Environment at a Glance

OECD Environmental Indicators

OECD

2005

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ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

Organisation for Economic Co-operation and Development

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FOREWORD

Environmental indicators are essential tools for tracking environmental progress and supporting policy development and evaluation. Since the early 1990s, such indicators have gained in importance in many countries and in international fora. They are used in reporting, planning, clarifying policy objectives and priorities, budgeting, and assessing performance. Countries are also increasingly interested in using a reduced number of indicators selected from larger sets, to inform civil society and to support wider communication with the public.

The OECD pioneered the development of international environmental indicators and has long supported its member countries' efforts in this field. It has developed and published the first international sets of environmental indicators and uses them regularly in its country environmental performance reviews and other policy analysis work. Central to the OECD work are core environmental indicators included in the OECD Core Set to measure environmental progress, complemented with several sets of sectoral environmental indicators to help integrate environmental concerns in sectoral policies such as energy, transport and agriculture. Indicators are also derived from environmental accounting mainly from natural resource and environmental expenditure accounts, and work is done on indicators to measure the decoupling of environmental pressure from economic growth.

The present report is one of the products of the OECD programme on environmental indicators. It is updated at regular intervals and includes core environmental indicators from the OECD Core Set, including selected socio-economic and sectoral indicators having an environmental significance, and the sub-set of key environmental indicators, endorsed by OECD Environment Ministers in May 2001 for public information and communication by OECD.

This report was prepared by the OECD Secretariat, but its successful completion depended on personal or official contributions by many individuals in Member countries, and on the work and support of the OECD Working Group on Environmental Information and Outlooks. This report is published on the responsibility of the Secretary General of the OECD.

Lorents G. Lorentsen
Director
OECD Environment Directorate

The indicators in this report build on data published in "OECD Environmental Data - Compendium 2004". Some were updated or revised on the basis of data from other OECD and international sources available to the OECD Secretariat before May 2005 and on the basis of comments from national Delegates as received by the 1 April 2005.

These data come from the OECD SIREN* database, which is regularly updated with information provided by Member countries' authorities (through biennial data collection using the OECD/Eurostat questionnaire on the state of the environment), from internal OECD sources and from other international sources. The data are harmonised through the work of the OECD Working Group on Environmental Information and Outlooks (WGEIO) and benefit from continued data quality efforts in OECD member countries, the OECD itself and other international organisations.

In many countries, systematic collection of environmental data has a short history; sources are typically spread across a range of agencies and levels of government, and information is often collected for other purposes. When reading this report, one should keep in mind that definitions and measurement methods vary among countries, and that inter-country comparisons require careful interpretation. One should also note that indicators presented in this report refer to the national level and may conceal major sub-national differences.

* System of Information on Resources and the Environment

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INTRODUCTION

THE OECD WORK ON ENVIRONMENTAL INDICATORS

APPROACH AND RESULTS[1]

The OECD programme on environmental indicators, initiated in 1989 and carried out in close co-operation with OECD member countries, has led to the development of several sets of indicators using harmonised concepts and definitions. It builds on the assumption that:

- there is no unique set of indicators; whether a given set is appropriate depends on its use;
- indicators are only one tool among others and have to be interpreted in context.

It builds on the agreement by OECD member countries to:

- use the pressure-state-response (PSR) model as a common reference framework;
- to identify indicators on the basis of their policy relevance, analytical soundness and measurability;
- to use the OECD approach at national level by adapting it to national circumstances.

PURPOSES

The work contributes to three major purposes:

- Measure environmental progress and performance.
- Monitor and promote policy integration, and in particular: ensure that environmental concerns are taken into account when policies are formulated and implemented for various sectors, such as transport, energy, agriculture; and ensure a similar integration of environmental concerns into economic policies.
- Monitor progress towards sustainable development by measuring the level of decoupling of environmental pressure from economic growth.

USE IN POLICY ANALYSIS

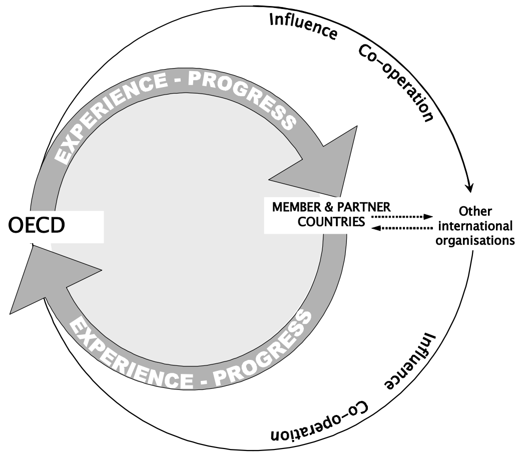
OECD environmental indicators are regularly published and used in the OECD's work. They are used in reviewing countries' environmental performance and in monitoring the implementation of the OECD Environmental Strategy. This is done by relating them to: quantitative objectives (targets, standards, commitments), or to broad qualitative objectives linked to the efficiency of human activities or to the sustainability of natural resource use; and by complementing them with specific national indicators and data to ease interpretation.

