers/citizens to act sustainably, and business and citizens need to take action by adopting more sustainable consumption and production patterns.

1 Introduction

…the sheer weight of the combined aspirations and lifestyles of 500 million Europeans is just too great. Never mind the legitimate desires of many other billions on our planet to share those lifestyles .... We will need to change the behaviour of European consumers. To work on people's awareness, and to influence their habits.

Janez Potočnik, European Commissioner for Environment (March 2010)

…the major cause of the continued deterioration of the global environment is the unsustainable pattern of consumption and production...

UN Agenda 21, Chapter 4 (1992)

1.1 Why do we need to address consumption?

Demand for natural resources worldwide has increased tremendously over recent decades. The main drivers have been growth in population, wealth and consumption, with high population growth mainly in developing countries and highest levels of wealth and consumption in developed countries.

This demand is causing major, irreversible impacts on global ecosystems and ecosystem services: 130 000 km^2 of tropical rainforest are being cleared each year. In addition, since 1960 a third of the world's farmland has been abandoned, exhausted as a result of overexploitation and soil degradation (EEA, 2010a).

Moreover, emissions and wastes emitted during the processing and conversion of resources into goods and services have caused further damage to the natural environment and human health. Nitrogen pollution, ground-level ozone and particulate pollution are on the increase, as is the prevalence of synthetic chemicals in the environment (EEA, 2010a), with negative impacts on the environment and health.

If one isolates different activities in the economy, it is production activities across sectors, such as mining, agriculture, and manufacturing, that are directly responsible for the majority of the environmental pressures caused by economic development. However, private and public consumption of goods and services is the fundamental causal factor and driver of change in production activities and the resulting flows of resources and wastes from and to the environment.

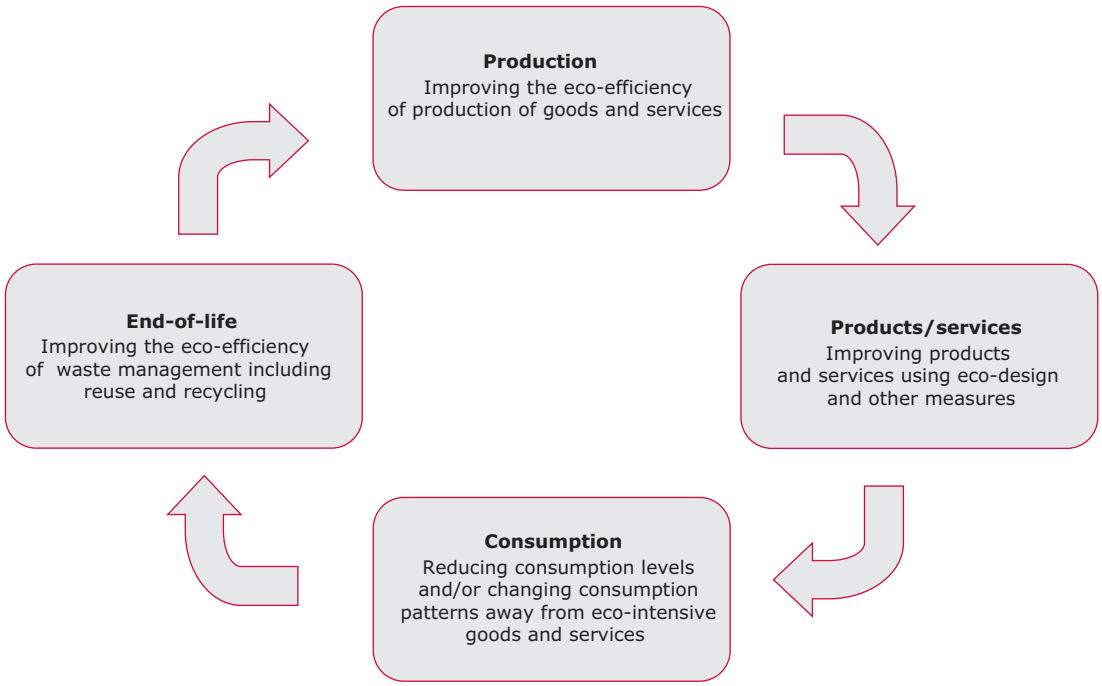
Although an increasing global population is a factor in rising pressures, it is consumption and production patterns in developed countries, with developing countries catching up rapidly, that are the key drivers of global environmental problems. This was recognised in Agenda 21 in 1992 and again at the Johannesburg World Summit on Sustainable Development in 2002, where governments agreed a Plan of Implementation strongly focused on sustainable consumption and production (SCP) and a commitment to develop a 10-year framework of programmes on SCP (UNCSD, 2002).

Consumption leads to direct environmental pressures from the use of products and services, for example, through driving a car or heating a house with fossil fuels. Of greater interest and magnitude, however, are the indirect pressures created along the production chains of goods and services, including, for example, food and other consumer goods, but also energy services. Since an increasing share of the final and intermediate goods consumed in Europe is imported, a growing proportion of impacts caused by our consumption takes place in other parts of the world.

A consumption-based perspective for assessing and responding to environmental pressures highlights various leverage points for reducing them. Complementary actions to reduce environmental pressures throughout the life cycle from resource extraction and production through consumption to final use are shown in Figure 1.1.

The uppermost set of actions — responses aimed directly at improving production processes and technologies, and substituting environmentally-intensive material and energy inputs with greener alternatives — have

Figure 1.1 **Complementary actions to reduce the environmental pressures along the life cycle of products and services**



received most attention over recent decades. Such actions have resulted in clear reductions in the intensity of environmental pressures (emissions per unit of economic output) from European industry. Some progress has also been made in the end-of-life stage through improving waste management (see the SOER 2010 material resources and waste assessment (EEA, 2010b)).

This assessment focuses on the two other stages in the life cycle: products/services and consumption.

Improved design can provide products with lower impacts, including lower waste generation during their production, when they are in use and at the end of their useful lives. However, it is increasingly recognised that environmental problems such as climate change cannot be solved through technological improvements alone (see, *inter alia*, Swedish EPA, 2010).

Actions influencing private and public consumption are also necessary as these can have knock-on effects upstream, potentially reducing pressures created during production. Such actions include those aimed specifically at encouraging demand for less pressure-intensive products but also actions aimed at encouraging broader lifestyle changes.

The term consumption as used in this assessment covers private (household) and public (government) final consumption of goods and services and investments in infrastructure ([1]), whether domestically produced or wholly or partially supplied through imports. In terms of value, private consumption was 2.6 times greater than public consumption across the EU-27 at the beginning of 2010 (Eurostat, 2010a, 2010b). The main focus in this assessment is accordingly on private consumption, with public consumption addressed to a lesser extent.

1.2 The policy challenge: some first reflections

There is a huge, largely unused potential for encouraging environmentally less intensive consumption patterns by households. This is illustrated by a recent report that found that the annual greenhouse gas (GHG) emissions caused directly and indirectly by equal-income Swiss households range from 5 to 17 tonnes of carbon dioxide (CO_2) per person, purely as a result of differing patterns of consumption (Girod and de Haan, 2009). Encouraging greener procurement by government and business can also pay significant environmental dividends and may be more easily achievable than shifting private consumption

([1]) More formally called 'fixed capital formation' and including investments in machinery, transport systems, sewage and water services etc.

patterns as it does not involve millions of citizens. Green procurement by government and business can also play an exemplary role and encourage more widespread adoption of sustainable purchasing amongst citizens.

The broad private consumption areas of housing, food and drink, and mobility are given special attention as they have been identified by a number of studies as being responsible for a large part of the pressures caused by consumption in the EU (JRC/IPTS, 2006; ETC/SCP, 2009). Although it overlaps with the other consumption areas, tourism has also been identified as an important contributor to environmental pressures, especially water shortages, land-use changes in vulnerable areas and consequently considerable impacts on biodiversity (Nijdam and Wilting, 2003; EEA, 2009a,b; EEA, 2006), and GHG emissions from air travel.

Changes in consumption behaviour are needed to complement technological improvements as targeting consumption can tackle issues that production- and technology-focussed policies cannot. Firstly, environmental gains made through technical efficiency are often partially or wholly offset by resulting increases in consumption due to lower costs of production and/or use and more money thereby becoming available for spending on other/more goods and services — the so-called rebound effect (Box 3.1; Hertwich, 2008). Secondly, global environmental pressures that take place overseas but are caused by European consumption are beyond the reach of current European production-related policies. The most direct way to reduce these pressures may therefore be to influence which types of imported goods are being purchased.

The potential for reducing global environmental impacts through influencing consumption is yet to be exploited. The EU Sustainable Development Strategy (European Council, 2006) has identified the promotion of sustainable consumption and production as one of seven key challenges and stipulated respective objectives and targets. More specifically, the EU Action Plan on Sustainable Consumption and Production and Sustainable Industrial Policies (EC, 2008) includes elements that aim directly at influencing consumer behaviour and promoting greener public procurement, but its main focus lies in cleaner and leaner production and better products. The planned review of the Action Plan in 2012 may provide an opportunity to expand and strengthen the consumption elements.

The Europe 2020 Strategy for Smart, Sustainable and Inclusive Growth includes a flagship initiative on Resource-efficient Europe which aims to support the shift towards a resource-efficient and low-carbon economy (EC, 2010). Achieving this will require major technological improvements, but also changes in consumption — moving towards goods and services that are more resource-efficient.

This will not be easy. Environmentally harmful consumption patterns are institutionalised, economically, politically, technically and socially, and consequently seem normal and inevitable to most Europeans. They also help define the aspirations for public spending and consumption by the growing consumer class in developing countries, that could amount to 1.2 billion people in 2030 (see EEA, 2010c).

The promotion of more sustainable consumption patterns in the future may be achieved most effectively through the development of sophisticated tailored policy packages that provide a framework that enables consumers, retailers and producers to act more sustainably. Such packages would include well-chosen mixtures of economic incentives, provision of information to consumers through awareness-raising, labelling and other means, investments in improved infrastructure, technology support, voluntary agreements and where necessary regulation to achieve objectives as effectively as possible.

In the following sections, the global environmental pressures resulting from European consumption and key individual consumption areas are assessed on the macro scale. The differing environmental profiles of households and their underlying behavioural causes are then reviewed to assess the potential for reducing consumption-related environmental pressures.

The complex nature of consumption and the underlying factors that shape it now and in the future are briefly investigated. The environmental pressures related to four areas of consumption with high environmental pressures — food, housing, mobility and tourism — and the responses used to tackle them are examined. The final section provides concluding reflections on consumption, environmental priorities and the role various actors — public authorities, business, and citizens — can play to achieve desired change.

2 Consumption patterns in Europe and their worldwide environmental pressures and impacts

2.1 Trends in consumption expenditure

Consumption, as used in this report, covers both private and public consumption of goods and services produced domestically and imported, and investments in infrastructure. Private consumption in Europe is significantly higher than public consumption, ranging from 2–3 times higher in the EU-15 and EFTA ([2]) countries to 4–6 times in Turkey and the Western Balkans (World Bank, 2009). However, public consumption remains an important element of national consumption, and is also arguably more directly responsive to government policy.

Average private consumption expenditure per person ([3]) rose by 35 % in the EU-27 between 1990 and 2007, with the greatest growth, 75 %, in the 12 countries that have joined the EU since 2004 (EU-12). Growth has also been rapid in the West Balkans and Turkey, rising by 130 % and 54 % respectively in the same period (World Bank, 2009). Nonetheless, private consumption expenditure in the EU-15 and EFTA still exceeds expenditure in the other regions by a factor of 2–2.7.

Private consumption in EEA member countries is dominated by housing, transport and food and drink, with the share of food and drink reducing as incomes increase. The fastest growing private consumption categories in the EU are communication, recreation and culture (Eurostat, 2009). Health and social services, education services, and public administration and defence services together consume nearly 90 % of public expenditure.

2.2 Current European consumption patterns have high environmental impacts

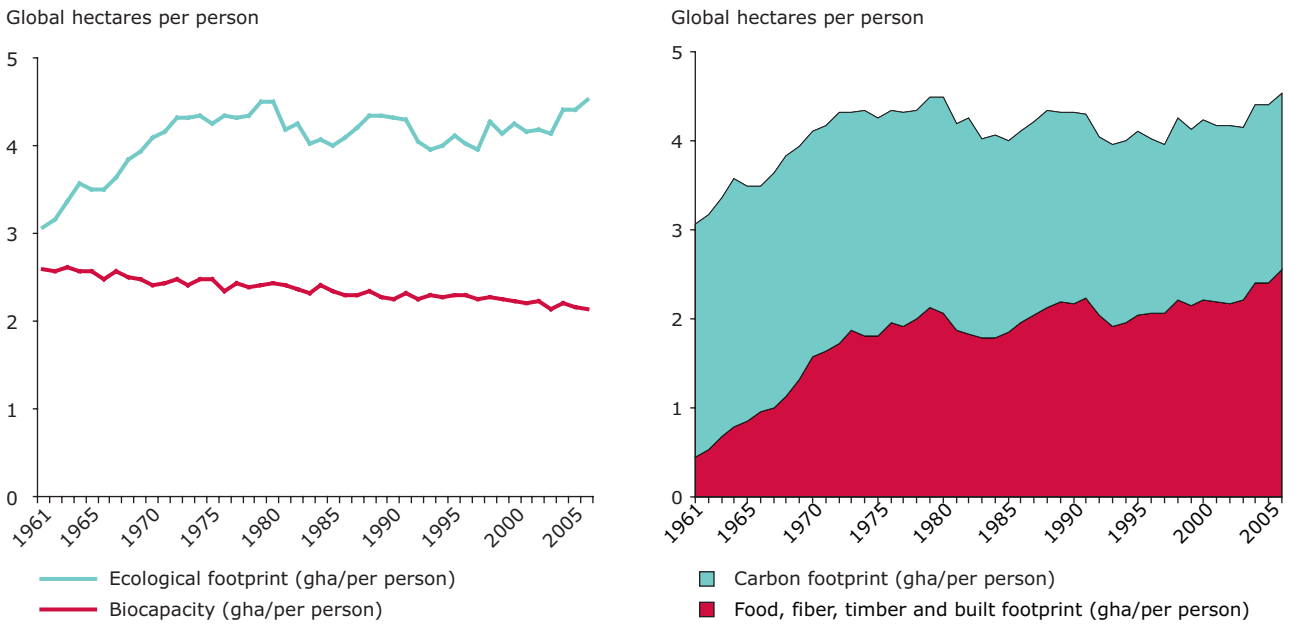
Many of the key environmental pressures created directly within Europe during the extraction of resources and the production and use of goods and services are closely monitored and well documented, for example through the collation of national emissions inventories. Methodologies for measuring the global pressures caused by European consumption are less mature and significantly more uncertain, due in part to data scarcity in many of Europe's trading partners.

Various methods for estimating global pressures caused by European consumption are under development. These include the input-output analyses of single regions or multiregional economic and environment accounts (for an overview, see Minx et al., 2009); methods using national inventory tables combined with life-cycle impact data for key imported and exported goods; hybrids of input-output methods and life-cycle-analysis (LCA) process data; and resource accounting methods developed to estimate national ecological, carbon, land and water footprints. A description and evaluation of methods can be found in Lutter et al. (2008). The EEA is currently implementing a simplified accounting method that addresses, inter alia, the relationship between production and consumption patterns and their impacts on ecosystems, both within and outside Europe (footprint). The Joint Research Centre (JRC) is also developing methods for estimating the impacts of European consumption using combinations of national inventory and trade flow data as well as life-cycle inventories of representative imported and exported goods.

The Ecological Footprint (EF) is currently one of the few consumption-based indicators that can be benchmarked against sustainability thresholds. It has been methodologically criticised (Best et al., 2008; Van den Bergh and Verbruggen, 1999; Fiala, 2008; Lenzen and Murray, 2001; Wiedmann and Lenzen, 2007) and is under a continuous process of improvement to strengthen some methodological weaknesses such as its limited scope, excluding key impacts such as toxicity, non-renewable resource use, eutrophication and ecosystem degradation, and its lack of ability to allow for improvements in land productivity (Kitzes et al., 2009a; Kitzes et al., 2009b). Nevertheless, the benchmarking option gives it a role in communicating over-consumption (Wiedmann and Barrett, 2010) and for measuring environmental sustainability if used in combination with other indicators (Best et al., 2008). The EEA's simplified accounting method, focused on ecosystems, seeks to

([2]) Iceland, Norway, Switzerland and Liechtenstein.
([3]) Standardised in terms of purchasing power parity.

Figure 2.1 **Development of ecological footprint and available biocapacity per capita in EEA member countries**



Source: Global Footprint Network, 2009a.

strengthen footprint calculations for Europe and make them more operational for EU environment and sectoral policies, currently a major weakness of the EF work.

The EF translates a few of the global pressures caused directly and indirectly by a country's consumption into direct and virtual land use worldwide ([4]). A nation or a region's footprint can be benchmarked against the area of land, or biocapacity available nationally and globally per person, giving a useful indication of the extent to which its consumption is environmentally sustainable (Wackernagel and Rees, 1996). The biocapacity of a given piece of land is a function of its physical area, a factor that takes account of the type of land cover, and a yield factor varying according to local conditions.

The global average EF was estimated at 2.6 global ha per person in 2006 compared to an average available global biocapacity of 1.8 global ha/person (Global Footprint Network, 2009a). In other words we are already using more of the world's resources than can be renewed — termed global overshoot. Environmental degradation due to over-use of natural resources is likely to lead to serious consequences for human well-being and health (Millenium Ecosystem Assessment, 2005; EEA, 2010).

By 2006, the EF of the average resident of EEA member countries — 4.5 global ha/person — was already more than double both the average global biocapacity of 1.8 global ha/person and the available biocapacity within the territory of the EEA member countries of 2.1 global ha/person.

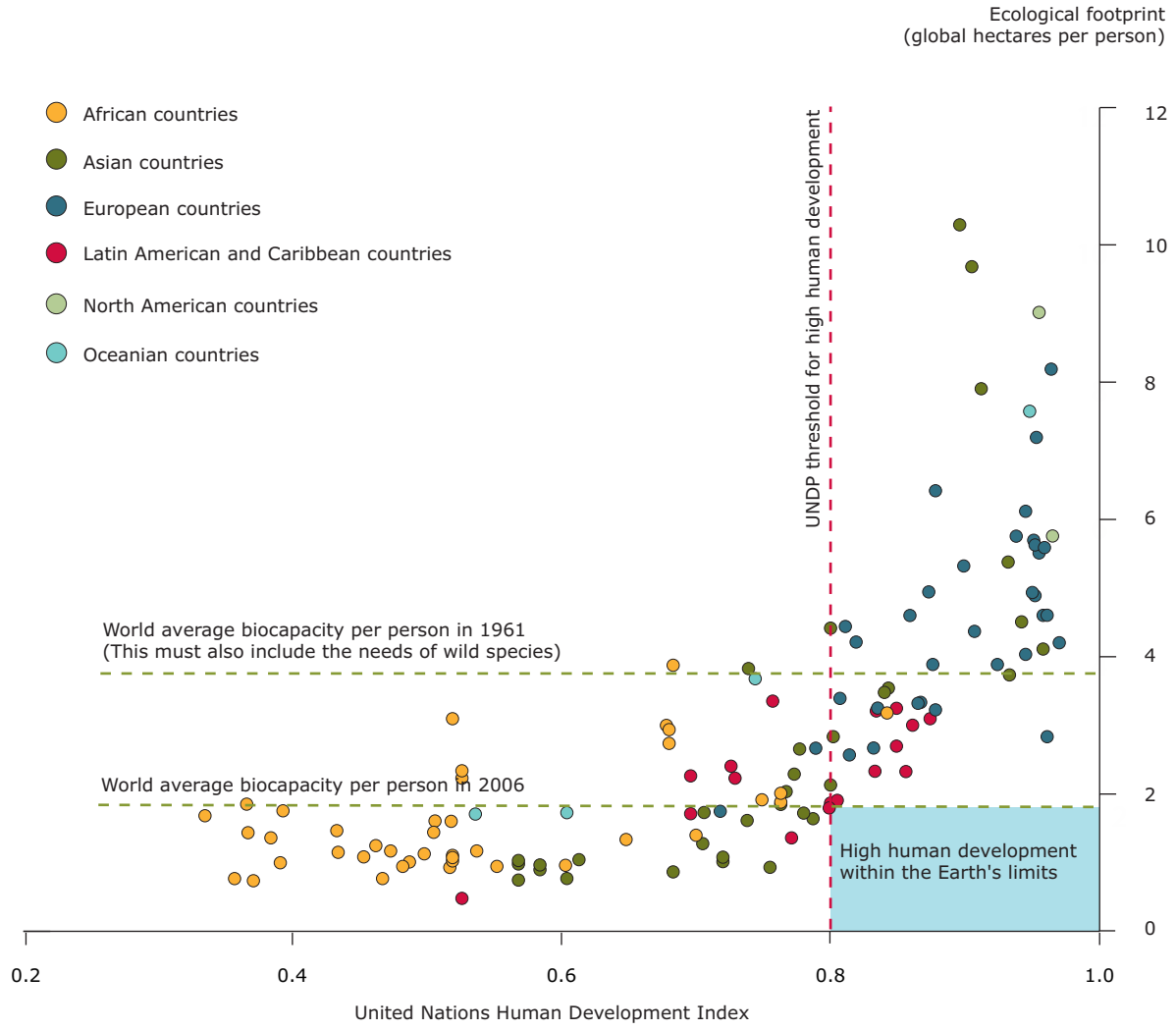
This suggests that current European consumption and production patterns could not be transferred to the rest of the world without overstretching global ecosystem services. Moreover, Europe's footprint continues to rise while the available biocapacity per person both in Europe and globally is shrinking due to population growth and the degradation of ecosystems.

Economic growth in Europe and other OECD countries has brought significant social gains. However, these have come hand in hand with a high demand for natural resources. Under current development pathways no country has so far managed to maintain sufficient levels of human development while keeping resource consumption within ecological limits (see Figure 2.2).

Achieving a high level of human development without exceeding ecological limits requires the development of alternative ways of providing for social, health and educational needs that are less resource-intensive and less environmentally damaging. It should be noted that well-being is not necessarily linked to material wealth once basic needs are covered. In recognition of

([4]) This includes direct land use in the country for urban areas and roads, land used indirectly globally for the production of food, fiber, timber, energy consumed in the country, and finally 'virtual' land in the form of average forest that would be required to absorb CO_2 emissions from the country's use of fossil fuels thus avoiding accumulation in the atmosphere.

Figure 2.2 Human Development Index and ecological footprint



Note: Both HDI and EF data refer to 2006.

Source: Global Footprint Network, 2009b.

this, the European Commission is committed to taking leadership in developing and making use of alternative and complementary indicators to gross domestic product (GDP) as a measure of social progress (EC, 2009).

2.3 The unseen trade in environmental pressures

Only a relative minor part of environmental pressures caused by a country's consumption are emitted directly by consumers. For example, only 10–30 % of CO_2-emissions caused by consumption in EU Member States are directly emitted by households for heating, cooking and the use of private cars. The majority are emitted during the production of consumed goods and services, including electricity.

Moreover, in the global economy, where goods are increasingly produced and traded worldwide, a significant share of the environmental pressures associated with a European country's consumption are felt outside national borders, not only in other EU Member States but also elsewhere in the world. Although indirectly caused by

([5]) 'Embodied' pressures refers to pressures which have taken place along the full production chain of a product from material extraction to sale to the consumer.

European consumption, these pressures are less visible to European policy makers.

Multiregional input/output models can be used to estimate environmental pressures embodied in trade between global regions and individual countries. For EU Member States on average, 40 % of total CO_2 emissions caused by national consumption were found to be embodied in goods imported from both within the EU and from the rest of the world (Figure 2.3). The figure rises to over 50 % for some smaller countries including Austria, Belgium, the Netherlands, Denmark and Sweden. Peters and Hertwich (2008) estimate that typically half of embedded CO_2 in imports to EU Member States are associated with goods coming from outside Europe.

Due to increasing international trade the shares of non-domestic emissions in the carbon footprints of EU Member States are likely to be on the increase. In the cases where imports are sourced increasingly in countries with typically less eco-efficient industrial production processes and more impact-intensive energy mixes than EU Member States (Rørmose et al., 2009) increasing trade might push up carbon footprints of EU countries.

Helm et al. (2007), for example, estimated that the GHG emissions associated with consumption in the United Kingdom increased by 19 % between 1990 and 2003.

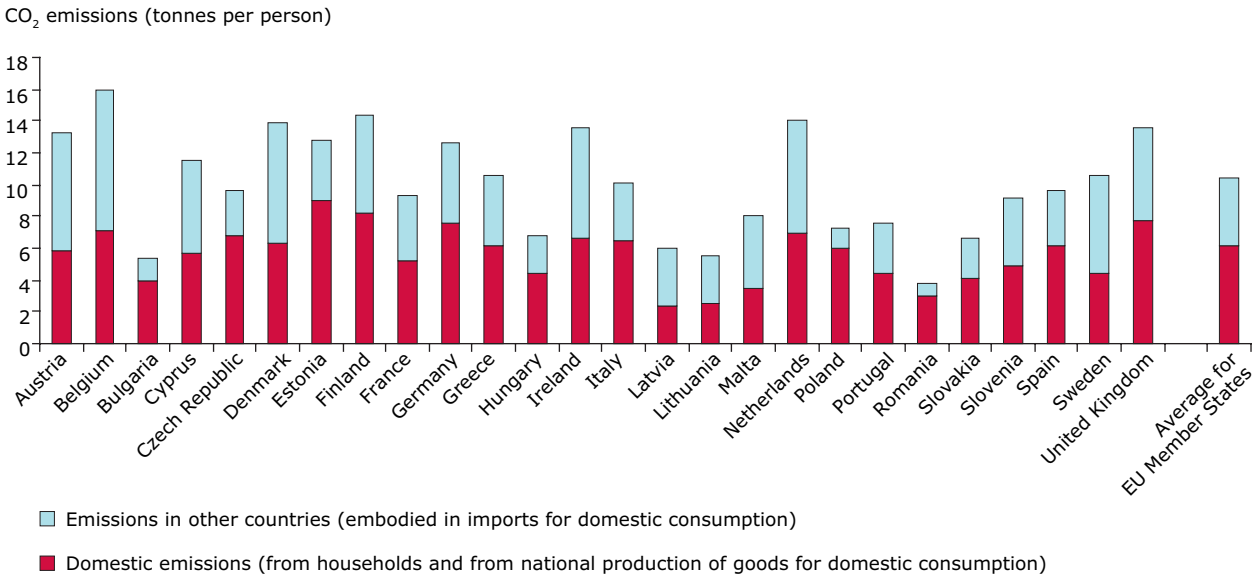
Similarly, while direct material resource use in Europe has stabilised, there are indications that indirect resource use and associated pressures caused by European consumption are on the increase (EEA, 2005). The total material consumption (TMC) for Germany, that includes direct and indirect material extraction caused by consumption, fell during the first half of the 1990s but has been rising since then, increasing from 69 to 74 tonnes per person between 1996 and 2004 (Schulz and Bringezu, 2008). Austria showed a 5 % increase in direct and indirect material use — measured as Raw Material Consumption (RMC), excluding unused extraction and waste — caused by consumption between 1995 and 2005 (Schaffartzik et al., 2008).

This 'virtual' trade of environmental pressures is not necessarily a problem. It merely demonstrates that a different set of measures can be used to reduce consumption-caused emissions than may have been adopted to tackle emissions from domestic industry.

2.4 Environmental pressures caused by different consumption categories

The EEA has estimated the environmental pressures caused by consumption in nine EU Member States ([6])

Figure 2.3 CO_2 emissions caused by consumption in 26 EU Member States, 2004



Note: CO_2 emissions in other countries include emissions in other EU Member States resulting from internal EU trade.

Source: Davis and Cadeira, 2010.

([6]) Austria, Czech Republic, Denmark, Germany, France, Italy, the Netherlands, Portugal and Sweden.

Box 2.1 Consumption and chemicals

There is growing concern about the potential human health and environmental impacts of chemicals in consumer products, in particular persistent and bio-accumulative organic compounds, endocrine-disrupting chemicals and heavy metals used in plastics, lubricants, textiles, cosmetics, dyestuffs, flame retardants, wood preservatives, electronic goods, and food packaging. Exposure to these chemicals is thought to be linked with declining sperm counts, genital malformations, impaired neural development and sexual behaviour, obesity, and cancer. Many of these chemicals leach easily from the products and can be found in the environment — in ambient (urban) air, indoor dust, wastewater, sludge — in some cases at levels high enough to be of health concern (Fisher et al., 2006). Some are highly persistent in the environment where they may undergo further transformation. For example, it has recently been shown that the flame retardant polybrominated diphenyl ethers (PBDE) exposed to wastewater treatment can generate dioxins (Betts, 2009 — orig. Steen et al., 2009). Widely-used plasticisers such as phthalates and bisphenol A; perfluorinated chemicals used in a variety of commercial applications as water, oil, soil and grease repellents; and brominated flame retardants are most often discussed in this context due to their suspected health effects and ubiquitous presence in the environment. A matter of particular concern is exposure to a mixture of low levels of chemical compounds that may exert synergistic effects, especially in unborn and very young, vulnerable children (ULSOP, 2009).

representing 268 out of Europe's 501 million people (Eurostat, 2010) and allocated them to final consumption categories. The estimates were made using a single region input-output model.

The majority of four key environmental pressures caused by private and public consumption ([7]) can be allocated to the consumption of food and drink, housing and infrastructure, and mobility. These three broad consumption areas are estimated to have contributed 68 % of GHG emissions, 73 % of acidifying emissions, 69 % of tropospheric ozone precursor emissions and 64 % of the direct and indirect material input caused globally by consumption in 2005 in the nine countries (EEA and ETC/SCP, 2010; ETC/SCP, 2009). The same critical consumption areas have been identified in other key studies (for example, JRC/IPTS, 2006).

It should be noted that the single region methodology used for these calculations assumes that imported goods are produced with the same resource inputs and emissions per unit output as those produced domestically. For example, agricultural products imported to Sweden are assumed to have emitted the same volume of GHGs as if they had been produced in Sweden. This assumption will considerably underestimate GHGs embedded in imports from countries with less efficient production processes (see Rørmose et al., 2009, for Denmark) and thus affect estimates for consumption-based footprints of countries. However, the share of pressures allocated to different consumption categories is expected to be much less affected.

For other environmental pressure categories not covered by these analyses, for example, land degradation, other consumption areas might also be as relevant or even more important, for example tourism for degradation of coastal habitats, chemicals in consumer products for health impacts and eco-toxicological impacts (see Box 2.1).

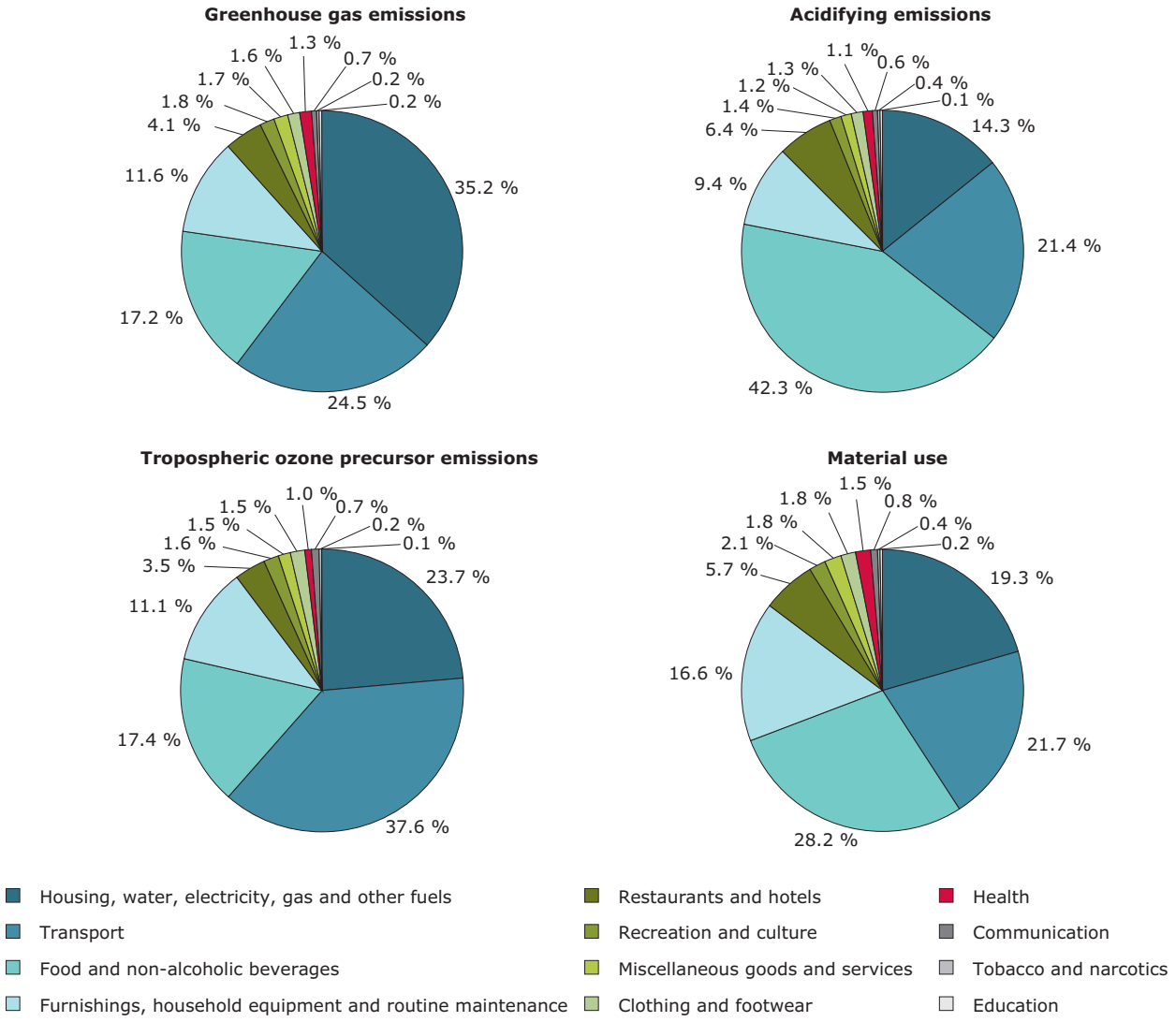
Pressures caused directly and indirectly along the production chain of consumed goods and services plus direct pressures created during private consumption can be allocated to 12 broad categories of private household consumption as defined under the Classification of Individual Consumption according to Purpose (COICOP) nomenclature used by Eurostat. When pressures caused by private consumption are allocated to these 12 main areas, food, housing and mobility dominate, followed by furnishings and household equipment (Figure 2.4).

The dominance of the first three is partly due to their also being the three private consumption categories in the EU-27 with highest expenditure (Eurostat, 2009a). However, food and mobility, and to a lesser extent housing, are also the areas of private expenditure with the greatest pressures for each euro spent (Figure 2.5). These three areas are addressed in more detail in Chapters 4–6 of this assessment. Chapter 5 on housing also covers furnishings and household equipment. A fourth area, tourism is considered in Chapter 7 because of its fast growing contribution to environmental pressures from consumption. The pressures caused by public consumption, meanwhile, can be partially tackled through green public procurement. This is looked at in more detail in Chapter 8.

Decoupling environmental pressures from growth in private consumption can be achieved by reducing the pressure intensities within individual consumption categories — through improvements in housing energy efficiency, switching transport expenditure from private

([7]) Including fixed capital formation — investments in machinery, roads, water and sewage networks and other infrastructure.

Figure 2.4 **Direct and indirect global pressures caused by private (household) consumption distributed by consumption (COICOP) category, in selected EU Member States, 2005**



Notes: The input/output analysis of NAMEA tables gave estimates of pressures created along the production chains of finally consumed products from 36 individual economic sectors. These were then allocated to the 12 COICOP household consumption areas using a simplified transformation matrix developed by the EEA- ETC/SCP. The pressures allocated to these categories do not include pressures created by public (government) consumption or caused by gross capital formation — the building of roads, water and sewage networks serving households.

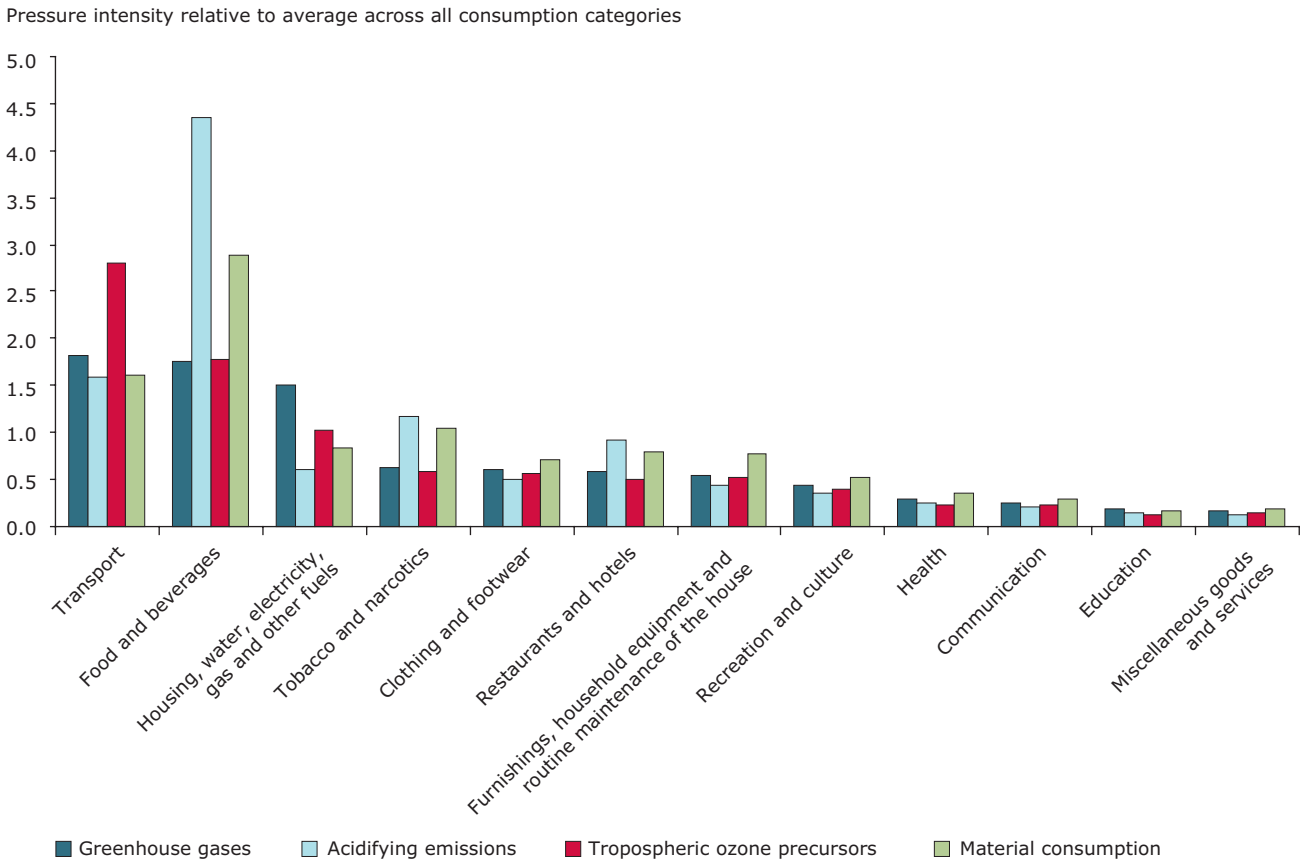
Source: EEA and ETC/SCP, 2010.

cars to public transport, or a shift from spending on quantity to quality in food, furniture, clothing, etc.

However, the large differences in environmental pressure intensities found between private expenditure categories (Figure 2.5) highlights a second potential for reducing or decoupling environmental pressures from growth in consumption: that of channelling additional expenditure of growing incomes towards low pressure consumption categories such as education, communication, or recreation and culture — except recreation activities involving intensive use of transport.

Consumption trends appear to have moved modestly in the right direction over recent years. Two of the less pressure-intensive categories, communication, and recreation and culture, were the two fastest-growing private expenditure categories in the EU-27 Member States

Figure 2.5 **Relative environmental pressure intensities — indexed pressure caused per euro of spending — of private consumption categories in nine EU Member States *, 2005**



Note: * Austria, Czech Republic, Denmark, Germany, France, Italy, the Netherlands, Portugal and Sweden.

Source: EEA and ETC/SCP, 2010.

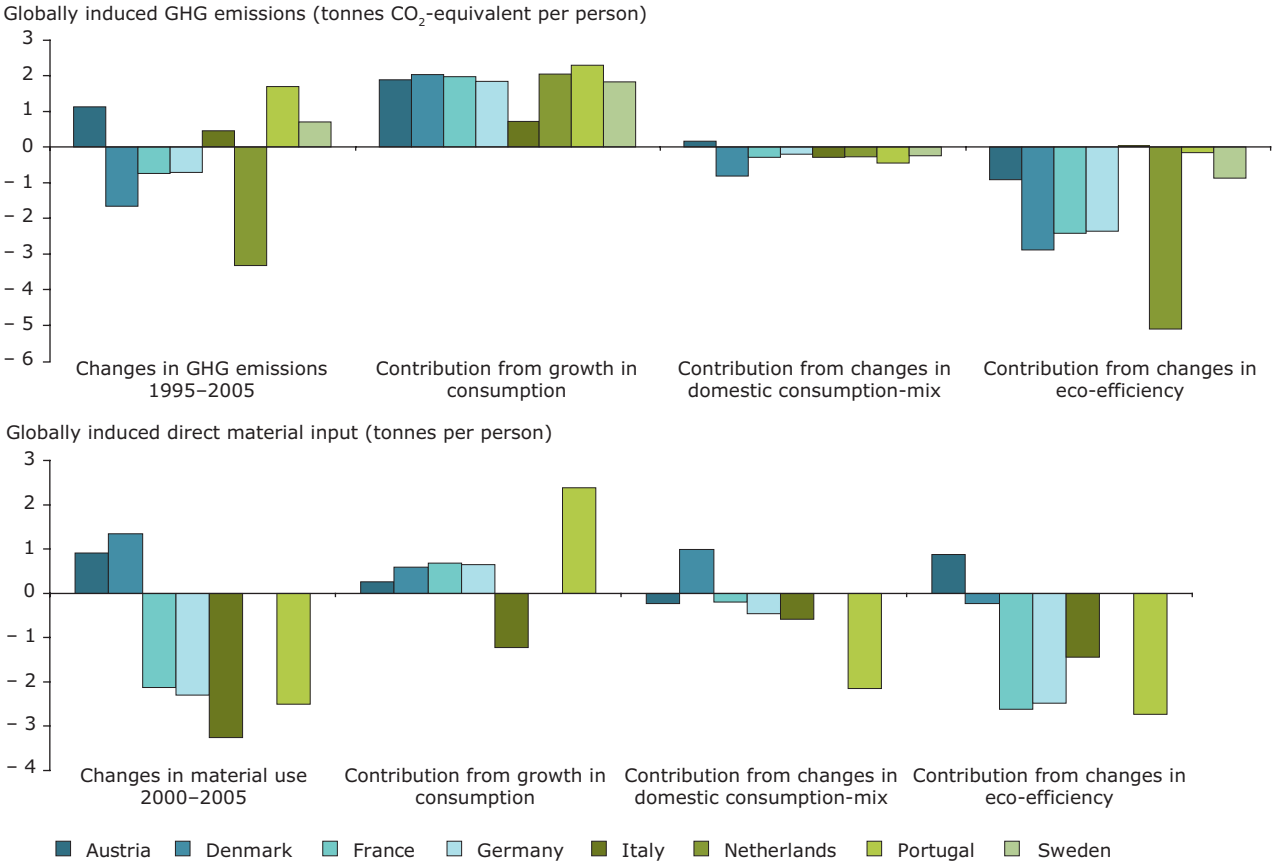
between 1995 and 2006, increasing by 10.2 % and 4.4 % respectively per year (Eurostat, 2009). However, evidence from the EEA's NAMEA-based analysis suggests that gains made through such shifts in consumption spending are relatively modest compared to gains made from improving eco-efficiencies within individual consumption categories (Figure 2.6). Similar results were found by Baicocchi and Minx (2010) for the United Kingdom between 1992 and 2004.

Where decoupling of global GHG emissions and material use from growth in consumption was achieved, it resulted, in most cases, primarily from eco-efficiency improvements in production chains, energy efficiency improvements, or shifts in fuel use. Shifts in spending from more intensive to less intensive consumption categories, for example, from mobility to communication, have contributed to decoupling to a limited extent. As noted earlier, assumptions concerning pressures embodied in imports can lead to overestimates of the levels of decoupling of pressures from growth in consumption, and results may therefore differ from findings in other studies (for example, Netherlands Environmental Assessment Agency, 2007).