This systematic use in analytical work provides valuable feedback on the indicators' actual policy relevance and analytical soundness.

LINKS WITH NATIONAL AND INTERNATIONAL INITIATIVES

The development of environmental indicators has built on OECD experience in environmental information and reporting and has benefited from strong support from member countries, and their representatives in the OECD Working Group on Environmental Information and Outlooks.

Results of OECD work, and in particular its conceptual framework, have in turn influenced similar activities by a number of international organisations and countries. Continued co-operation is taking place in particular with: UN Statistical Division, UN Commission on Sustainable Development and UN regional offices; UNEP, and the World Bank, the European Union (Commission of the European Communities, Eurostat, EEA) and with a number of international institutes. Co-operation is also taking place with non OECD countries, and in particular with China, Chile and Russia.



[1] For further details on the OECD work for environmental indicators, see Part IV of this report and:
"OECD Environmental Indicators – Development, Measurement and Use", Reference Paper (http://www.oecd.org/env/)

THE OECD SETS OF ENVIRONMENTAL INDICATORS

Work carried out includes several categories of indicators, each corresponding to a specific purpose and framework:

TRACKING ENVIRONMENTAL PROGRESS AND PERFORMANCE

CORE ENVIRONMENTAL INDICATORS (CEI) are designed to help track environmental progress and the factors involved in it, and analyse environmental policies. They are included in the OECD Core Set of environmental indicators, commonly agreed upon by OECD countries for OECD use, and published regularly. The Core Set, of about 50 indicators, covers issues that reflect the main environmental concerns in OECD countries. It incorporates core indicators derived from sectoral sets and from environmental accounting. Indicators are classified following the PSR model: indicators of environmental pressures, both direct and indirect; indicators of environmental conditions; indicators of society's responses.

INFORMING THE PUBLIC

KEY ENVIRONMENTAL INDICATORS (KEI), endorsed by OECD Environment Ministers, are a reduced set of core indicators, selected from the OECD Core Set, that serve communication purposes. They inform the general public and provide key signals to policy-makers.

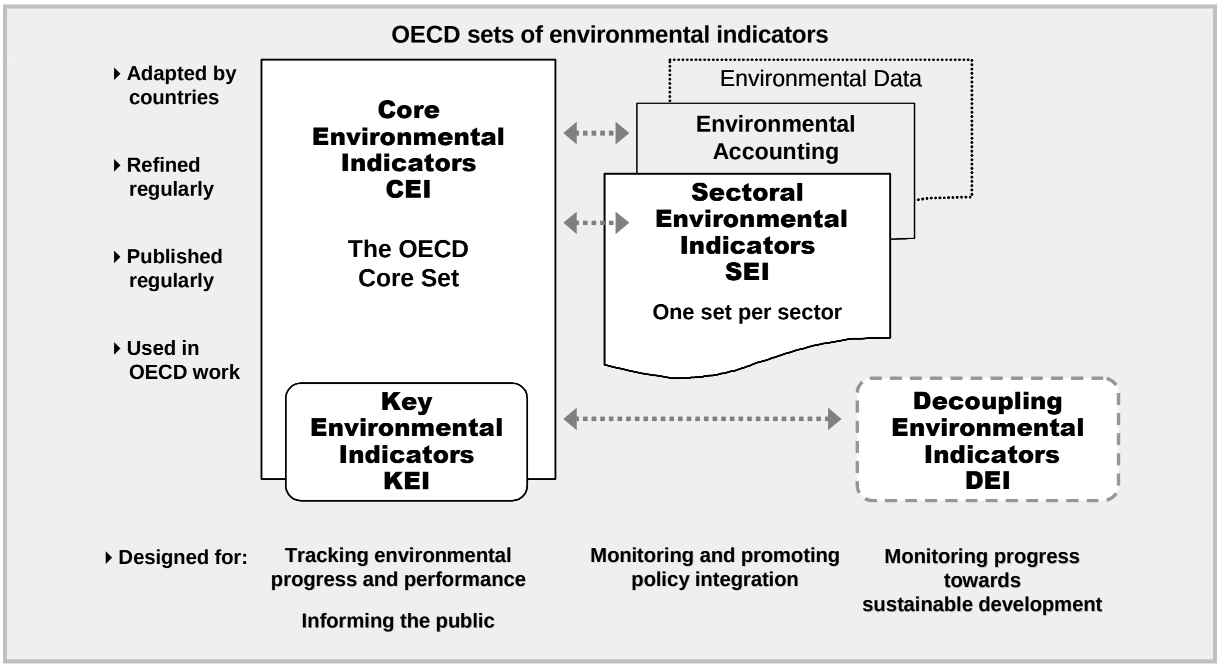
MONITORING AND PROMOTING POLICY INTEGRATION

SECTORAL ENVIRONMENTAL INDICATORS (SEI) are designed to help integrate environmental concerns into sectoral policies, i.e. ensure that environmental concerns are taken into account when policies are formulated and implemented for various sectors. Each set focuses on a specific sector (transport, energy, household consumption, tourism, agriculture). Indicators are classified following an adjusted PSR model reflecting: sectoral trends of environmental significance; their interactions with the environment (including positive and negative effects); and related economic and policy considerations.