More rapid decoupling of GHG emissions and material consumption from consumption expenditure is required if absolute pressures are to be reduced significantly in the foreseeable future. This will require more eco-efficient production of goods, fewer toxic products, more resource-efficient appliances, buildings and transport systems, but also widespread fundamental changes in the type of goods and services we buy.

Last but not least, current consumption patterns do not only impact the environment, they can also have negative impacts on health, as concerns about obesity illustrates (Box 2.2).

Figure 2.6 **Changes in GHG emissions (1995–2005) and material use (2000–2005) caused by national consumption and contributing factors in selected EU Member States**



Note: The left-hand set of bars in each graph show how per-person pressures have developed over the given time interval. The next set of bars indicate how the pressures would have developed over the same period if they were linked to economic growth only. The two sets of bars can be compared to see if decoupling has occurred. For example, the Netherlands showed strongest decoupling in GHG emissions 1995–2005, while Italy showed very little decoupling.
The right-hand two pairs of bars demonstrate the extent to which shifts in consumption patterns and improvements in eco-efficiency in the provision of goods and services have contributed to the observed decoupling.

Source: EEA and ETC/SCP, 2010.

Box 2.2 Health impacts of unsustainable consumption patterns: obesity

Current consumption patterns of a large part of the European population, especially in terms of food and mobility, are linked to several health risks, with overweight and obesity issues being of greatest concern because they are linked to serious health problems including cardiovascular disease, diabetes, some types of cancer and reduced life expectancy. Although overweight has many and complex determinants, increasing calorie intake, coupled with a more sedentary lifestyle, is the root of the problem. More than 53 % of the EU population are estimated to be overweight (IASO, 2008), and the numbers are increasing (WHO, 2008).

Excessive intake of high-energy food, often cheaper, heavily advertised and more easily available than more healthy food, plays an important role. Although not all healthy food has low environmental impacts and vice versa, several dietary recommendations, such as a higher proportion of cereals, potatoes, vegetables and fruit in diets, and less meat, are beneficial both to human health and to the environment (Figure 4.2). Higher calorie intakes combined with sedentary lifestyles do not only have adverse health effects but also mean that more food has to be produced, resulting in higher life-cycle environmental impacts than diets based on recommended healthy calorie intakes.

Insufficient physical activity is another very relevant factor for overweight, obesity, and their related health problems. In addition to individual behaviour/life style-related choices, physical activity depends on many conditions, including mobility patterns, access to walkable neighbourhoods, safe green areas, as well as infrastructure, promoting physical activity. Overweight people report that they walk less (Eurostat, 2006) and tend to live in low-density areas and with a higher dependency on car-based transport, although the nature of this association is highly complex (Scottish Government, 2008; Eid et al., 2007).

2.5 Low-pressure households — a good example of more environmentally sustainable consumption?

The potential for reducing environmental pressures through behavioural change can to a certain extent be identified by analysing differences in the behaviour of households within a single community or country. A number of such studies have been carried out in Europe, for example, Girod and de Haan (2009); Lähteenoja et al. (2008); Brand and Boardman (2008); Vringer and Blok (1995) and OFEV (2006). All these studies found large differences between the environmental pressures caused by households.

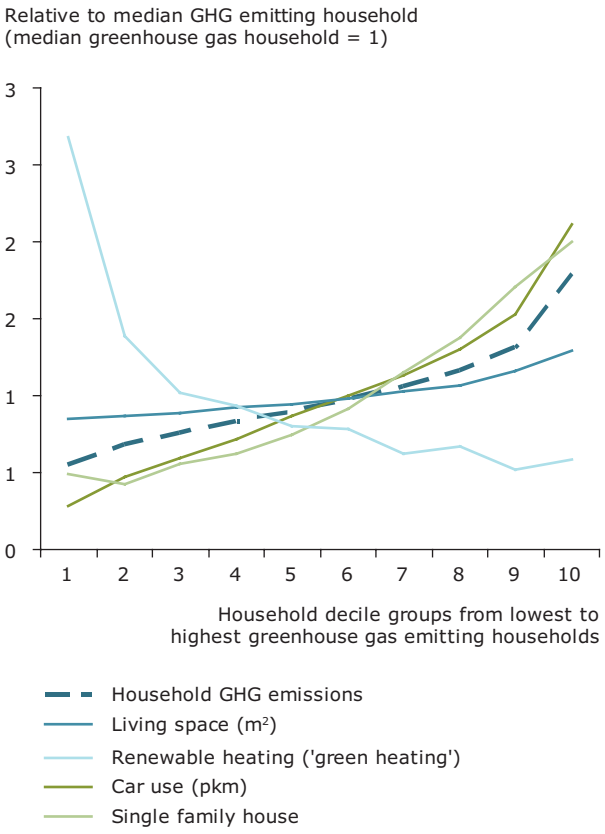
For example, Brand and Boardman (2008) found that 10 % of United Kingdom households were responsible for 43 % of total GHG emissions from mobility. Kotakorpi et al. (2008) found nearly a factor 10 difference in direct and indirect material use caused by the most and least impactful of 26 households studied in Finland.

A larger-scale Swiss study of 14 000 households found that even after adjusting for income differences, GHG emissions per person varied by a factor of 4, ranging between 60 % and 170 % of the value for the mean household (Figure 2.7). Vringer and Blok (1995) also found large differences in energy use between Dutch households of the same income level.

The Finnish and the Swiss studies show that households that cause low environmental pressures tend to live in urban areas, use public transport rather than private cars, use renewable energy for heating, have smaller living space per person, live in apartments rather than single family houses, and eat less meat and more organic food. Importantly, low-emitting households spend more on leisure activities and are willing to pay more for quality rather than quantity in the goods they buy. The fact that the low-emitting households tend to lie in urban areas does not mean that urban households on average are lower emitters than rural ones. Rather the infrastructure in urban areas more readily allows for reduced carbon lifestyles by engaged citizens.

Some of the characteristics of low-emitting households in the studies — use of public transport, living in apartments, green heating, etc. — are only available in dense urban areas where this kind of infrastructure is economically viable. However, a study of the behaviour and GHG emissions of urban households in the city of York, United Kingdom, showed that while those living in city centres made least use of cars, they were also the households with the highest emissions related to air travel (Haq and Owen, 2009).

Figure 2.7 Key differences between equal income low and high GHG emitting households in Switzerland



Note: The households are grouped according to their emission of greenhouse gases. The 10 % of households with highest GHG emissions (group 10) also had the highest car use, the highest share of single family houses, the largest living space per person and the lowest use of green heating (district heating or renewables).

Source: Girod and de Haan, 2009.

The types of consumption behaviour shown by low-pressure households in these studies could provide a good example for helping shape future consumption patterns. The potential for reductions in pressures caused by consumption would be even higher than indicated by the variations between current households when combined with technological advances such as improved efficiency of the housing stock, increasing share of renewable electricity and improved fuel efficiency of vehicles.

Such findings showing large variations in behaviour across society demonstrate the need for focussed policies tailor-made for different social groups. A first stage in tailoring responses to enable greener consumption will be to gain an understanding of the key factors shaping consumption behaviour. These are examined in Chapter 3.

3 Understanding what shapes current and potential future consumption

Private consumption is shaped by an array of complex and interrelated factors, including demographics; income and prices; trade, globalisation and technologies; supply of goods and services and how they are marketed; information and transparency on products and services; policies; housing and infrastructure, as well as social and psychological factors such as habits, culture and taste (Mont and Power, 2010; Power and Mont, 2010).

Some of those factors are very well understood by policy makers — in particular income and prices, while others, such as habits and culture, are typically less understood. Future trends in European consumption, and the resulting environmental impacts, will depend on how these many factors develop. Policies at all levels, not only those directed at consumption, also influence consumption behaviour. These are dealt with in Chapter 8.

To develop effective policy responses to limit negative environmental pressures and impacts from private consumption, there is a need for a better understanding of the many complex factors that shape people's consumption behaviour (PSI, 2006). This chapter provides an overview of the main factors, including how they relate to one another, as well as some possible future developments.

3.1 Economic influences on consumption

The most important factor influencing consumption patterns is the level of disposable income at the individual household level (OECD, 2008a). The growth path hypothesis, implying an ever-growing GDP, can be identified as one of the driving forces behind consumption dynamics. Recent baseline projections published by the EC — which take into account the current economic downturn — assume that GDP in the EU-27 will grow again between 2010 and 2020 but that this would not compensate GDP losses from the downturn compared to earlier projections (EC, 2010a). However, economic forecasts are very uncertain (see also EEA, 2010b) and recent developments show that steady growth cannot be taken for granted.

Immediately before the financial and fiscal crises began in 2008, other major global economic trends had been making their mark on European consumption patterns. These included steeply rising prices of oil, steel and other non-renewable resources in response to global increases in demand, and rising food prices (see Chapter 4). These resource price increases were alleviated by the economic downturn but could well reappear when a period of stable economic growth returns.

Rather than growth being a driver of future consumption patterns, the potential for growth may in future depend to an increasing extent on how we consume. The economic system is increasingly being recognised as being bounded by the limits of the ecological system and is heavily dependent on the services that ecosystems deliver to the economy (TEEB, 2008).

The household savings rate is a key influence on the extent to which income is translated into material consumption; the savings rate in the EU rose by nearly 3 percentage-points during late 2008 and 2009, and started to fall again as consumer confidence increased in the last quarter of 2009 (EC, 2010b). In the longer term, the ageing population could lead to a fall in the household savings rate, as older people tend to save less than people of working age.

The relevance of prices for consumer decisions means that, generally, consumers demand more of any product if the price goes down and less if the price increases. The degree of change in demand resulting from a variation in price depends on the price elasticity of that particular product or service. For example, price elasticities for basic food items such as bread, milk and eggs are lower than for restaurant meals, as going to a restaurant is much easier to avoid than purchasing basic food.

However, the effects of resource use on the environment and society, such as costs of cleaning up pollution or climate change mitigation, are in many cases not included in the prices of goods and services. Instead the costs associated with negative effects are paid for by the wider society. This lack of internalisation of external effects — the costs to society of environmental degradation — in the prices of products and services is a market failure driving consumption patterns based on high resource use.

Economic instruments, such as taxes, can be applied to overcome such market failures to ensure that prices include economic, social and environmental costs (see also Chapter 8). Carrying out such adjustments is one of the

principles of the EU Sustainable Development Strategy (European Council, 2006). Setting of high environmental and social standards for resource extraction, production and products is another option to internalise social and environmental costs. Increases in product prices caused by implementation of this internalisation principle can lead to a reduction in the consumption of products and services with higher environmental impacts.

The granting of subsidies also influences consumption and its environmental impacts. Subsidies are implemented for economic, environmental and/or social policy reasons and are often seen as a policy failure. They can be counterproductive in the sense that they can encourage higher levels of consumption with negative environmental consequences. But at the same time they can also be justified because of their economic motives and for promoting jobs. They can also be used to make consumption patterns more sustainable, for example loan programmes for energy efficiency measures or renewable energy installations, fostering the implementation of eco-innovative technologies and thereby helping to achieve environmental and economic benefits.

Policies driving economic development towards a green economy, including taxes and charges, removing environmentally-harmful subsidies, and economic incentives at the point of sale such as tax rebates for less pressure-intensive products or services might also influence future consumption patterns, especially if they successfully address the market failures. Such policies have the potential to make products and services with lower resource use and lower environmental impacts more competitive and thus change their availability and attractiveness to the market.

However, there is a risk that environmental benefits resulting from changes to more sustainable consumption patterns cannot be fully effective if they are not accompanied by adjustments in the production structure of economies, thereby reducing environmental impacts. Otherwise, the existence of production over-capacity for products with high environmental pressures generally creates incentives to enhance consumption of these products, thereby using sophisticated marketing strategies. To maximise their environmental benefits, policies promoting sustainable consumption and production need to be well coordinated.

3.2 Demographic influences on consumption

Consumption in Europe is by nature also shaped by the size of its population, the share of the population in various age groups, location, the number of people per household and living space available per person.

The total population of Europe has been increasing albeit slowly, acting as a driving force of total household consumption expenditure — the EU-27 population reached 501 million in January 2010 (Eurostat, 2010). In a scenario developed by Eurostat, assuming that fertility, mortality and net migration will progressively converge between Member States, population is expected to reach 514 million in 2020, largely driven by immigration, but to decline after peaking at around 520 million in 2035 (EUROPOP, 2008). The United Nations projects an even sharper decline of population in the EU-27 plus Iceland, Norway, and Switzerland (Hoßmann et al., 2008). There are significant differences between countries, and several already have declining populations, mainly the EU-12 Member States (CSIS, 2008). The expected slow-down of population growth and the later shrinking of population in Europe may help curtail increases in energy consumption (York, 2007).

The effect of immigration from non-European countries is likely to influence consumption patterns, but little is known about the direction of that influence. For example, the impact of immigration on food consumption is obvious when one looks at the wide range of foreign foods, and the increase in the number of ethnic restaurants in Europe (European Migration Network, 2006) but the resulting impacts on the environment are uncertain.

A second demographic trend, the ageing of the European population, influences the patterns of consumption, however the exact influence is uncertain. The share of the EU-27 population aged 65 years and over is likely to rise from 17.1 % in 2008 to 30 % in 2060 (Eurostat, 2008a). The share of household expenditure on food generally increases with age, as retired people tend to have lower relative incomes and thus spend more on basic goods such as food (UK Office for National Statistics, 2007). Ageing societies may result in reduced disposable incomes and slower economic growth (EC, 2006; OECD, 2005). On the other hand, an increase in the number of pensioners who have disposable income for leisure and travel is projected to have negative environmental impacts (EC, 2006; OECD, 2008a); currently, older people typically take longer and more frequent leisure trips abroad than the average person (Eurostat, 2008b), but this may change as pensions provision comes under pressure in ageing societies.

The third demographic trend is towards smaller and therefore more households, which is expected to result in higher demand for space and increases in consumption of household goods. This phenomenon is observed in almost all industrialised and European countries (Liu et al., 2003). One-person households consume on average 38 % more products, 42 % more packaging and 55 % more electricity per person than four-person households, as well as producing significantly more waste (Williams,

2007). The Second European Quality of Life Survey (Anderson et al., 2007) indicates that the people of the Baltic States, Bulgaria, the former Yugoslav Republic of Macedonia, Hungary, Poland, and Turkey are the least satisfied with the size of their living space and thus, depending on socioeconomic conditions, increases over the next years can be expected.

3.3 Technology and innovation as drivers of consumption

Technology and innovation have changed our lifestyles significantly: the emergence of convenience foods, manifold household appliances and modern information and communication technologies have changed our patterns of mobility, recreation and leisure time activities, and food consumption beyond recognition compared to those of only one or two generations ago (Mont and Power, 2010).

Markets play an important role in deploying technological changes. Competition encourages innovative and improved products, and variety and novelty are cornerstones of modern life; European consumers generally respond favourably, with a few exceptions such as food based on genetically modified organisms.

When new goods first enter the market they are often considered luxuries and are typically expensive. As the market for early adopters saturates, the companies may lower their profit margins or produce cheaper versions in order to maintain or increase sales (Mont, 2007). This process means that once-luxury goods become part of normal consumption patterns, as has happened with cars, personal computers, and mobile phones.

Technological developments and breakthroughs often lead to improvements in eco-efficiency, though these gains are often outweighed by consumption growth, including from so-called rebound effects where technology and efficiency gains often lead to the increased consumption of other goods and services (Box 3.1).

Future technological innovations, for example, in the areas of nanotechnology, biotechnology and the further development of information and communication technologies, have a high potential to change our daily life. Smart devices, such as intelligent appliances, floor tiles with embedded sensors, and biosensors could change the way we use appliances and heat and cool our homes (Biointelligence Service, 2010). Full wireless broadband access for all households and rolling out of radio frequency identification (RFID) technology, which are expected to enable people to instantly connect to each other using tiny screens, digicams, video graphic messages, are just some examples. Mobile phones are increasingly used as digital terminals for data, text and media at declining costs. These new options might further encourage more working from home (JRC/IPTS, 2008) that could have the positive environmental impact of reducing commuting, but the effect is not clear-cut because people might accept longer commuting distances if they do not have to commute every day.

New technologies aimed at higher energy efficiency for example in housing design including novel materials, decentralised renewable energy generation, and transport systems such as electric cars, can positively influence the environmental impacts of mobility and housing consumption patterns, but need strong European energy efficiency policies to speed up their uptake.

Box 3.1 The rebound effect

The rebound effect is usually examined in the context of the adoption of new energy-saving technologies — more fuel-efficient cars, energy-efficient household appliances, etc. It refers to behavioural changes or other systemic responses that can partly or fully offset the beneficial environmental effects of these new technologies.

The rebound effect can be explained by three different economic reactions:

- Direct rebound effect: an increase in efficiency lowers the cost of consumption which can then lead to a rise of the consumption of the product. For example, fuel efficient cars reduce the petrol cost per distance travelled, which can then lead to more kilometres travelled and more petrol used.
- Indirect rebound effect: reduction in the costs of consumption increases the real income of households which can trigger a rise in the consumption of other goods and services.
- Economy-wide or general equilibrium effect: this is more complex and refers to changes in aggregate consumption patterns which may lead to structural change, as well as to changes in relative prices (Brännlund et al., 2007). An example is time savings (Jalas, 2000) from efficiency improvements such as email or e-banking so that more time is available for other forms of consumption, for example, leisure driving.

There is a general agreement that the rebound effect exists and can be significant in many cases. However, the size of the rebound effect varies substantially from case to case (UKERC, 2007).

Future developments will depend on many factors, including the pace of technological change and public perception of the risks involved. The implications for the environment are often uncertain, as science struggles to keep pace with the speed of developments. For some technologies such as mobile technologies, nanotechnologies and genetically modified organisms, the application of the precautionary principle is increasingly discussed as a tool to help society strike a better balance between innovation and risk.

3.4 Urbanisation and the role of infrastructure

Most European consumption takes place in cities and towns, as 73 % of EU citizens live in urban areas, and this share is expected to grow to 80 % by 2030 (IEA, 2008). Urban density and the design of the built and natural environments of cities therefore play a crucial role in shaping consumption patterns. At the same time, urban areas and consumption patterns of urban dwellers depend heavily on ecosystem services provided by rural areas, such as clean water, food, and green areas for recreation, and urbanisation and urban sprawl contributes to biodiversity loss especially if not counterbalanced by good urban and landscape planning (see also the SOER 2010 urban environment assessment (EEA, 2010c) and land use assessment (EEA, 2010d)).

Rural residents in Europe have largely adopted urban lifestyles and luxuries, work in towns or cities and use other urban services — but often commute longer distances to achieve this and on average use more living space per person. Although urban living in developed countries is generally more efficient in terms of energy use for mobility and housing than in rural areas, energy consumption in urban areas accounts for 69 % of Europe's energy use (IEA, 2008), but the picture might change if all consumption-related pressures were included. In a study examining a number of Finnish households, urban dwellers also caused lower material resource use than rural dwellers (Kotakorpi et al., 2008).

Urban design is thus relevant particularly in two areas: urban transport, which accounts for 40 % of GHG emissions and 70 % of air pollutants from European road transport (EC, 2007), and housing. Although data for GHG emissions from housing in urban areas differ depending on the applied methodology, usually a share above 50 % is stated in literature (see the SOER 2010 urban environment assessment (EEA, 2010c)). Building design can therefore reduce energy consumption dramatically. Urban design and spatial planning also play an important role for quality of life, which in turn influences consumption patterns.

3.5 Social and cultural influences on consumption behaviour

Our behaviour is greatly influenced by the lifestyles of those around us: friends, family, colleagues, and increasingly by the lifestyles, both real and fictional, portrayed in the media: we want to belong to our social group, but at the same time we also want to establish our status within it. Consumer culture encourages many to establish a place in society or status through the purchase of material possessions and other lifestyle choices we make. In this way, we use consumption to help us construct our personal and collective identity (Power and Mont, 2010).

Fitting in with our social groups is a crucial driver of conspicuous consumption, as we use goods to signify and maintain both our membership of a group and our status within it (Power and Mont, 2010); however, as goods that were once seen as luxuries, such as cars or televisions, that signified status gradually enter the mainstream these products lose their positional status, and so people are drawn to ever-higher levels of luxury consumption (Veblen, 1902; Hirsch, 1977; for further explanation, see Mont and Power, 2010). Of course this is not inevitable: in some social groups status can be established through non-material means including charitable works or education and there are means of further promoting less-materially intensive values (Schor, 1999; Jackson, 2009).

In addition to group identity, our personal identity can also be a relevant psychological driver of consumption as we are not born with a fixed identity, and in the Western world our roles are no longer defined by traditional roles. We have a strong need to define our own identity and our material possessions may play an important part in this process (Halkier, 1998). A further psychological factor is the symbolic role goods play in our lives: our possessions are not only functional, they may also have meanings and signify information about us or our lives, both to ourselves and others — examples are wedding rings, family photos and religious artefacts (Power and Mont, 2010).

Research confirms the commonly-held belief that we are led more by our desires than by our actual needs; this is often used in marketing campaigns, based on the idea that we respond more strongly to desire than to rational ideas (Belk et al., 2003). Consumer choices are strongly influenced by media, marketing and popular culture (Henderson, 2005; Mont and Power, 2010). As the basic needs of most Europeans have been met, the advertising industry is increasingly creating new needs to ensure that we buy new products. This is known in marketing as problem recognition: the consumer recognises a need or want and is motivated to act upon it (Belch and Belch, 2007). This process starts early in life: the average kindergartner child

can identify 300 logos (McNeal, 1992; Schor, 2004; Fischer, 1991). Although European spending on advertising fell in 2009 during the financial crisis, it is expected to return to growth in 2010 and 2011 (Zenith, 2009).

It is also important to address concerns about 'green washing' — to ensure that market information for consumers is not misleading: one policy response to this concern is the EU Directive 2006/114/EC which deals with misleading and comparative advertising, and also covers environmental and ethical claims by companies (EC 2006b; Mont and Power, 2010). However, there are also positive examples of the power of advertising in promoting more sustainable consumption — see for example UNEP's Creative Gallery on Sustainable Communications, a database of mostly corporate advertisement which encourage the purchase of environmental or ethical products (OECD, 2008b, UNEP, 2010).

However, much of our consumption expenditure is inconspicuous, for example rent payments or utility bills, as well as mundane everyday purchases such as lunch or a newspaper. Many consumption decisions and behaviours are driven by habit and context (Gronow and Warde, 2001; Shove, 2003), rather than by rational and conscious decision-making processes, and they become stronger every time we repeat an action, which is one reason why they can be difficult to change. In addition, history and cultural norms can also play a role in shaping consumption choices.

The normal practices of everyday life have meanings and associated consumption norms. For example, being an accepted part of society requires us to take part in standard practices such as wearing suits to work, or buying material gifts for wedding presents (Randles and Warde, 2006). Inevitably people find it difficult to live sustainably when this is not the social norm (Jackson, 2009).

Social norms can, however, change over time. For example, a consumerist culture has evolved in Western European countries but also rapidly in the EU-12 Member States and Western Balkan countries (EEA, 2010a). Consumerism is where high consumption of material goods is seen as normal, seems necessary to be accepted in society and is generally associated with well-being and success. However, the Sustainability First scenario of UNEP's GEO-4 report shows that new values can emerge that respect sustainability objectives (Box 3.2).

3.6 Types of consumers

There are different types of consumers, and not all consumer types respond in the same way to policy instruments. People have different values and attitudes, different cultural backgrounds, different incomes, ages, genders, education, access to infrastructure and abilities. In marketing, the concept of consumer segmentation is widely used to sub-divide populations according to various attributes in order to be more effective in targeting

Box 3.2 But what if?

The emerging trends indicate that incomes and consumption levels in Europe will continue to grow, which is likely to result in higher pressures and impacts on the environment. But the uncertainties around the trends are high, as has recently been illustrated by the economic downturn that started in 2007. In order to explore possible future developments, scenarios are used to show what could happen if uncertain factors ('what ifs') develop in different directions (UNEP, 2007a).

What if ecosystems and the services they are able to provide continue to decline so that clean water, high-quality food, energy and materials as well as access to nature become more expensive relative to European citizens' incomes? Will Europeans still be able to buy resources from other parts of the world to satisfy their consumption?

What if the economy does not recover to previous growth paths, more people become unemployed and pension and social security systems come more and more under pressure? People might want to save more, some might stay away from green products if these are more expensive, and others might reduce spending on holidays or use public transport instead of the car. Perhaps people would become more interested in extending the lifetime of goods or buy second-hand, or would buy cheaper goods which might break more quickly.

What if the world becomes more dominated by business, with markets and free trade being seen as the best path for rapid economic growth and markets also playing the main role in regulating future development? This 'Market first' scenario is one of four scenarios in UNEP's GEO-4 report (UNEP, 2007b) — a world where water and other services are increasingly privatised, and ecosystem services turned into commodities by putting a price on them? The poorer people in Europe, but especially in developing countries, might then suffer from not being able to purchase more expensive energy, water and other goods and services, whereas the richer part of the world could more or less continue their lifestyles, albeit in a somewhat more resource-efficient manner.

But what if more sustainable lifestyles become trendy and the norm? The 'Sustainability first' scenario of UNEP's GEO-4 report maps out a world where society groups promote slow food (as opposed to fast food, advocating for example local food traditions), socially responsible investment and fair trade (UNEP, 2007b). In such a scenario, status might become more connected to the latest fancy bike instead of the fastest car, and people might compete for the lowest energy bill within their neighborhood.

consumers. This approach can also be used for designing policies directed at making consumption patterns more sustainable.

There are relatively few environment-related segmentation models, and many focus on a specific behavioural domain such as car use (Sharp and Darnton, 2006). However, an interesting example is the United Kingdom's assessment of the potential for different types of people to change to greener behaviours (Defra, 2008). Their model looks at ability to act, willingness to act, and the potential to do more on key behaviours that would lower their carbon footprint — and indicates which types of policy intervention would be most effective within each segment (Figure 3.1).

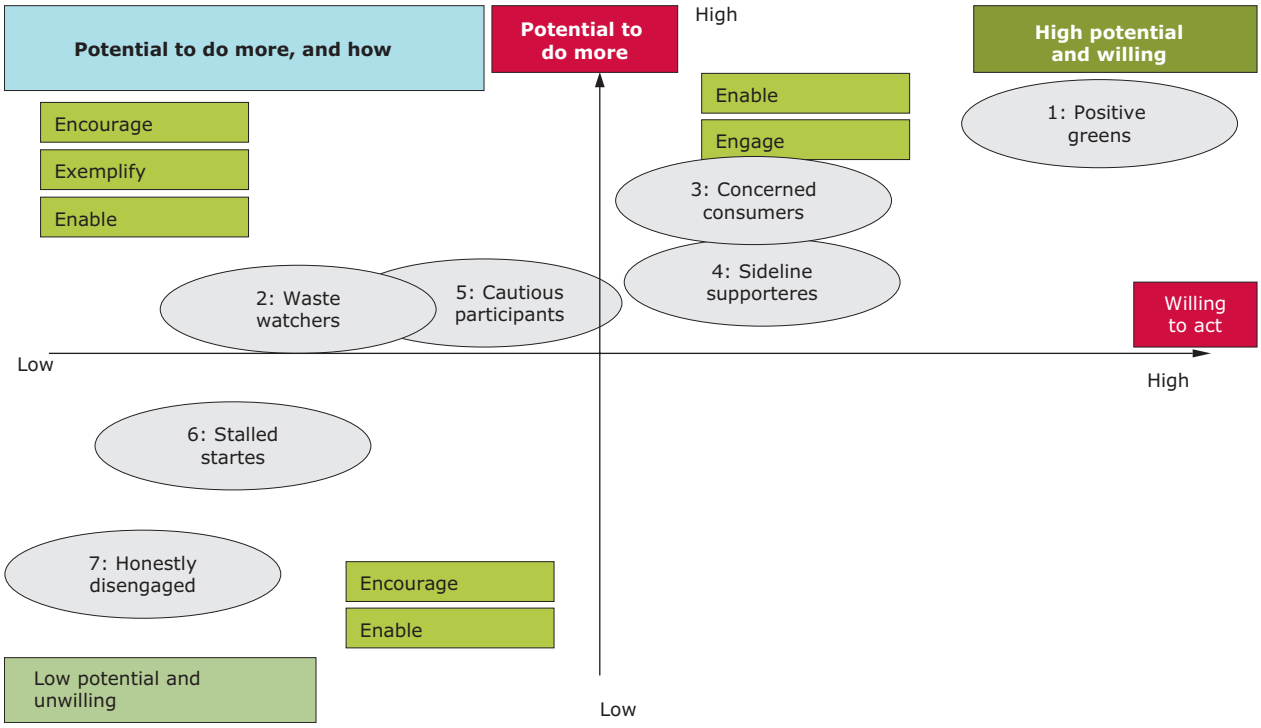
For example, people who are willing and able to do more — in this model called positive greens, the concerned consumers and the sideline supporters could be effectively engaged through communications, community actions, and targeting individual opinion leaders. Those who are concerned about how others act — in this model called cautious participants and waste watchers — would need government leadership as well as social norms supporting sustainable lifestyles to change. Those less willing to act — typified as stalled starters and honestly disengaged — could be encouraged through pricing policies, regulation or choice editing (Defra, 2008).

In the United Kingdom, Defra (2008) has estimated the following distribution of the population in the various categories: positive greens 18 %; waste watchers 12 %; concerned consumers 14 %; sideline supporters 14 %; cautious participants 14 %; stalled starters 10 %; and honestly disengaged 18 %.

The study concludes that a 'multiplicity of actions (is) needed to support greener lifestyles, confirming the need for packages of mutually supporting measures' (Defra, 2008). The segmentation is not aimed at developing targeted policies for different sections of the populations, but to enable the development of a range of policies that 'collectively will motivate a range of responses across larger population groups' (PSI, 2006).

Understanding the motivations behind consumer behaviour enables policy-makers to devise more effective solutions, drawing on a range of policy instruments that address different types of people and situations. Many of these solutions will work most effectively when tailored to those sectors of the economy that are the source of most environmental pressures caused by consumption.

Figure 3.1 **Segmented strategy, showing potential by segment and main emphasis for interventions**



Source: Defra, 2008.

4 Food and drink

4.1 Trends in consumption

Eating and drinking, along with shelter, tend to dominate household spending in poorer households and societies. However in developed countries, as incomes increase, absolute spending on food and drink tends to remain fairly stable, and therefore represents a dwindling proportion of incomes. Actual calorie intake is only weakly correlated to income once it exceeds a certain level (Danish EPA, 2004). In the past decade, European expenditure on food and non-alcoholic drinks increased by only around 10 % in absolute terms (Eurostat, 2009) and fell from 14 to 12 % of total expenditure. In comparison, food represents around 20 % of total household expenditure in the poorest EU Member States (EC, 2008).

Nevertheless, while total consumption of food in Europe is relatively decoupled from income, the types of food we eat and the way we eat and drink has changed with increasing wealth, and this change is exacerbated by falling household sizes, increasing globalisation of food markets and tastes and reduced time devoted to preparing food (EEA, 2005).

Some general trends in European food consumption are:

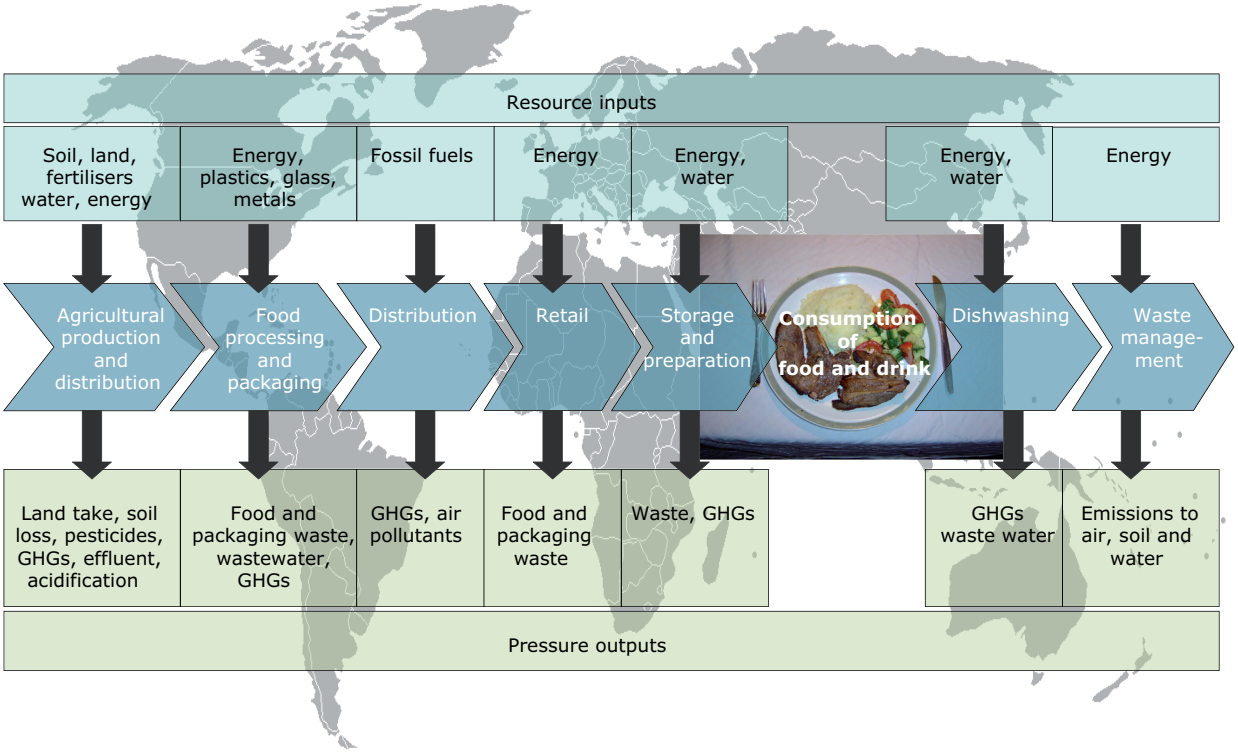
- Replacement of beef and lamb in diets by pork and, particularly, poultry across the EU as a whole (FAO, 2010), although beef consumption is growing in newer Member States. This is due to a combination of factors including price differences, a general trend towards healthier food and the ease by which poultry can be combined with pre-prepared foods (Danish EPA, 2004; Omann et al., 2007). This trend accelerated in 2008 due to increases in food prices, and total meat consumption even dropped by 2.2 % in the EU-27 compared to 2007 (EC, 2009a).
- Increasing consumption of fruit by 11 % in the EU-15 in 1990–2005 (FAO, 2010). This may be due to greater availability and reduced prices of (imported) fruit.
- Rise in the purchase of pre-prepared and frozen meals and convenience foods due to smaller household sizes and reducing time devoted to food preparation as more women enter the labour market (Omann et al., 2007).
- Increasing expenditure and frequency of eating take-away food and in restaurants (Omann et al., 2007; Danish EPA, 2004).
- A dramatic increase in quantities of imported food. Meat imports to the EU-15 increased by 120 % between 1990 and 2007. Cereal imports increased by 83 %, frozen vegetables by 174 %, and bananas by 92 % over the same period (FAO, 2010).
- A marked rise in the consumption of bottled water in many European countries (IBWA, 2010). Consumption in the EU was on average 105 litres per person in 2009, varying from 16 litres in Finland to 189 litres in Italy (EFBW, 2010). Energy is used in the manufacturing and transport of the bottles and many are made from plastic derived from non-renewable resources, i.e. oil (EEA, 2009).

These trends have differing consequences for the environmental impacts of eating and drinking. The switch from beef to pork and poultry is likely to have resulted in lower GHG emissions during food production. The rise in processed, convenience and frozen foods may have overall net negative effects because of increased energy use during sale, distribution and storage at home due to the increased need for freezing, and from packaging waste. Increases in imported foods may increase energy use and emissions from long distance food transport. On the other hand energy use and emissions from agriculture and production may in some cases be lower, for example imported Mediterranean field grown tomatoes to northern European countries where local tomatoes would be grown in greenhouses. Food imports also have other benefits, including economic and social benefits in the producing countries.

4.2 Life-cycle environmental impacts of food and drink

The EEA and ETC/SCP (2010) have estimated the pressures associated with the consumption of 31 key product categories in nine EU Member States. If the pressures caused by the product categories associated with food and drink are summed, consumption of food and drink is estimated to cause 15 % of GHG emissions, 37 % of acidifying emissions, 14 % of tropospheric ozone precursors and 19 % of material resource use activated by national consumption. Comparable results have been found through life-cycle analysis, where food and drink consumption was found to be responsible for around

Figure 4.1 How the food and drink value chain impacts the environment



Source: Compiled by EEA-ETC/SCP.

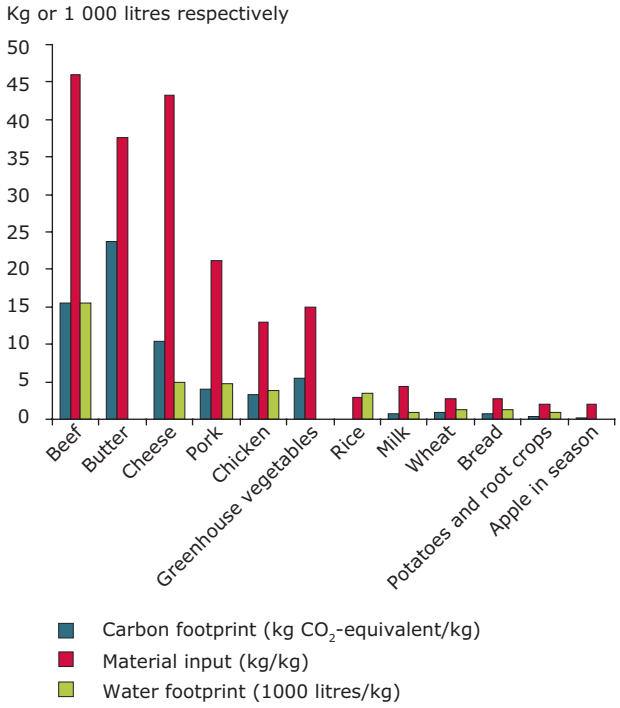
20–30 % of environmental impacts, in most impact categories caused by consumption in the EU. Impacts analysed were abiotic resource depletion, acidification, ecotoxicity, global warming, eutrophication, human toxicity, ozone layer depletion, and photochemical oxidation (JRC/IPTS, 2006).

Environmental impacts are caused during all stages along the food product chain (Figure 4.1), but agricultural production and to a lesser extent industrial processing are responsible for the most significant impacts caused by eating and drinking (EEA, 2005; ETC/SCP, 2009; Foster et al., 2006). These include impacts from: energy, water use and waste generation in agriculture and the processing industry; the use of fertilisers and pesticides; emissions from livestock; land use and transport; and biodiversity loss from clearance of ecosystems to make way for food and feed cultivation, and pollution of water courses. However, agriculture can also have positive environmental effects. For example, grazing animals often play a role in protecting and maintaining biodiversity, and well-managed grasslands serve as a carbon sink.

The direct impacts of food consumption are lower in magnitude and relate to travel for shopping, energy use for cooking and cold storage, energy and water use for dishwashing, and the generation of food and packaging waste (EEA, 2005). At the household level, approximately 20 % of private electricity consumption is used for the storage and preparation of food, including processing heat — cookers — and mechanical energy, including fridges and freezers (ETC/SCP, 2009).

The carbon, material and water footprints of different types of food and drink vary considerably. Figure 4.2 gives an indication of how footprints range between different food types based on a number of representative studies. It should be noted, however, that footprints for the same food type vary significantly according to the place and type of production (for example, the data shown for meat in Figure 4.2 relate to industrial production systems highly based on grain feed). Beef, butter and cheese generally have higher footprints, especially carbon and material footprints, while vegetables, cereal products, potatoes and fruit such as apples in season generally have much lower footprints. With regard to water footprints, the environmental impacts of a high footprint are of concern especially in case of products from water-scarce regions and using irrigation (for more information on the water footprint, see the SOER 2010 water resources: quantity and flows assessment (EEA, 2010a)).

Figure 4.2 **Carbon, material and water footprint for different types of food**



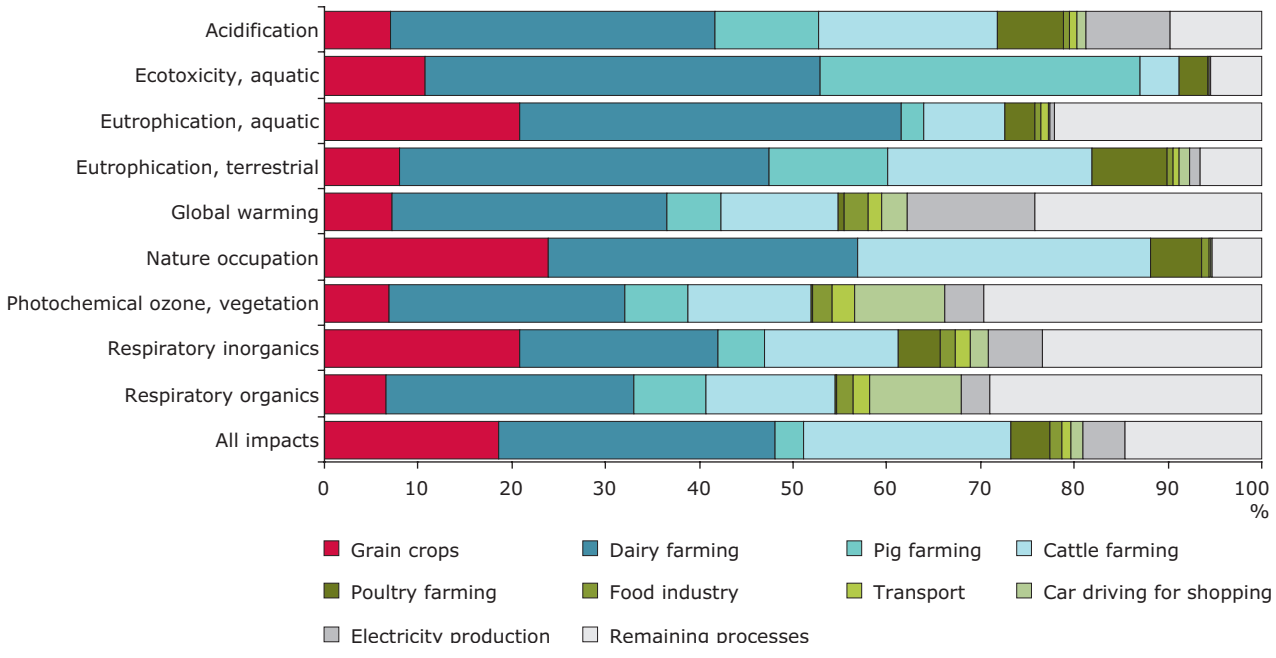
Source: Carbon: Angervall et al., 2008; Danish EPA, 2006; Fritsch and Eberle, 2007; Hirschfeld et al., 2008; Williams et al., 2006; Århus University, 2007; Material input: Kotakorpi et al., 2008; Water: Water Footprint Network, 2010.

The consumption of meat and dairy products is responsible for the bulk of a number of key impacts caused by eating and drinking and also for a considerable share of overall impacts from consumption. According to a study by the European Commission's Joint Research Centre, it contributes 24 % of the overall environmental impacts caused by total consumption in the EU-27, but accounts for only 6 % of total expenditure (JRC/IPTS, 2008). The same study shows that in the EU-27 meat and dairy products contribute about 30–40 % of aquatic and terrestrial eutrophication, 14 % of GHG emissions, and 35 % of nature occupation caused by total European consumption (JRC/IPTS, 2008).

The majority of a number of key impacts from meat and dairy products are caused by cattle and dairy farming (Figure 4.3). Poultry and pig farming contribute generally less across a range of key impact types per kg of meat produced due in part to poultry and pigs often being more efficient converters of plant energy into animal energy and producers of lower methane emissions (Garnett, 2009).

Reductions in some environmental impacts could potentially be gained through diets with a lower consumption of meat and dairy products and to a certain extent through shifts in diets from beef towards chicken and pork. This latter partly depends on which farming methods are substituted. Intensive livestock farming in general uses considerable inputs of cereal and soybean feeds, with chicken and pork farming in

Figure 4.3 **Contribution from the meat and dairy value chain to environmental impacts**



Source: Joint Research Centre, Institute for Prospective Technological Studies (JRC/IPTS), © European Communities, 2008.

particular requiring rich feeds. But considerable amounts of soybean feeds are also used in intensive dairy and beef production. Therefore, replacement of products from intensive cattle farming with those from chicken or pork farming with lower per kg impacts will in general give environmental benefits, although substantial improvement potentials also remain for intensive pork and chicken farming in Europe (JRC/IPTS, 2008). However, it is likely to have negative effects on animal welfare.

On the other hand, extensive (i.e. low density, low input) cattle and sheep farming can have positive effects on biodiversity in upland and nutrient poor areas of Europe which are unsuitable for other types of farming including intensive cultivation. Extensive livestock farming forms an essential element of high nature value (HNV) farming and European biodiversity goals. A shift from beef to pork and chicken could, therefore, also negatively impact extensive cattle farming and potentially HNV farming in general (European Forum on Nature Conservation and Pastoralism, 2010; Garnett, 2009).

While higher availability of meat and dairy products has led to better availability of nutrients in human diets, it also has contributed to negative health effects (Box 2.2). Lower consumption of animal fats, for example butter, is generally in line with dietary recommendations for a large part of the European population (JRC/IPTS, 2009).

Another key issue is that of food waste. Based on data from Eurostat and national data, it has been estimated that around 89 million tonnes or 181 kg per person of food waste was generated in the EU-27 in 2006, of which 42–43 % was from households, 39 % from manufacturing and the rest from other sources including retailers, wholesale and the food service sector, but excluding agricultural waste. Per person generation of total food waste varies between countries by a factor of more than 10, reflecting not only differences in the importance of the food industry between countries, but also data uncertainties (Biointelligence Service et al., 2010). A recent study shows that in the United Kingdom an estimated 137 kg/person or 25 % of food purchased by households ends up as waste, of which nearly two-thirds would have been avoidable — roughly split between leftovers from meals and not using the food in time (WRAP, 2009). Any reduction in avoidable food waste should eventually lead to equivalent reductions in impacts upstream from agricultural production.

A further major issue related to food consumption is the overexploitation of fish stocks. In all, 88 % of EU stocks are already fished beyond their maximum sustainable yield, and for some, such as North Sea cod, the vast majority are caught before they have reproduced (EC, 2009b; EEA, 2010b). EU-27 fish and seafood imports rose by an average of 4.2 % per year in the period 2000–2007 (Eurostat, 2008).

4.3 Food and drink outlooks and scenarios

Key determinants of changing food consumption in the EU over the next decade may include: food prices, Common Agricultural Policy (CAP) reform, developments in transport costs, competition with biofuels and developments in global food demand, developments in preferences driven by health concerns, and changes in food culture.

Average crop prices during 2009–2018 are projected to be much lower than their 2007–2008 average — the recent peak — while meat prices are not expected to change substantially. Crop and livestock productivity is expected to increase, especially in Central and Eastern Europe — provided that new technologies, infrastructures and services are successfully adopted. Assuming a recovery of the economy, increasing incomes and relatively stable food prices, the major trend over the next ten years could be shifting consumption patterns rather than markedly increasing per person consumption volumes (OECD/FAO, 2009).

The European Commission projects that the marked decline in meat consumption seen between 2007 and 2008 due to price increases may continue for a short while as a result of reduced incomes during the economic crisis, but will recover again in the mid-term. However, the growth is likely to be in pork, and especially poultry consumption in relation to beef that is expected to decline, though by less than 1 %. Production of pork and poultry in Europe is unlikely to keep up with increases in demand and will increasingly be imported from outside Europe. Demand for cheese is also expected to grow by 10 % between 2008 and 2015 (European Commission, 2009a).

The projected small decline in the consumption of beef is likely to have some positive effects on a number of key environmental impacts from cattle farming by reducing nitrate pollution and methane emissions if intensive beef farming is reduced. Effects on biodiversity and land management may be negative, however, if the reductions take place in the extensive beef farming sector rather than in the intensive one. A rapid growth in poultry consumption will have major implications for animal waste disposal and for animal welfare if the growth takes place in the intensive sector. A small but continuing growth in calories consumed could also raise questions about the health of the European population in the future, with increasing levels of obesity (Danish EPA, 2004).

4.4 Responses

Reducing the environmental impacts related to the consumption of food and drink is a major challenge that requires efforts at all phases of the food value chain. The majority of environmental impacts related to consumption of food are from agricultural activities, including in particular dairy farming, cattle farming and grain crops production, and fisheries. Thus, targeting policies at the source of impacts — the agricultural and fisheries sector — is one of several options for reducing impacts. However, such policies might sometimes conflict with free trade and competitiveness concerns.

There are two main pieces of EU legislation specific to agricultural food production and fisheries:

- The 2003 reform of the EU Common Agricultural Policy (CAP) included environmental goals and developed the role farmers could play in managing natural resources and contributing to landscape conservation (EC, 2003). But it did not succeed in introducing significant reductions of impacts (EEA, 2010). The next reform, planned in 2013, may possibly allow policymakers to address the challenges of delivering sustainable and multifunctional agriculture in the future.
- The Common Fisheries Policy. A major reform is foreseen in 2012 as current policies have not succeeded to bring European fisheries and fish stocks to a status of sustainability, to avoid over-fishing or to stop the decline of marine biodiversity.

Impacts could also potentially be reduced by policies targeting food processing or transportation. Another option is policies aimed at the demand for foods linked to heavy environmental burdens (Box 4.1). Many EU Member States already have policies to promote organic food or aimed at preventing food waste.

Recently, the European food industry launched a Roundtable on Sustainable Consumption and Production, with the involvement of major European food producers and the European Commission, and support from the EEA and UNEP (European Food SCP Roundtable, 2010). This initiative already seems to have raised awareness in the food industry, but it remains to be seen whether it will result in reduced pressures from food production.

Environmental impacts from dairy and meat farming are being tackled in some countries through industry initiatives, such as the United Kingdom's Milk Roadmap (DEFRA, 2009) — a scheme based on voluntary pledges from industry stakeholders.

However, the European Commission's Joint Research Centre (JRC) has shown that technical abatement can only cut the environmental impact from livestock production by about 20 % (MacMillan and Durrant, 2009). The JRC concludes that future reductions in impacts from meat and dairy products would also require targeting the levels and patterns of food consumption (JRC/IPTS, 2008).

A shift towards consumption of more products from organic farming is also an option. But LCA-based comparisons of organic and non-organic production show mixed results for different products (Williams et al., 2006). Reduced impacts resulting from no inputs of artificial fertilisers and reduced animal feed inputs are

Box 4.1 The role of retailers in sustainable consumption

Retailers are in a unique position at the heart of the food chain by providing the link between production and consumption, and they can play a key role on the path towards sustainable consumption. Through their contact with producers, retailers have the potential to encourage more sustainable production practices. Through their direct contact with consumers, retailers have the potential to encourage more sustainable ways of living.

Today a growing number of retail organisations and producers are developing and implementing internal environmental management schemes and sustainability strategies. While the initial focus of these are often on internal operations, an increasing number of retailers are also seeking to green their upstream supply chains and reduce the downstream impact of products by raising customer awareness and providing appropriate choices. However, there is still a great, unharnessed potential for retailers to contribute to more sustainable consumption especially through focusing on environmental hot-spots such as meat production and through promoting more sustainable and healthier choices. A specific approach that is starting to receive attention is that of choice-editing, the practice of removing products with significant environmental impacts from the shelves, or the placement and advertisement of more sustainable alternatives.

The important role of retailers and their potential contribution to SCP was recognised by the EU Action Plan on Sustainable Consumption and Production and Sustainable Industrial Policy (SCP Action Plan). Through the Plan in 2008, the European Commission launched the European Retailers Forum to promote sustainable consumption and production through retailers.

Similarly the pivotal role of retailers in SCP is being recognised by national policymakers in Europe, who are increasingly involving retailers through voluntary agreements and public-private partnerships.

often offset by greater direct energy use and the use of manure in organic farming. However, organic farming has biodiversity and eco-toxicity benefits due to the lower intensity of land use and a reduced use of pesticides, but these are not well recorded by LCA methods. Moreover, organic farming tends to preserve soils in the long term and is being promoted through the European Action Plan for Organic Food and Farming.

Nonetheless, organic farming is often, at least in the short term, less productive per hectare than non-organic (Williams et al., 2006), and thus requires more land, though these differences might reduce considerably when viewed over a longer period (Mäder et al., 2002). All other things being equal, a major shift to organic production would mean either more biodiversity-rich land taken into production or an increase in imports leading to increased environmental impacts overseas. However, a significant shift to organic farming without increased imports or increased land under production could occur if the shift to organic were accompanied by a complimentary shift towards diets with a lower meat and dairy content and therefore lower demand for land.

A larger share of consumption of fruit and vegetables would have environmental benefits. The JRC recently published a study investigating the environmental implications of a switch to healthier diets in Europe. Two of the three healthy diet scenarios investigated included a reduction in the consumption of beef and pork by ~ 60 % in favour of chicken and fish, and one of these, the so-called Mediterranean diet, also included a 9 % reduction in the consumption of dairy products: According to the JRC, a 100 % shift to this diet across the EU-27 would reduce the overall environmental impacts related to food consumption by around 8 % (JRC/IPTS, 2009). The other two healthy diet scenarios resulted in lower but still positive gains, though these gains reduced somewhat when rebound effects were taken into account (Box 3.1).

Shifting to seasonal locally-grown fruits and vegetables would also in general lead to less environmental impacts, in particular from transport, cooling and freezing.

The United Nations has supported a call to halve food waste by 2025; researchers suggest this could be achieved more quickly if businesses, governments and the public work together (Lunqvist et al., 2008). There are indications that the generation of food waste may be exacerbated by quantity-based marketing strategies such as buy-one-get-one-free offers. Finland had already banned such promotions, and Belgium has considered the idea, but the European Court of Justice recently ruled against such bans (ECJ, 2009). The onus is therefore on retailers to find a voluntarily solution. Civil society has an important role to play in promoting voluntary sustainability initiatives among retailers and encouraging consumers to support them.

5 Housing

5.1 Trends in consumption

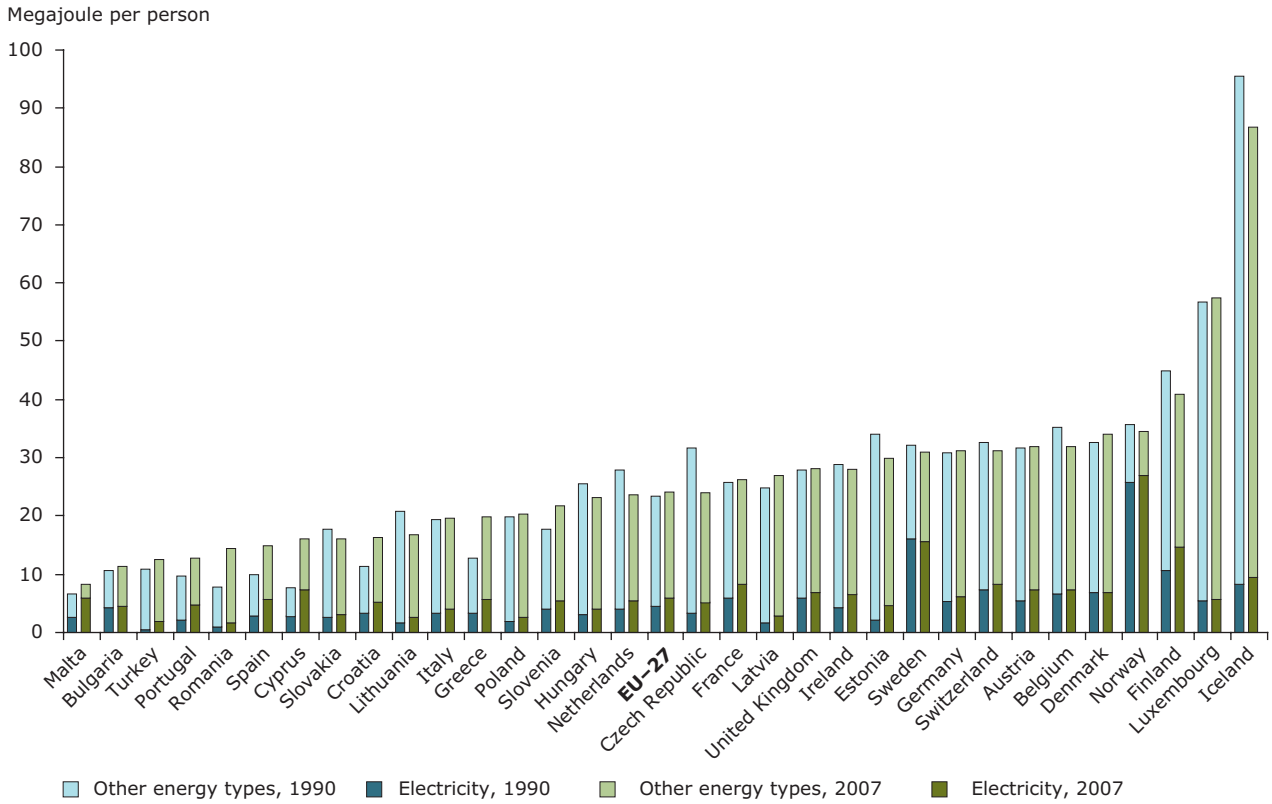
In this chapter, housing includes both the use of buildings as shelter and living space for people and the construction and demolition of buildings. In the use phase, the energy consumption of households is an important source of environmental impacts, but water use and materials consumption, for example for furnishings and household equipment, are also relevant.

Energy consumption in buildings — for space heating, water heating and use of electric appliances – is a key cause of environmental impacts. Energy use in buildings — including commercial and public buildings — represents approximately 40 % of total final energy consumption and 36 % of CO_2 emissions in Europe (EC, 2010a). Space heating accounts for 67 % of household energy consumption in the EU-27, followed by water heating and appliances/lighting (Odyssee database, 2010).

There are large differences in final energy consumption per person for space and water heating, cooking and electricity in households across Europe (Figure 5.1). The differences are influenced by many factors including different consumption patterns, climate, energy efficiency of dwellings, type of heating systems, and energy prices. Direct and indirect CO_2 emissions resulting from energy use depend mainly on the fuels used for heating and the national energy mix.

Final energy consumption per person in the EEA (EU-27, EFTA and Turkey) member countries increased by 3 %

Figure 5.1 Final household energy consumption per person in EEA member countries, 1990 and 2007



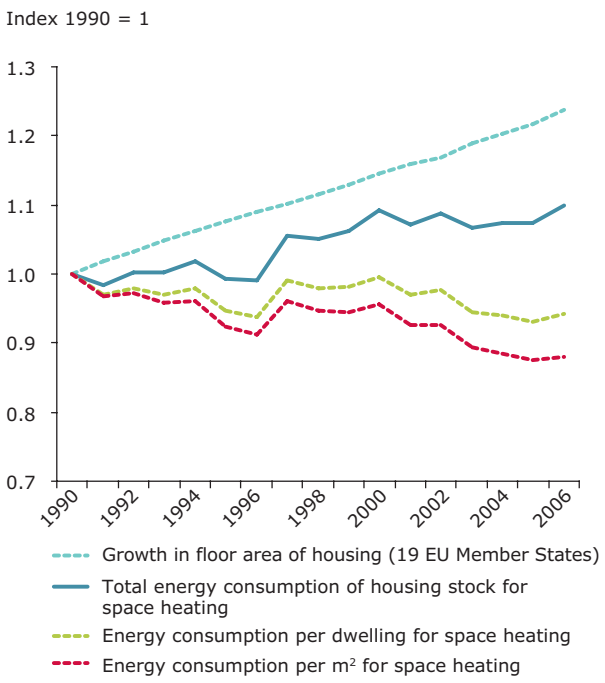
Note: Iceland: 2006 instead of 2007.

Source: Eurostat energy statistics.

between 1990 and 2007. However, the increase was reversed between 2005 and 2007 when it decreased by 9 % in the EU-27 and 7 % in the EEA member countries, partly driven by rapidly increasing energy prices, although energy efficiency policies might also have contributed to this effect. Household electricity consumption per person increased more rapidly: on average by more than 30 % between 1990 and 2007 in the EEA member countries, in spite of increasing prices in many countries (Figure 5.1). Consumption more than doubled in Cyprus, Estonia, Malta, Portugal, Romania, Spain and Turkey in the same period. Since 2005, however, electricity consumption per person in the EU-27 has stabilised (EEA energy indicators ENER22, 2010).

Rising energy consumption for space heating is mainly driven by an increase in housing space per person. The average area of a dwelling unit rose from 86 to 92 m^2 in the EU-15 between 1990 and 2007 (EEA energy indicator ENER22, 2010), while the number of people per household decreased from 2.8 to 2.4 (Odyssee database, 2010), giving a 20 % rise in floor space per person and an increase in the number of households. In the EU-12 countries, the average floor area per dwelling increased even more rapidly from 62 m^2 to 71 m^2. These trends have largely offset the gains made in the energy efficiency of buildings (Figure 5.2).

Figure 5.2 **Trends in heating energy consumption and energy efficiency of housing, EU-27**

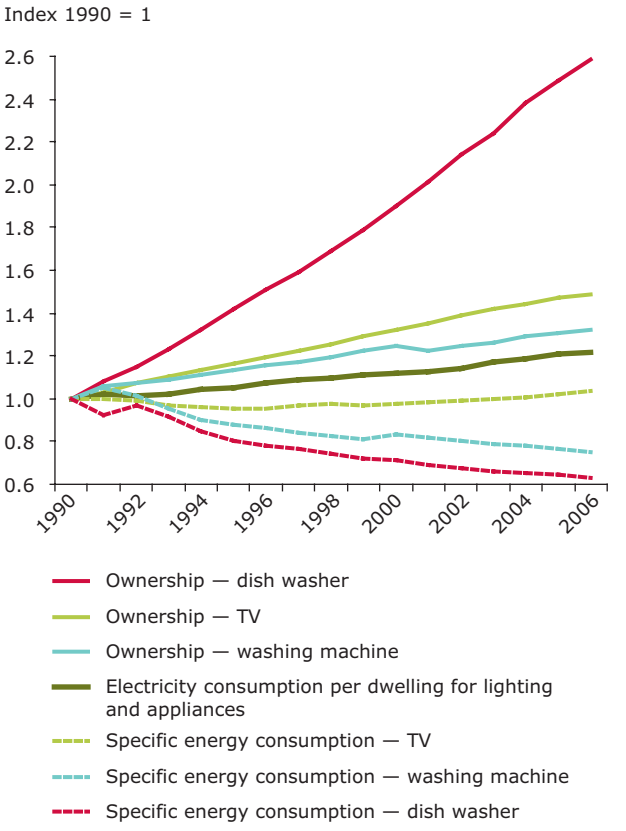


Source: Odyssee database, 2010.

While the energy efficiency of some types of appliances has improved significantly over the past two decades (Figure 5.3) these product improvements have not been able to keep up with increasing ownership and use of appliances. As a result, overall electricity consumption per dwelling for lighting and appliances has gone up, illustrating the rebound effect (Box 3.1).

The main reasons behind the increase in electricity consumption are the steady increases in the numbers of appliances — including TV sets and dishwashers owned by households (Figure 5.3), consumer electronics and information and communication equipment — and a rising demand for air conditioning and cooling technologies, especially in the Mediterranean countries (JRC/IE, 2009). Part of the increase in ownership is due to increasing numbers of households and increasing disposable income. In addition, consumer electronics and information and communication equipment tend to have a high rate of standby energy consumption — responsible for around 6 % of all electricity in households (JRC/IE, 2009).

Figure 5.3 **Trends in appliance energy efficiency and ownership, EU-27**



Source: Odyssee database, 2010.

Housebuilding, especially diffuse residential sprawl, and related infrastructure are responsible for a high share of land-take in Europe. Total annual land-take for artificial areas has increased to 0.61 % (percentage of initial year) in the period 2000 to 2006 compared to 0.57 % in the previous decade, but land-take for housing has slowed slightly. Most of the new artificial areas were formerly agricultural land and forests, although re-utilisation of developed urban land — contaminated and non-contaminated brownfield sites — has increased considerably, a sign of better management of land development patterns (ETC/LUSI, based on Corine Land Cover data, see the SOER 2010 land use assessment (EEA, 2010a)).

5.2 Life-cycle environmental impacts of housing

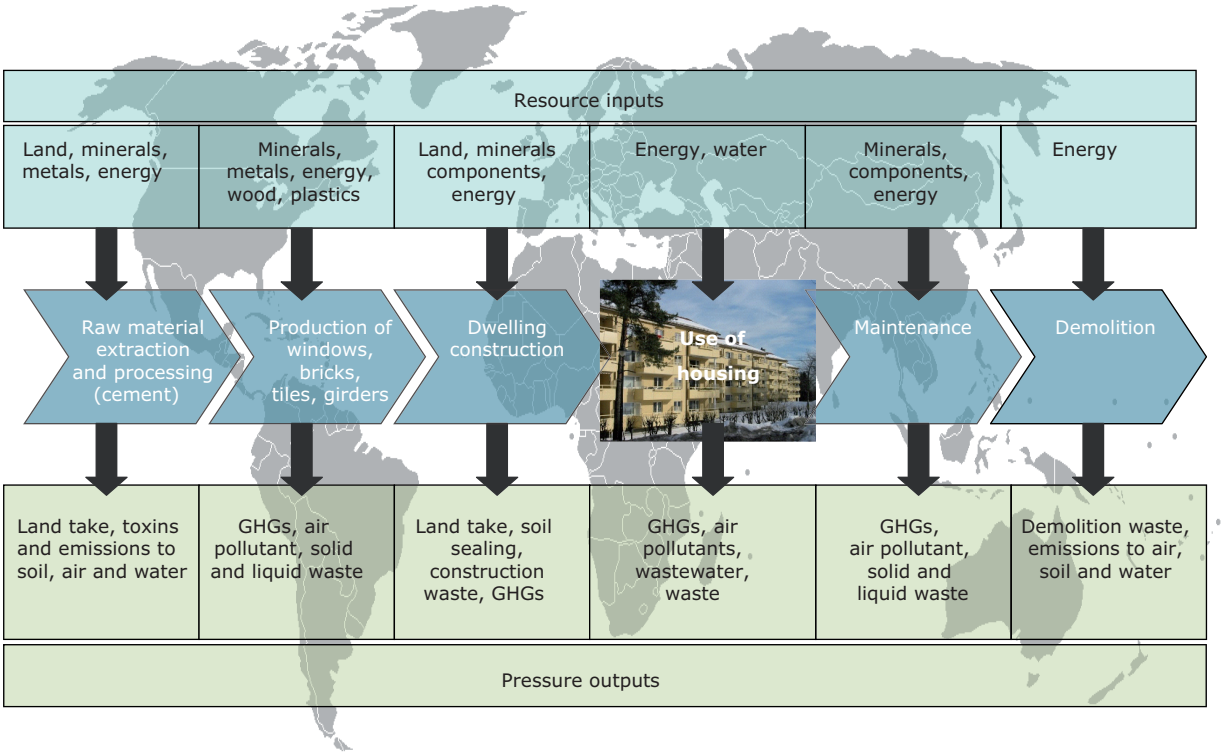
Housing has multiple impacts on the environment throughout its life-cycle (Figure 5.4). The EEA has estimated the pressures associated with the consumption of 31 key product categories in nine EU Member States. If the pressures caused by the product categories associated with housing and infrastructures are added up — including furnishing and household appliances — use of housing is estimated to cause 38 % of GHG emissions, 22 % of acidifying emissions, 32 % of tropospheric ozone precursors and 38 % of material resource use activated by national consumption (EEA and ETC/SCP, 2010).

Other studies vary on the proportions of key environmental impacts that can be allocated to housing and household equipment, but there is general consensus that this area of consumption is one of the most important EU contributors to global environmental impacts (JRC/IPTS, 2006). The majority of environmental pressures are caused by energy use while the houses are in use, while around one fifth are caused during their construction (EEA and ETC/SCP, 2010; JRC/IPTS, 2008).

Around one third of total material use in Europe is for housing — mainly construction material — with consequent negative impacts on land and biodiversity from mining and waste disposal. Although construction and demolition waste in the EU is increasingly recycled (see the SOER 2010 material resources and waste assessment (EEA, 2010b)), the resulting savings only substitute a fraction of construction resource use. For example, in Denmark where more than 90 % of construction and demolition waste is recycled, this still only contributes around 6 % of the materials used in new construction (calculated based on data from the Danish Statistics Office).

Land sealing — making land impermeable — is also a significant impact of housing and associated infrastructure like residential roads and parking. Sealed land looses its soil functions and cannot be used for other functions like agriculture, is detrimental to biodiversity

Figure 5.4 How the housing value chain impacts the environment



Source: Compiled by EEA-ETC/SCP.

and can increase the risk of flooding (see the SOER 2010 land use assessment (EEA, 2010a), urban environment assessment (EEA, 2010c), soil assessment (EEA, 2010d) and biodiversity assessment (EEA, 2010e)).

With regard to water consumption, an average of around 100–200 litres of tap water are used per person per day in most European countries, but if the amount of water embedded in products such as food, paper and cotton clothes is included, water use is often 10–20 times higher (EEA, 2010f).

Dwelling type has important consequences for energy use, material use and soil sealing. For example, single family houses typically use 1.5 to 2 times more energy per m^2 than multi-family buildings, and have a higher demand for land per unit of floor area and material use than multi-family and high-rise buildings (JRC/IPTS, 2008). Moreover, low density housing reduces the economic viability and technical efficiency of district heating and public transport systems. However, single-family houses make up 57 % of homes in the 19 EEA member countries for which data are available (calculated based on Odyssee data, 2009).

5.3 Housing outlooks and scenarios

The past trend in the EU towards fewer people per household is likely to continue until 2020 (Jiang and O'Neill, 2009), leading to a growth in demand for living space per person. In addition to the projected slight growth in population, these factors are expected to increase the total area of dwelling space, and along with it associated demand for heating/cooling energy and construction materials unless rising energy and material efficiency offsets these trends. However, the economic downturn adds uncertainty to this development as the housing market has been heavily affected, and if incomes grow more slowly or even decline, the ability to buy houses and apartments is also likely to be affected.

The International Energy Agency (2009) expects that ownership and use of consumer electronics, including televisions and information and communication equipment, will continue to increase rapidly in Europe. Equipment for the reception, decoding and interactive processing of digital broadcasting will also increase with the gradual switch to such broadcasting (JRC/IE, 2009). As a result, the electricity consumption of households for consumer electronics and information and communication technologies is expected to increase substantially (IEA, 2009) unless more ambitious policy measures are introduced to increase energy efficiency.

The reference scenario of the European Commission's PRIMES model, which takes into account the effect of energy efficiency policies in place and the anticipated effects of the climate and energy package adopted in 2009, projects a growth of final energy demand for electrical appliances and lighting in the residential sector of 2.2 % annually in the period 2010 to 2020, whereas final energy demand for heating and cooling is expected to stabilise over the same period (based on data published in a summarised form in EC, 2010b).

5.4 Responses

Houses and other buildings have a huge potential for significant energy saving (EEA, 2008). The EU and individual Member States have introduced a number of policies to tap this potential:

- the Energy Efficiency Action Plan (EEAP) (EC, 2006);
- the Eco-Design of Energy-Related Products Directive (2009/125/EC);
- the Energy Performance of Buildings Directive (EPBD) (2010/31/EU);
- the Energy End-use Efficiency and Energy Services Directive (ESD) (2006/32/EC);
- the Energy Labelling Directive (2010/30/EU);
- the renewed agreement on Energy Star endorsement label use in Europe.

The Eco-Design of Energy-Related Products Directive (Ecodesign Directive) sets a framework for setting minimum environmental performance and energy-efficiency requirements for energy-related products, with new standards recently adopted for refrigerators, freezers, TV sets, set-top boxes, and lighting. The directive was extended in 2009 to products that can influence energy use such as windows. Although environmental aspects other than energy efficiency are covered by the directive, it has in practice been used mainly to set energy-efficiency performance criteria. Thus there is a future opportunity to steer product design into a more sustainable direction, for example requirements on repairability or upgrading in order to prevent waste.

The directive is supplemented by the recently revised Energy Labelling Directive, and the EU Eco-label Regulation (EC, 2009). However, resultant energy-efficiency improvements in appliances from these directives have, to date, been largely offset by increasing ownership and use (Figure 5.3).

The Energy Performance of Buildings Directive requires Member States to apply minimum requirements on the energy performance of new and existing buildings when undergoing major renovation, and technical building systems. All new buildings shall fulfil a near zero-energy standard by the end of 2020, and public buildings by end of 2018. The directive is expected to result in reductions

of 160–210 Mt/year CO_2 across the EU by 2020, 4–5 % of EU total CO_2 emissions (EC, 2008). However, substantial potential still remains for further reductions in energy use in buildings in areas yet to be addressed by policy. For example, if renovation and refurbishment of windows, wall insulation and roof insulation were always performed to the cost-optimal energy efficiency level, GHG emissions could be reduced by a further 25–30 % with payback periods of 10–15 years (JRC/IPTS, 2009).

In addition, the EU's Lead Markets Initiative (EC, 2007), especially the initiatives on sustainable construction and renewable energies, can help to realise eco-innovation potentials in housing. Actions include, for example, establishing a network of public authorities in charge of construction and the widening of European construction design codes to include sustainability aspects.

Making dwellings more energy-efficient, generally requires to make them tighter against cold or hot air from the outside, a measure that might be in conflict with providing fresh air for the dwellers and prevent in-door air pollution or mould. However, good planning and implementation of such measures combined with information for dwellers about correct airing of highly energy-efficient buildings can prevent health problems.

Driven by front-running stakeholders from business and civil society, the technology and designs for zero-energy and very low energy housing already exist, including super-insulated building envelopes, passive solar heating, cooling and lighting, ventilation and shower drain heat exchangers, solar water heaters and photovoltaic panels on roofs. Several hundred houses have already been built across Europe that meet the passive house standard for heating demand that is factor 4–5 below normal new built houses (Harvey, 2009).

Other examples of implementation of these technologies include the solar settlement in Freiburg (Heinze and Voss, 2009) and the BedZed development in London (Bioregional, 2009). More ambitious policy targets, economic incentives, green public procurement and regulation in Europe could ensure a more rapid development and uptake of this kind of housing. The United Kingdom, for example, has a target for all new housing to be zero carbon by 2016 (ETC/SCP, 2010b) backed by an exemption from stamp duty land tax (HM Treasury, 2007).

Household water consumption can be effectively influenced by water pricing and metering, and the introduction of metering in households is reaching a high level of implementation in EU Member States (EEA, 2009) as required by the Water Framework Directive (EC, 2010c). Water metering and charging by volume has been shown to influence household behaviour (OECD, 2010). In eastern Europe, water demand has declined by 40 % since the early 1990s as a result of higher water prices, and consumption has also decreased in western Europe, albeit at a slower pace (EEA, 2010f; EEA, 2009). Figure 5.5 illustrates that household water consumption has decreased along with increasing water prices in Spain and Estonia. In Spain, reduction of water use has been supported by regulatory developments including regulation on watering gardens and filling of private swimming pools.

So overall there is substantial potential to improve the picture for housing through uptake of existing policies and coupling them with good urban design and spatial planning. Doing so can deliver a wide range of benefits through significantly reducing the environmental impacts of housing on land-take, biodiversity, soil sealing, materials, water and energy consumption and people's overall well-being.

Box 5.1 Smart metering

Smart metering of electricity, space heating and gas consumption can help citizens to better control their energy consumption in the home. A smart meter shows the energy use in the dwelling in a more accessible way, helping citizens to identify the appliances which use the most energy, and also shows the consequences of energy behaviour, raising people's awareness of the structure of their energy consumption. The EU's energy market liberalisation package requires 80% of households to be equipped with smart meters by 2020. Finland, Italy and Sweden have already widely introduced smart meters for electricity (ESMA, 2010).

Experience from pilot projects in the United States of America shows that smart metering can be made more effective if combined with smart communication: telling households how efficient they are relative to their neighbours in similar houses, accompanied by tailored recommendations on how to use less energy led to a reduction of 2–5 % of energy use whereas smart meters alone had only a limited effect (von Renssen, 2009). An experiment where 'smileys' were used to communicate above/below average energy consumption showed a much larger effect compared to information-only communication (Schultz et al., 2007).

Figure 5.5 **Water pricing and household water use in Spain, 2000–2008, and Estonia, 1992–2007**

Note: Spain: Prices are calculated as average unit values for water supply and sewage services; in Estonia: water use for human consumption only.

Source: National Statistics Institute of Spain, 2010 (left figure); Estonian Environment Information Centre, 2010 (right figure).

6 Mobility

6.1 Trends in mobility demand and modal split

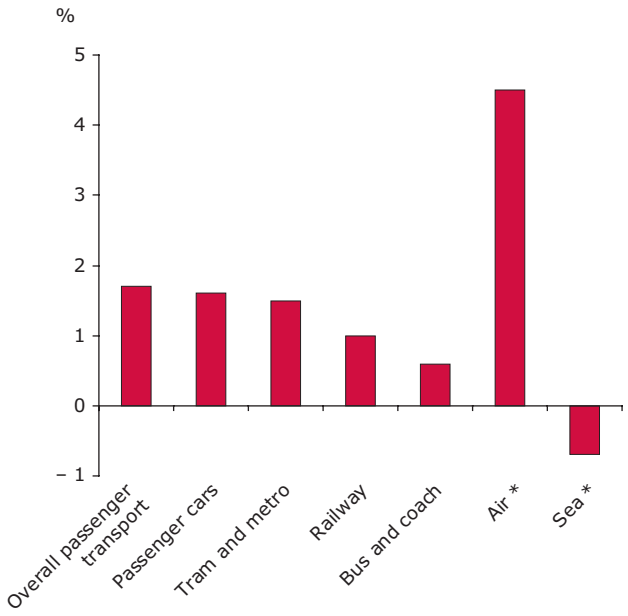
In this section, mobility includes life-cycle based environmental pressures from passenger transport. This means pressures from the provision of transport services for passengers — railways, metro, buses, airlines, taxis, ferries and cruise services; transport equipment purchased by households — cars, motor cycles, etc.; extraction and delivery of fuel for private transport as well as direct environmental pressures from the use of private vehicles — exhaust emissions. Freight transport is not included except for the transport of transport equipment and fuel.

Europeans are moving further and faster than ever before. The number of kilometres travelled by people in the 32 EEA member countries increased by 20 % between 1995 and 2007 or roughly 1.5 % per year over the past decade, slightly below growth in GDP, and although there are variations between countries, passenger kilometres continue to grow overall across all EEA member countries (EEA, 2010a).

Not all transport modes show similar growth. While road and particularly air transport demand has increased significantly, use of trains, buses and coaches in the EU-27 has increased at a much slower rate (Figure 6.1). Cars remain the dominant mode, with a 72 % share of passenger kilometres in the EU-27, excluding Cyprus and Malta, in 2007. Bus and coach travel have decreased slightly from a share of more than 9 % in 1995 to 8 % in 2007. Intra-EU air transport increased to a 9 % share of total passenger kilometres in 2007, while trains, trams and metros now account for 7 % of passenger kilometres (EEA, 2010a).

Interestingly, while the use of rail has remained stable overall, high-speed trains are among the transport modes that have recently seen the highest growth rates, with passenger kilometres increasing by 180 % in the EU-27 between 1995 and 2007 (EC, 2009a) driven by the expansion of the high-speed network. The share of high-speed transport of total rail passenger transport kilometres in the EU-27 increased to 23.3% in 2007 (EC, 2009a). In some cases, such as France, the expansion of the high-speed network has been successful in reducing the demand for air travel (EEA, 2008).

Figure 6.1 **Average annual growth rates for passenger transport, EU-27, 1995–2007**



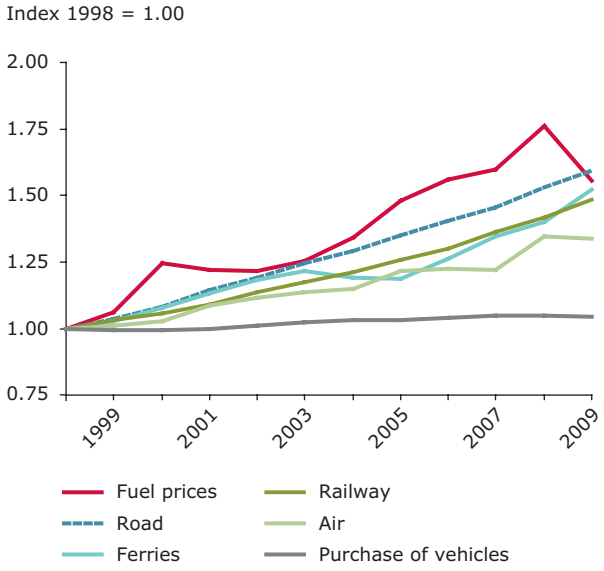
Note: * Sea and Air only include intra-EU traffic. Estimates are made by the European Commission based on airport-to-airport data collected under Regulation (EC) 437/2003 and port-to-port data collected under Council Directive 95/64/EC.

Source: EC, 2009a.

The demand for mobility and the choice of transport mode is driven by a variety of distinct factors including socio-economic ones, income and prices; socio-demographic, family size and structure; spatial and infrastructural, population density, distance between home and work place; and cultural factors, image and status (EEA, 2008).

One important driver of increased mobility demand is the increase in car ownership. In the EU-27, this increased by 35 % in the period 1990–2007 (EC, 2009a) and average car ownership in EEA member countries in 2008 was 419 cars per 1 000 inhabitants (EEA, 2010b). A further driver is the expansion of transport infrastructure, particularly motorways. In the period 1990–2005 total transport networks in the EU-27 grew by 3 %, while the length of motorways increased by 47 % (Eurostat, 2009).

Figure 6.2 **Indexed consumer prices * for passenger transport, EU-27, 1998–2009**



Note: * Indexed consumer prices are calculated as harmonised indices of consumer prices (HICPs), a set of EU consumer price indices calculated according to a harmonised approach and a single set of definitions.

Source: Eurostat, 2010.

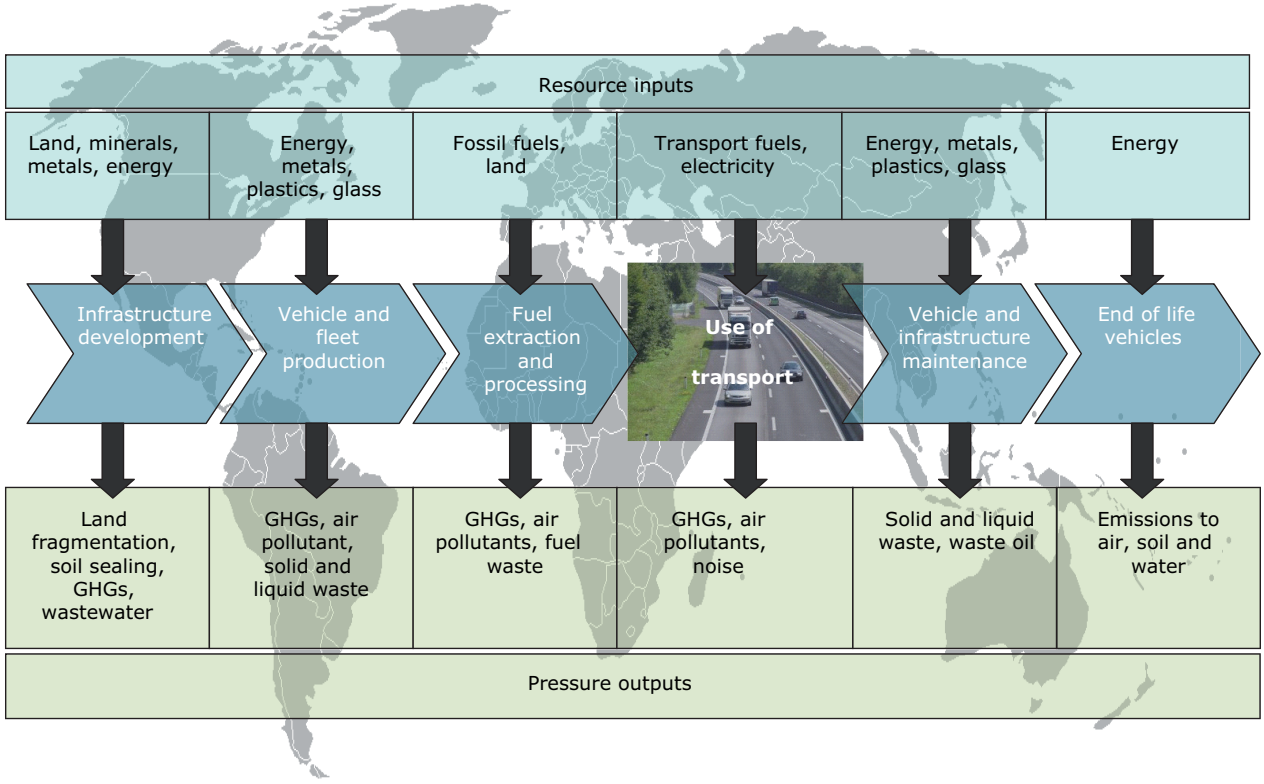
The price of different transport modes is another determining factor for mode choice, and differential pricing, for example through taxation and fees, can be an effective tool for encouraging a shift to more sustainable forms of transport. While the cost of all modes of transport has increased significantly over the past decade (Figure 6.2) the prices of air travel and the purchase of vehicles have increased less than those of public transport.

6.2 Life-cycle environmental impacts of mobility

Transport gives rise to various environmental impacts including climate change, air pollution, noise pollution, resource consumption, generation of waste, and habitat fragmentation and soil sealing as a result of the building of roads, airports, railways, etc., leading to losses of biodiversity (Figure 6.3).

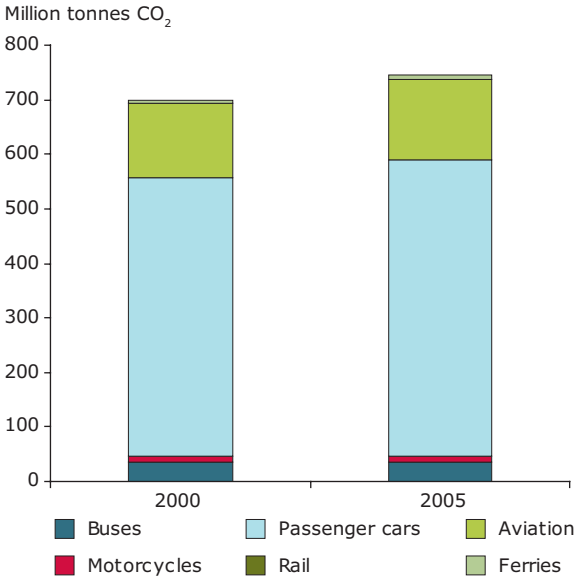
Increasing travel, especially by modes of transport with high GHG intensity such as private cars and aviation — means that GHG emissions from passenger transport continue to grow (Figure 6.4). According to the LIFE EC4MACS (2010) project, direct emissions of

Figure 6.3 **How the mobility value chain impacts the environment**



Source: Compiled by EEA-ETC/SCP.

Figure 6.4 **CO_2 emissions from passenger transport (use phase only), EU-27, 2000 and 2005**



Notes: Emissions from ferries and aviation only include intra-EU traffic. CO_2 emissions from rail transport are too low to be seen on the graph. The reason is that only emissions from the use phase are covered — indirect emissions such as from electricity production for electric trains are excluded.

Source: LIFE EC4MACS, 2010.

CO_2 from passenger transport in the EU-27, excluding the production and waste management of vehicles, and international air and maritime transport, increased by 6 % between 2000 and 2005. Emissions from the transport sector as a whole now account for just below 20 % of total GHG emissions across the EEA-32 countries (EEA, 2010).

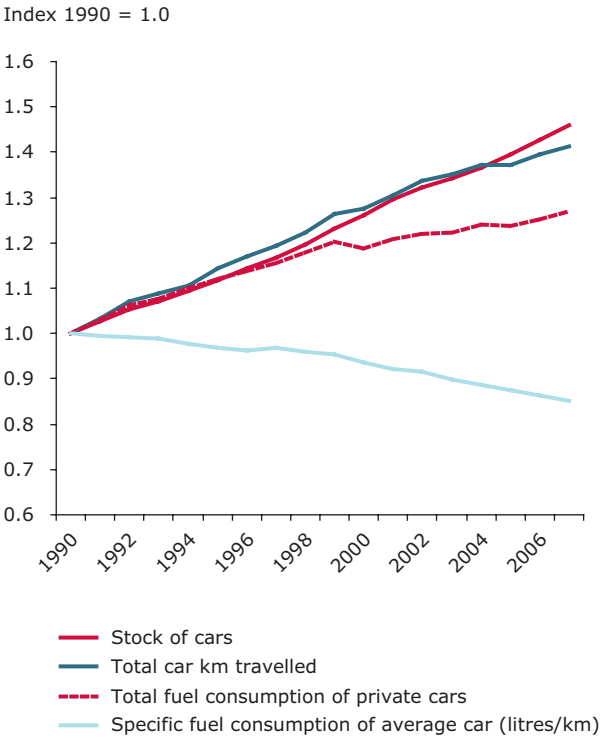
The EEA and ETC/SCP (2010) have estimated the pressures associated with the consumption of 31 key product categories in nine EU Member States. If the pressures caused by the product categories associated with mobility are added up, personal mobility is estimated to cause 20 % of GHG emissions, 19 % of acidifying emissions, 32 % of troposheric ozone precursors and 15 % of material resource use activated by national consumption. These environmental pressures include a rough estimate of pressures arising from international sea and air transport. Comparable results were found using life cycle approaches: mobility was found to be responsible for 15–25 % of the environmental impacts in most impact categories caused by European consumption (JRC/IPTS, 2006).

While the fuel efficiency of the average car has been improved continuously in recent decades, the improvements have been more than offset by growing demand for travel by private car in the EU-27 (Figure 6.5).

Direct emissions from the combustion of fuels make up about 77 % of total life-cycle based GHG emissions from passenger car transport. The remainder can be allocated to fuel production and supply, 13 %; vehicle production and maintenance, 9 %; and disposal and end of life, < 1 % (JRC/IPTS, 2008).

Unlike GHG emissions, emissions of pollutants from transport that affect local air quality have continued to decline across EEA member countries, but passenger cars are still among the top six individual polluting sources for NO_X, particulate matter (PM_{10}, $PM_{2.5}$), carbon monoxide (CO) and non methane volatile organic compounds (NMVOC). As a result, ambient concentrations of nitrogen dioxide (NO_2) still exceed 2010 limit values in many cities around Europe (EEA, 2010a). Transport, and especially road transport, is also the major source of noise pollution in the largest cities in the EU-27, with 47 million people being affected by noise levels that are considered dangerous for public health (see also the SOER 2010 air pollution assessment (EEA, 2010d) and urban environment assessment (EEA, 2010e)).

Figure 6.5 **Growth in private car travel versus fuel efficiency in EU-27, 1990–2007**



Source: Odyssee database, 2010.

6.3 Mobility outlooks and scenarios

Current GHG emissions caused by transport are already close to what we can emit from all our consumption activities by 2050 if Europe is to meet the strategic objective adopted by the European Council of limiting the global average temperature increase to not more than 2 °C above pre-industrial levels (Council, 2007 and ETC/SCP, 2009).

A further 30 % increase in passenger transport demand between 2010 and 2030 is projected based on a business-as-usual scenario (EEA, 2010), and demand is growing fastest for modes of transport that emit higher levels of CO_2 (Figure 6.6). Past experience suggests that fuel efficiency and technology improvements are unlikely to develop at sufficient rates to offset the projected increases in personal transport and consequent GHG emissions (Box 3.1). Demand management, therefore, appears to be an indispensable measure alongside modal shifts if GHG emissions from mobility are to be reduced.

6.4 Responses

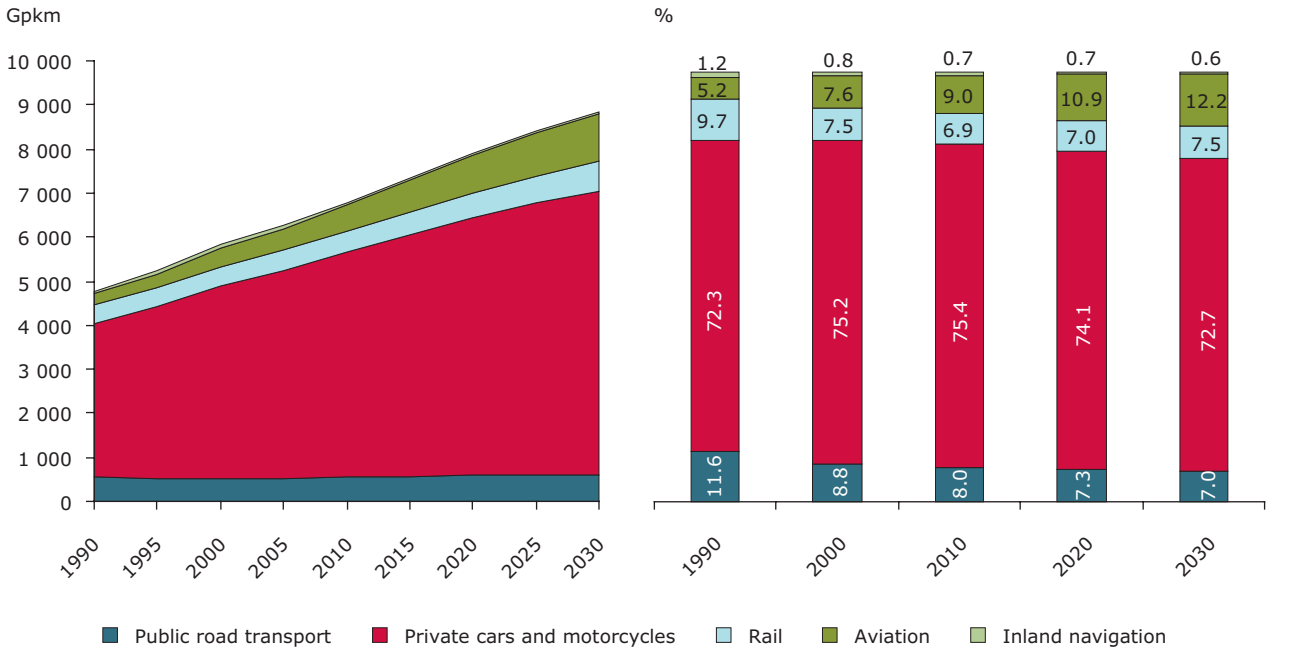
Some examples of positive developments related to mobility are being seen, including the rapidly expanding high-speed train system in some European countries, the renaissance of research into the technical and commercial aspects of electric vehicles, the potential abatement of GHG emissions from aviation by its integration into the European emission trading scheme, the European clean air programme to tackle air pollution, and noise mapping. However, it is clear that further action is needed to reduce the environmental footprint of European mobility.

Strategies for reducing the environmental impacts of transport include (BUND et al., 2008 and Dalkmann and Brannigan, 2007):

- **avoid:** reduce overall transport demand by intelligent urban and regional design — compact cities and a polycentric regional development;
- **shift:** improve system efficiency by promoting a shift from less to more sustainable modes, such as from air to rail or from car to public transport or non-motorised modes; or car sharing rather than individual ownership;
- **improve:** technological improvement of vehicles and promotion of cleaner vehicles.

Policies aimed at managing the environmental pressures of mobility should tackle all these three areas to be successful. A number of policy instruments have been used: regulation such as speed limits or fuel-efficiency standards, economic instruments like taxation on cars and fuels, congestion charges or increased parking fees,

Figure 6.6 Trends and outlooks in passenger transport demand for the different modes of transport, EU-25, 1990–2030



Note: Figures for aviation and inland navigation only include intra-EU air and sea travels.

Source: EEA, 2010c. Figures after 2005 are based on projections.

information-based instruments like information on fuel consumption and CO_2 emissions of new cars, voluntary agreements with industry including voluntary targets on fuel efficiency and education such as eco-driving campaigns (ETC/SCP, 2009 and Böhler et al., 2009).

These measures are most effective when applied in an appropriate mix, complementing each other and targeting relevant actors, rather than used on their own. Furthermore, as the drivers of demand for transport are often outside the transport policy area, for example in spatial patterns, urban design, and production and distribution systems, transport policy must be integrated with other policies, particularly within urban and regional planning and health planning (EEA, 2007).

Some economic instruments used to discourage car use are included in Box 6.1. However, if such instruments are to be effective, they must be combined with investment in viable alternatives such as effective public transport systems and bicycle lanes, thereby making sustainable alternatives attractive. Bicycle action plans such as those implemented in Denmark and Germany (TRM, 2007 and BMVBS, 2002) and city-bike systems and investments in cycling infrastructure such as the United Kingdom's Cycling City, Cycling Town could be used to promote cycling in place of motorised transport.

Integrating sustainable mobility concepts into urban planning is also crucial. For example, the EC's 2009 Urban Mobility Action Plan (EC, 2009b) develops measures identified in the European Green Paper on Urban Transport (EC, 2007). It highlights the responsibility of local, regional and national authorities in developing urban mobility policies that have the promotion of sustainable transport at their core. One theme in the plan, The optimisation of urban mobility, describes the importance of affordable and family-friendly public transport solutions to promote reduced car-dependence.

A study carried out for the European Commission concludes that GHG emissions from transport in the EU could be reduced by 89 % by 2050 compared with 1990 levels if all the options currently available are embraced with bold actions. To achieve such reductions, non-technical measures, including better spatial planning and use of economic instruments to internalise the externalities of transport as well as removal of harmful subsidies, etc. are essential (EC, 2010).

Box 6.1 Use of economic instruments in the area of transport

Pricing of passenger transport can focus on different issues: ownership and size of cars (vehicle tax), fuel consumption (energy tax or green taxes), and the use of transport infrastructure (road-pricing, congestion charging, parking fees) (Böhler et al., 2009).

Feebate systems that combine a fee and a rebate have been introduced in several EU Member States. Examples include the French Bonus-Malus scheme and the Danish differentiated registration levy. These systems introduce CO_2 emission rates in the registration of cars combining elements of both a fee and a rebate thus providing a price incentive for cars with lower CO_2 emissions. A recent study (JRC/IPTS, 2009) found that the feebate instrument could benefit both the environment and the economy.

Green taxes on fuel consumption have already been implemented in several European countries either as fuel taxes or as carbon taxes. In the United Kingdom and Germany the environmental benefits included reductions in fuel use and emissions, and vehicle kilometres were found to be below expectations (Green Fiscal Commission, 2009; UBA, 2005).

Congestion charges, in combination with improved public transport, have proved to be very effective in reducing impacts, but to date have had only very limited application. The London congestion charge introduced in 2003 has led to a reduction in traffic by 18 %, which accounts for 150 000 tonnes of CO_2-reduction per year (Siemens AG, 2009). Similarly, the Stockholm congestion charge, introduced in 2006, resulted in a 25 % reduction in traffic during its 6-month trial period (Eliasson, 2007; Pike, 2010). A study for Switzerland showed that a nationwide kilometre-based charge could reduce traffic by 4–7 % (ARE, 2007).

7 Tourism

7.1 Trends in consumption

Europe is both a key tourist destination — six EU Member States are in the world's top ten destinations, with France heading the list — and a key source of tourists taking trips within Europe and to many other parts of the world (UNWTO, 2010). The EU tourism industry is of high economic importance, generating more than 5 % of EU GDP and employing around 5.2 % of the total labour force, and these figures double if indirect effects are included (EC, 2010). This section focuses, where data allow, on Europeans as tourists.

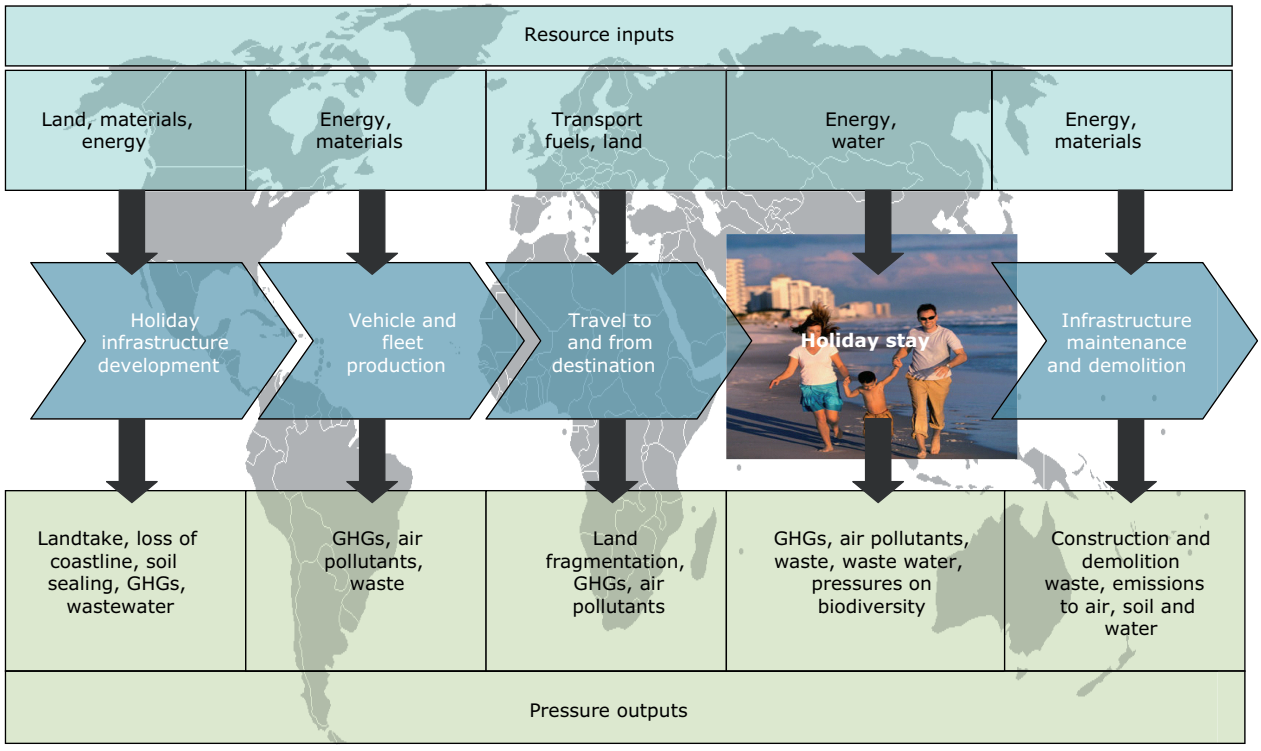
Leisure trips are becoming more frequent, and shorter (Eurostat, 2008; OECD, 2010), although the economic crisis may have temporarily curbed the growth in tourism. The spread of low-cost air travel has been an important driver of the growth in the number of trips and the trend towards more frequent and shorter stays. The number of people with time and money for tourist trips has generally increased in Europe, especially among the elderly, singles, and couples without children (Eurostat, 2008).

There are indications that tourism is spreading uncontrolled in some areas, for example the Greek islands (EEA, 2010b) and Croatia (UNEP/MAP/BLUEPLAN, 2008). In addition, second homes are becoming more and more attractive. For example, in France, the building of second homes in coastal municipalities has increased by a factor of 2.5, compared to 1.7 for regular residential houses in the past 40 years (INSEE, 2009).

7.2 Life-cycle environmental impacts of tourism

Tourism has multiple environmental impacts inside and outside Europe, including from travel to destinations,

Figure 7.1 How the tourism value chain impacts the environment



Source: Compiled by EEA-ETC/SCP.

the building of facilities such as hotels, second homes or tourism infrastructure and activities at the destinations (Figure 7.1). Life-cycle assessment studies on tourism are sparse and often related to a specific hotel or destination (De Camillis et al., 2010).

Transport connected to tourism accounts for about 8 % of GHG emissions in the EU-15 (Working Group on Sustainable Tourism, 2007) and the choice of transport mode to and from the destination is by far the most influential factor in overall GHG emissions from tourism, as illustrated by the emissions associated with different types of typical holiday trips of German tourists (Figure 7.2). In the EU-15, most trips are made by car, followed by air. Car travel accounts for about 41 % of GHG emissions from tourism (Working Group on Sustainable Tourism, 2007), and trips made by plane account for about 55 % despite only being used for 20 % of trips (UNWTO and UNEP, 2008). In the Mediterranean countries, the share of tourists arriving by plane increased from 23 % to 40 % between 1988 and 2006 (UNEP/MAP-Plan Bleu, 2009).

Some tourist activities, such as swimming and golf, are responsible for heavy water use, often in regions with few water resources. In sensitive regions such as the Mediterranean or the Alps, tourism is thus an important cause of water shortages and the degradation of water supplies (EEA, 2009a; EEA, 2010c, 2010d). In order to meet high tourist water demands, in some cases drinking water is even transported over long distances by ship, for example to some of the Greek islands (EEA, 2010b).

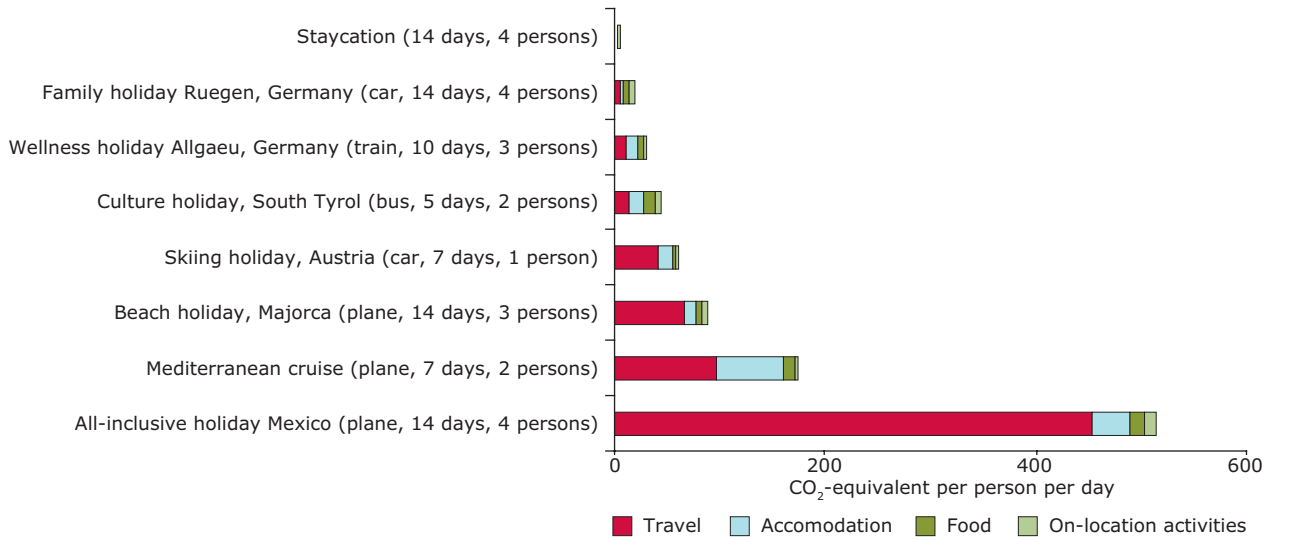
Although highly dependent on environmental quality, tourism, through the construction of hotels, second/holiday homes, marinas, skiing facilities, and other attractions, is an important driver of land take and degradation, especially in coastal areas. Together with other tourism-related pressures, such as over-visiting vulnerable habitats, disturbance of wildlife, sale of endangered species to tourists, trampling of dune environments, this contributes to the loss of habitats for wildlife (UNEP/MAP/BLUEPLAN, 2008; see also EEA, 2010e). Tourism based on observation of marine wildlife is both an opportunity and a threat to biodiversity if the intensity of such activities is not controlled (UNEP/MAP/BLUEPLAN, 2008).

The growth in tourism is proving to be especially environmentally damaging in some mass tourist destinations such as the Mediterranean coasts and islands and the Alps. And as mass tourism spreads further to the coastal areas of the Southern Baltic Sea, Brittany and the Black Sea, similar environmental degradation is occurring and can be expected to continue (EEA, 2006). In the Alps, winter tourism is growing rapidly, often extended by artificial snow-making, which is not only energy-intensive but has high water demand in a season of low water levels, thus putting pressures on lakes, rivers and groundwater, and enhances flood risks when the snow melts (EEA, 2009b).

7.3 Tourism outlooks and scenarios

Before the economic recession, total tourist travel was forecast to grow by 122 % between 2000 and 2020, with a related increase in CO_2 emissions from European tourism of 85 % (Simpson et al., 2008). Tourist air travel is expected

Figure 7.2 **GHG emissions for some types of holiday trips from Germany, CO_2-equivalent per person per day**



Note: Staycation means a holiday at home with holiday activities locally.

Source: WWF, 2009.

Box 7.1 What if? Effects of climate change on tourism and possible future scenarios

Climate change is expected to affect major tourism areas in Europe. For example, water demand for tourism is likely to increase with climate change, with warmer and longer summers driving up demand and worsening water stress, especially in the popular Mediterranean destinations (see also EEA, 2010b).

Winter tourism areas such as those in the Alps might face shorter snow seasons (EEA, 2009b). What if winter tourism regions react by using more artificial snow-making to keep winter sports enthusiasts coming, leading to increased energy and water consumption? Ski resorts might also opt to build large-scale indoor winter sports facilities with the associated need for cooling energy, similar to the ones that already exist in several European countries, thereby adding further to climate change.

But tourist resorts in the Alps might also opt for withdrawing from winter tourism, compensating by developing summer tourism, promoting more sustainable options, including agri-tourism, eco-labelled tourist accommodation and investing in the maintenance of the Alpine ecosystems keeping them attractive for tourists.

to continue to increase, though the growth trend for air travel, including tourism, slowed during 2006–2007 (EEA, 2010a).

The face of tourism is changing: it is expected that experimental tourism — which includes eco-tourism, nature, heritage, cultural, and soft adventure tourism, as well as sub-sectors such as rural and community tourism — is among the sectors that will grow most quickly over the next two decades (TIES, 2006).

7.4 Responses

European Commission communications include: a renewed EU tourism policy: towards a stronger partnership for European tourism (EC, 2006); an agenda for a sustainable and competitive European tourism (EC, 2007) and Europe, the world's No 1 tourist destination — a new political framework for tourism in Europe (EC, 2010). The 2010 Communication proposes a number of actions to promote the development of sustainable, responsible and high-quality tourism, including sustainability indicators for destinations, a charter for sustainable and responsible tourism, a prize for tourism businesses following the charter, and a strategy for sustainable coastal and marine tourism. At the same time, the communication proposes actions to remove barriers to tourism growth, and mobilise Community instruments and programmes to support tourism. The European Destinations of Excellence (EDEN) project is a voluntary initiative of the European Commission to promote sustainable tourism.

Improved waste and water management and energy efficiency in tourist destinations can help to reduce the environmental impacts of tourism. There are some, mostly voluntary, initiatives, such as the Blue Flag for European beaches and the European eco-label for tourist accommodation and campsite services, as well as many national and regional environmental certificates and labels for tourism businesses (Hamele and Eckardt, 2006; De Camillis, 2010) but mainstreaming these approaches remains a challenge. Several EU-funded schemes support the development of sustainable tourism, such as stakeholder collaboration in the tourist industry (TRAVELIFE), benchmarking for sustainable tourism (TOURBENCH), and cooperation of environmental labels in the area of tourism (VISIT) (De Camillis, 2010).

Use of the European Environment Management and Auditing Scheme (EMAS) certification is still quite limited for tourism with only 230 hotels and other accommodation in the EU having being certified (EMAS-register, 2010). Sustainability principles have been included in many national and regional tourism strategies, with Hungary having developed a dedicated eco-tourism strategy (EC, 2010; Hungary tourism report, 2008), and a number of activities to encourage sustainable tourism are being taken at national and local levels, including tourist carrying-capacity assessments, managing access to vulnerable areas to protect wildlife, and programmes aimed at greening tourist accommodation (UNEP/MAP/BLUEPLAN, 2008). However, assessments of whether these activities are successful in reducing the environmental impacts of tourism are lacking.

Little has been done to tackle the most important source of environmental pressures: air travel and car-based tourism. However, in July 2008 the EU agreed to bring the aviation sector into the EU Emissions Trading Scheme (ETS) system from 2012 (Directive 2008/101/EC), while the International Air Transport Association (IATA) announced that the air-line industry is committed to achieving carbon-neutral growth from 2020 globally (IATA, 2009).

Governments at all levels and tourism businesses increasingly recognise that investing in ecosystems that underpin regional attractiveness is essential for sustaining tourism, and tourism-related local taxes, entrance fees or concession licence fees to national protected nature areas, etc. might be a viable option to finance the maintenance

of ecosystems. Tourism could play a vital role in halting the loss of biodiversity if managed sustainably, building on, maintaining and restoring the ecosystems that it relies on and building stewardship for protected areas (Lefèvre and McCool, 2008). Natural heritage areas can serve as learning laboratories, where tourists can learn about biodiversity and how to protect it. At the same time, the United Nation's World Tourism Organization promotes sustainable tourism as a tool to alleviate poverty (UNWTO, 2004).

The Marrakech Process Task Force on Sustainable Tourism has developed a number of policy recommendations that highlight the responsibility of all stakeholders (ITF-SDT, 2009). Recommendations include:

- governments at all levels are recommended to integrate sustainable tourism planning into national and regional development plans;
- financing from national and international organisations (public and private) dealing with investments in public infrastructure related to tourism or investments in private tourism businesses should estimate their social and environmental impacts and adopt economic measures to compensate for and offset unavoidable impacts;
- corporations should adopt corporate social and environmental responsibility (CSER) principles in their tourism investments;
- guidelines for the behaviour of tourists at destinations should be promoted using networks, media and other communication channels;
- governments and businesses should set baseline and measurable targets, review progress and report progress towards the achievement of sustainable tourism objectives.

Overall, there are many initiatives in place in Europe and globally, but in sum the package of measures is not as robust and effective in addressing consumption impacts on the environment as those for other consumption areas such as food and drink, housing and mobility.

8 Concluding reflections: consumption, environmental priorities and policies

The SOER 2010 synthesis (EEA, 2010a) identifies four future environmental priorities in Europe to address the identified links between risks and increased uncertainties across the world:

- implementing and strengthening current environmental policies;
- dedicated management of natural capital and ecosystem services;
- coherent integration of environmental considerations across the many policy domains; and
- a greening of the economy.

This chapter takes, as its starting point, these four priorities and provides a perspective on the role of consumption within them. It does so by using the analyses of the previous chapters to discuss options and potential obstacles.

Finally, the chapter considers that public authorities at the EU, national and local levels are responsible for deciding on and implementing a policy framework and policy instruments. However, they cannot ensure more environmentally sustainable consumption without business and citizens playing an active and complementary role in a triangle of change (Figure 8.1).

8.1 Consumption and current environmental policies

A broad range of policies, environment-related or not, set the framework for consumption patterns, including, for example, the EU Common Agricultural Policy (CAP), EU transport policies, the Cohesion Policy, and trade policies. All these influence the relative prices and availability of different goods and services.

The focus of EU environmental policies on sustainable consumption and production has gradually evolved over recent decades from a focus mainly on cleaner production, through sustainable products to a more holistic approach to sustainable consumption and production.

The overall EU policy framework dedicated to addressing the environmental impacts of consumption is the EU Action Plan on Sustainable Consumption and Production and Sustainable Industrial Policy (EC, 2008a). It seeks to improve the supply, and stimulate demand for, sustainable products and services. This includes the strengthening and extension of the Eco-design Directive, the EU Eco-label and Energy Label Directives, and Green Public Procurement (Box 8.1). The EU Action Plan thus mainly makes use of regulatory, information-based and voluntary instruments.

At the national level, at least 15 EU Member States have adopted national SCP strategies either as stand-alone overarching SCP strategies or action plans — the Czech Republic, Finland, Poland and the United Kingdom — or as a key theme within national sustainable development strategies — Austria, Belgium, Denmark, Finland, France, Hungary, Italy, Malta, the Netherlands, Romania and Sweden (EEA, 2010; Watson et al., 2009 and Adell et al., 2009). There is a great potential in sharing good practices from the design and implementation of such policies.

Policies in the EU and in individual EEA member countries have, in most cases, focused on products, by promoting the supply of more sustainable products and encouraging consumers to buy these through the use of labelling or other information-based instruments (Berg, 2007; Tukker et al., 2008; Rubik et al., 2009). In addition, at national and local levels, economic instruments are increasingly being used particularly for influencing energy and water consumption, mobility behaviour and waste (Table 8.1).

Research shows that policy implementation using a single type of instrument alone often has limited impact. Using a complementary mix of various types of policy instruments addressing different groups of actors is likely to increase the effectiveness of policy implementation in the field of SCP (OECD, 2010; Rubik et al., 2009; Jackson, 2005; Jackson and Michaelis, 2003).

Labelling has, in a few cases, proved effective, for instance in the case of electrical appliances for which energy efficiency labels have helped drive significant improvements over the past decade. In addition, well-designed consumer campaigns can help raise awareness and contribute to influencing behaviour, especially if campaigns are linked to other instruments and particularly in areas where awareness levels are low. A recent OECD study found that in addition to the key

Table 8.1 Examples of sustainable consumption policy instruments in place at EU and national levels

Policy instrument	EU level examples	National and local examples
Economic instruments	Energy Taxation Directive Vignettes for Heavy Good Vehicles The *EU Emissions Trading Scheme*	Energy and fuel taxes, emission-based car taxation, water fees, subsidies for installation of renewable energy systems and energy-saving measures in buildings, traffic congestion charges, deposit-refund schemes
Regulatory instruments and standards	The EU *Ecodesign Directive on energy-related products*, several waste-related directives aiming at enhancing recycling, and the EU *RoHS Directive*.	Regulatory requirements for energy performance of buildings (e.g. the German *Federal Ordinance on Energy Saving*)
Voluntary agreements	The *EU Retail Forum,* the *European Food SCP Roundtable* and the Communication on *Green Public Procurement;* the *EU-Asia partnership on Sustainable Consumption and Production (SWITCH Programme), the European Destinations of Excellence (EDEN) project to promote sustainable tourism*	Public-private partnerships, for example the Austrian *Sustainability Seal*, the British *Red/Green Calculator,* the German *Sustainable Retail Initiative* or the French retailers' commitments with regard to sustainable development.
Information-based instruments	The European *Ecolabel Regulation* (including its revision), the *EU Organic food label* and the Energy Label including its extension to more products, the *Control Climate Change* campaign, and the *Buying Green* Handbook	Numerous guidelines and portals, for example, *Topten* (Switzerland) and *topprodukte.at* (Austria). Campaigns include *Love Food, Hate Waste* (the United Kingdom), *Et ton mindre* (Denmark) or *Faisons vite, ça chauffe* Energy Campaign (France).

Note: Additional examples of sustainable consumption policies can be found in pilot SCP policy factsheets for six European countries developed by the EEA and the ETC/SCP (2009).

Source: Based on ETC/SCP and EEA, 2009; ETC/RWM and EEA, 2007 and Watson et al., 2009.

role played by economic instruments, information to consumers and education have a complementary role to play in inducing changes on the demand side (OECD, 2010).

However, as discussed in Chapter 3, raising environmental awareness alone is often not an effective approach for reaching all consumers (OECD, 2010). In general regulatory and economic instruments have a higher impact than softer informative ones (Tukker et al., 2008; Rubik et al., 2009; Jackson, 2005). Overall, current policies are rather incremental than transformative (WEF, 2010a).

8.2 Consumption and management of natural capital and ecosystem services

Sound management of natural capital and ecosystem services requires, inter alia, increased resource efficiency in production as well as in consumption (EEA, 2010a). Consumers and public authorities in Europe consume resources directly, for example when eating or drinking, building or renovating houses, and indirectly through the resources used in the life-cycles of the goods and services they use. Thus, efficiency in consumption is an essential part of increasing the overall resource efficiency within society with the aim of better management of our natural capital — water, land, biodiversity and soil, and ecosystem services.

Increasing the resource efficiency of consumption can be achieved either through eco-improvements in products or through changes in consumption patterns, both within — switching from car to bicycles and walking — and between consumption categories — spending less on mobility and more on recreation and culture.

The SOER 2010 synthesis (EEA, 2010a) recognises that an ecosystem-based approach is essential for managing the demands for resources in Europe. Through the increase in imports, European consumption is increasingly linked to ecosystems in the rest of the world, as shown in Chapter 2. Policies directed at making European consumption more sustainable, together with international cooperation on the better management of ecosystems, can therefore complement policies directed at preserving natural capital and ecosystem services in Europe.

Policies and initiatives to provide information on ecosystem and other lifecycle aspects of consumption in Europe have expanded in scope and recognition in recent years, although we have to recognise that information is not an effective instrument for all types of consumers, as argued in Chapter 3. Examples of such initiatives are the Forest Stewardship Council and the Marine

Stewardship Council, recent draft legislation to prevent illegally-logged timber and timber-based products from entering the EU market, and other supply-chain initiatives.

In Chapter 2, it was shown that the environmental pressures and material resource intensities per euro spent varied considerably for different consumption categories. Consumption of food and drink, mobility and housing have the highest pressures and material resource use per euro spent. Since these consumption categories also make up considerable parts of overall European consumption, they are the areas with the highest potential in terms of reducing environmental pressures caused by consumption patterns.

8.3 Consumption and integration of environmental considerations across policy domains

The SOER 2010 synthesis (EEA, 2010a) concludes that where environmental pressures correspond to multiple sources and economic activities — including consumption — there is a need to ensure coherence in the way we tackle the challenges. It identifies consumption, in particular housing, food and mobility as significant areas to address. The other clusters are territorial cohesion, resource efficiency and ecosystem management; agriculture, forestry, maritime and green infrastructure; and sustainable production, intellectual property rights, trade and aid.

Research into innovative approaches to SCP policy-making has shown the emergence in European academic and policy circles of new systems thinking about the dynamics of innovation and entrepreneurship for sustainable consumption and production. At the heart of this is a recognition of the systemic nature of new, long-term, global sustainability challenges such as climate change, which in turn require transitions in the systems that fulfil key societal needs like mobility, shelter, food and energy (Geels et al., 2008; Tukker et al., 2008). However, innovative system-oriented policy instruments do not fit easily into existing institutional and departmental frameworks.

Sustainable consumption is, by its nature, a broad field touching policy areas such as environment, climate change, energy, economy, industry, agriculture, transport, education and health. Tackling unsustainable consumption will require cooperation across these areas to deliver coherent, cost-effective sustainable consumption policies. Examples of policy fields relevant to achieving more sustainable consumption, which could benefit from a close cooperation across traditional policy domains, include sustainable transport policy, policies to promote corporate social responsibility (CSR), integration of sustainable consumption in education at all levels, agri-environmental policy, and spatial planning.

Many sustainable consumption policies are fully coherent with targets and policies in other areas. For example, the EU Energy Label Directives and the Eco-design Directive contribute directly to meeting EU climate change and energy targets. And policies to limit fuel use in cars and encourage a shift to public transport contribute to reducing our dependence on fossil fuels and meeting climate change and air pollution objectives and targets.

However, there are also cases where policies in specific sectors are not fully coherent with sustainable consumption policies or objectives. One example is the Common Fisheries Policy (CFP), which has been found to cause significant negative environmental impacts.

In the future, it is of the utmost importance to ensure that policies addressing sustainable consumption and policies in other areas are coherent and mutually supportive.

Measuring progress is key to achieving a successful transition to more sustainable consumption. The EEA and its European Topic Centre for Sustainable Consumption and Production (ETC/SCP) have developed a framework of indicators for reporting on progress in SCP in Europe (ETC/SCP, 2010).

8.4 The role of consumption in greening the economy

As consumption and production are the two main pillars of the economy, making consumption more environmentally friendly is vital if we are to move the economy on to a more sustainable footing. An integrated approach that targets both the supply and the demand side, should be taken in policy interventions.

The United Kingdom's Sustainable Consumption Roundtable (2006) suggests that there is a need for a mix of complementary policy responses that enable, encourage, exemplify and engage people, businesses and public authorities in what they call the 4 Es:

- **e**ncourages, including through the tax system, reward schemes, penalties and enforcement;
- **e**nables, for example through giving information, education, providing facilities and infrastructures and removing barriers;
- **e**ngages, through community action, media campaigns, networks, etc.;

- **e**xemplifies, by leading by example and achieving consistency in policies.

In practice, encouraging, enabling, engaging and exemplifying sustainable consumption more effectively will require intelligent and innovative policy packages that mix different complementary policy instruments — regulation, economic instruments, information and awareness-raising, voluntary agreements and investments in infrastructure (Rubik et al., 2009; Berg, 2007; Jackson and Michaelis, 2003; Sustainable Consumption Roundtable, 2006).

Such an approach is necessary to tackle the rebound effect and enhance policy coherence. The main objective should be to make sustainable alternatives available, affordable and attractive as well as to make consumers aware of them. Connected to this is the need to develop social norms and societal values that support sustainable lifestyles. This work has begun in the research community but needs to be translated into concrete policy initiatives.

Public authorities, which are responsible for 16 % of all European consumption (Chapter 1) can play a leading role through environmentally sustainable procurement and thus contribute to an increase in resource efficiency and setting an example for consumers and business (Box 8.1).

A major reason that consumption and production is negatively affecting the environment and causing overuse of resources is that the costs of environmental and resource degradation to society are not fully reflected in the prices of goods and services. Thus, many goods are relatively cheap even though they cause major harm to the environment, ecosystems or even human health. And goods and services that are less harmful or benign according to environmental, resource and even societal criteria are often more expensive as they are more costly to produce.

Environmental fiscal reform through the use of economic instruments aims to better integrate such external effects in the prices of goods and services through the use of economic instruments — removing subsidies for activities that have high external effects as well as financially supporting activities that have no or very low external effects.

The rationale of the environmental fiscal reform approach is not to increase the overall tax burden of an economy but to shift it in a revenue-neutral manner from taxes levied on economic functions, such as labour, personal income tax, and capital, corporate income tax, to taxes levied on environmental pressures and natural resource use as well as reforming environmentally harmful subsidies. The redistribution of tax burdens across the economy would provide appropriate signals to consumers and producers and lead to a better functioning of markets and increased welfare, as it moves society to a more sustainable development path (EC, 2010b; Ekins and Speck, 2011; Andersen and Ekins, 2009; EEA, 2005).

Box 8.1 Green public procurement

Green Public Procurement (GPP) means that public authorities and services take account of environmental factors when procuring products, services or works. Its merits often include not only direct savings and reducing the ecological footprint of the public sector, but also:

- helping to strengthen markets for green(er) products and services and stimulate environmental innovation;
- providing long-term economic savings, particularly where products consume large amounts of resources over their lifetime;
- contributing to changing societal norms, leading by example;
- potentially creating green jobs and reducing social costs via reduced environmental impacts.

In 2003, the European Commission recommended that Member States adopt national action plans on GPP by the end of 2006. To date, 20 Member States have adopted such plans: Belgium, Cyprus, the Czech Republic, Denmark, Finland, France, Germany, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, and the United Kingdom (EC, 2010a; REC, 2008). Three further Member States are in the process of adopting plans — Austria, Hungary and Romania — and four are in the process of preparing them — Bulgaria, Ireland, Estonia and Greece (EC, 2010a).

A 2008 study for the European Commission (PWC, 2008) demonstrates that there are seven front runners (Austria, Germany, Denmark, Finland, the Netherlands, Sweden and the United Kingdom) implementing GPP at a rapid rate. They had, on average, 55 % of the total number of contracts in 2006/2007, representing 45 % of the total value, in line with GPP requirements in ten priority sectors.

A new impetus has been given to GPP by the publication of the EU's Communication on Public Procurement for a Better Environment (EC, 2008b) which has been followed by the development of GPP criteria, in close cooperation with all stakeholders. As of August 2010, GPP criteria had been developed for 18 product groups.

In addition to public authorities, private companies also have great purchasing potential and there is significant potential for stimulating private companies to incorporate green demands in their dealings with subcontractors.

A combination of stringent carbon reduction targets, and the need for a number of European governments to increase revenues from taxation has led to a resurgence of interest in carbon/energy taxation and environmental fiscal reform with Denmark, Ireland and Sweden all either introducing new or redesigning existing environmental taxes in 2009. In recent decades, we have seen many policies that have improved the environmental sustainability of production in Europe mainly through regulations and the setting of standards, and to some extent economic instruments including taxes on CO_2 emissions; wastewater treatment; use of sand, gravel and stone; and landfill.

Economic instruments are used in European countries to some extent to create incentives for behavioural changes to more sustainable consumption patterns (OECD/EEA, 2010). Instruments aimed at the provision of household services — user charges for water, sanitation and waste — or transport — fuel taxes and congestion charging — are used in many countries. However, few countries have developed more ambitious demand-side policies incentivising lifestyle changes through the introduction of environmental fiscal reform, shifting taxes from labour to resource use and environmental pressures.

As the SOER 2010 synthesis (EEA, 2010a) argues, the evidence for the benefits of environmental fiscal reform, including environmental benefits, employment gains, stimulus to eco-innovation and more efficient tax systems, has grown in recent years.

8.5 The triangle of change — the role of different actors on the road to greening the economy

The analyses made throughout this assessment and the arguments presented in this section suggest that governments have a crucial role in providing the framework to make consumption more sustainable. However, although governments can enable this change, citizens and business also need to play an important role and have to take considerable action.

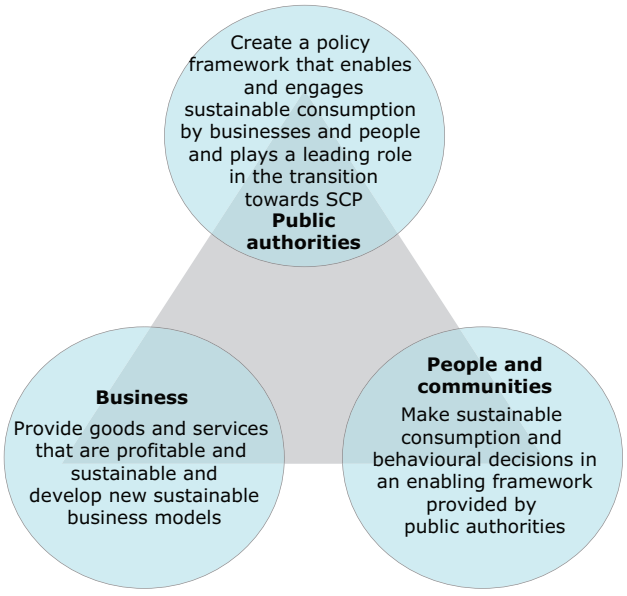
The triangle of change (Figure 8.1) is based on the recognition that neither businesses nor people nor policymakers can solve the problems alone. Rather they must work together, each having their own role to play (UK Sustainable Consumption Roundtable, 2006). The hope that green consumers or green businesses alone will save the day is unlikely to lead to sustainable consumption. In addition to creating a policy framework for sustainable consumption, governments themselves can play a leading role by building partnerships and showing the way forward, for example through providing sustainable spatial design and infrastructure, and green public procurement (Box 8.1) (Tukker et al., 2008).

Examples of business responses related to the supply of more sustainable products and services include eco-design, cleaner production and sustainable supply-chain management. Examples of business responses related to increasing the demand for sustainable products and services include environmentally sustainable corporate procurement, eco-labelling, green marketing and choice editing.

The transition to sustainable goods and services also involves changes to the business models from the current focus on material throughput to a focus on for instance the creation of values and welfare, with sustainable entrepreneurship and innovation playing a key role. One example of such a change is moving away from offering a product to offering a service, the so-called product-service systems (WEF, 2010a). Examples of such business models includes movie rentals, leasing of white goods, photocopiers, etc. and car-sharing schemes in which a company invites several individuals to pay to get access to the same car at different times. Product-service systems can potentially reduce the overall life-cycle environmental impacts of products and there is thus a great potential to expand such innovative business models to other products, such as PCs, TVs, mobile phones, and do-it-yourself tools.

Part of the business sector acknowledges the need for a transition to sustainable consumption, and many businesses and business associations have launched initiatives related to sustainable consumption. One example is the World Business Council on Sustainable

Figure 8.1 Triangle of change



Source: EEA, based on UK Sustainable Consumption Roundtable, 2006.

Development, another is the World Economic Forum's Sustainable Consumption Initiative in which a cross-industry group of companies and a network of sustainable consumption experts are developing practical ideas and new forms of collaboration putting sustainability at the heart of business models (WEF, 2010b).

The central position of retailers in the product chain provides an opportunity for them to play a key role on the path towards sustainable consumption. More research into what authorities can do to stimulate action by retailers towards SCP, both through supply chain management and choice editing, would be an important first step in this direction.

Some citizens — either as individuals or through community-based initiatives, consumer organisations and NGOs — have acted independently, playing a role as pioneers and agents of change in normalising and mainstreaming sustainable ways of living. Examples include the Transition Towns movement, the Co-housing Community and the Alliance of Climate-friendly Settlements in Hungary. However, it is crucial to recognise that placing the responsibility on individuals to make voluntary decisions in isolation is unlikely to bring about sufficient widespread changes in behaviour rapidly enough.

Thus, as illustrated above, some businesses and citizens are taking action towards more sustainable consumption in Europe. Public authorities at all levels — including at the EU level, national governments and local governments — are taking action towards putting better frameworks in place and implementing policies towards sustainable consumption. However, the policy area of sustainable consumption is still in its infancy and many options remain completely unexplored.

As shown in this assessment, there is huge potential for reducing environmental impacts in Europe and other regions of the world through changing private and public consumption patterns in Europe. Such changes could be instigated through policy packages that include legislation, taxes on environmentally harmful consumption, voluntary instruments with business and citizens, information-based instruments, including awareness-raising campaigns and labels. Together they would provide a necessary and effective supplement to the efforts to improve technologies and regulate environmental impacts from production in Europe.

The assessment also shows the systemic nature of the environmental impacts from consumption (and production) and the many common avenues for achieving sustainable consumption and production. Both reflections argue strongly for transformative responses that start from the natural environment and the resources and services it provides for our well-being, and linking much better existing actions so as to deliver timely, effective and cost-efficient improvements in times of economic and financial crises.

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3 Understanding what shapes current and future consumption

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