INDICATORS DERIVED FROM ENVIRONMENTAL ACCOUNTING are designed to help integrate environmental concerns into economic and resource management policies. Focus is on: environmental expenditure accounts; physical natural resource accounts related to sustainable management of natural resources; and physical material flow accounts, related to the efficiency and productivity of material resource use.

MONITORING PROGRESS TOWARDS SUSTAINABLE DEVELOPMENT

DECOUPLING ENVIRONMENTAL INDICATORS (DEI) measure the level of decoupling of environmental pressure from economic growth. In conjunction with other indicators used in OECD country reviews, they are valuable tools for determining whether countries are on track towards sustainable development. Most DEIs are derived from other indicator sets and further broken down to reflect underlying drivers and structural changes.



THE 2005 PUBLICATION

CONTENT

The present report updates the 2001 publication "Towards sustainable development – Environmental indicators".

Core environmental indicators

It includes core environmental indicators (CEI) from the OECD Core Set (Part II), including selected socio-economic and sectoral indicators with environmental significance (Part III).

Each indicator section in Parts II and III includes:

- a brief statement on the issue referred to and its importance for environmental performance and sustainable development;
- an overview of related OECD work and references, including a schematic description of the conceptual framework in which the indicators are placed, i.e. the PSR model for OECD core environmental indicators (CEI) and the adjusted PSR model for OECD sectoral environmental indicators (SEI);
- a summary of major trends.

Key environmental indicators

It also includes the sub-set of key environmental indicators (KEI) endorsed by Environment Ministers of OECD countries as a tool for use in OECD work and for public information and communication by OECD (Part I). This sub-set is an extract from the core indicators presented in Part II and is made available for free on the OECD's public website.

INTERPRETATION

The indicators in this publication are those that are regularly used in the OECD's work and for which data are available for a majority of OECD countries. It has to be noted that they are of varying relevance for different countries and have to be interpreted in context to acquire their full meaning.

No unique choice has been made as to the normalisation of the indicators; different denominators are used in parallel (e.g. GDP, number of inhabitants) to balance the message conveyed.

PROSPECTS AND FUTURE WORK

The OECD experience shows that environmental indicators are cost-effective and powerful tools for tracking environmental progress and measuring environmental performance. However, experience also shows significant lags between the demand for environmental indicators, the related conceptual work and the actual capacity for mobilising and validating underlying data. In the field of environmental statistics, differences among countries may be considerable and the establishment of reliable and internationally comparable data calls for continuous monitoring, analysis, treatment and checking.

Continued efforts are being done by the OECD to assist in further development and use of environmental indicators in OECD work and in OECD member countries, and promote the exchange of related experience with non-OECD countries and other international organisations. The aim is to:

- Improve the availability and quality of basic data sets, with a focus on comparability among countries, timeliness and coherence over time, and interpretability.
- Further develop concepts for medium term indicators and fill related data gaps paying particular attention to biodiversity and to indicators derived from environmental accounting, including material flow accounts.
- Link environmental data and indicators more closely to economic and social information systems.
- Link the indicators more closely to domestic goals and international commitments.
- Link the indicators more closely to sustainability issues.
- Complement the indicators with information reflecting sub-national differences;
- Further monitor indicator aggregation methods in use at national and international level, and produce aggregated indices when feasible and policy relevant.

I. OECD KEY ENVIRONMENTAL INDICATORS

KEY ENVIRONMENTAL INDICATORS

This part of the report presents key environmental indicators endorsed by OECD Environment Ministers in 2001 as a tool for use by OECD. It is based on the brochure on key environmental indicators made available on the OECD's public website[*].

BACKGROUND

The OECD, with the support of its Member countries, has long been a pioneer in the field of environmental indicators. It has developed and published the first international sets of environmental indicators and uses them regularly in its country environmental performance reviews and other policy analysis work.

Central to the OECD work are core environmental indicators included in the OECD Core Set, to measure environmental progress, complemented with several sets of sectoral environmental indicators to help integrate environmental concerns in sectoral policies. Indicators are further derived from environmental accounting and work is done on indicators to measure the decoupling of environmental pressure from economic growth.

During the 1990s, environmental indicators gained significant importance and are now widely used in OECD countries. They are used in reporting, planning, clarifying policy objectives and priorities, budgeting, and assessing performance.

WHY KEY INDICATORS?

Many OECD countries are also increasingly interested in using a reduced number of indicators selected from existing larger sets, to inform civil society and to support wider communication with the public.

To support such initiatives, the OECD identified in 2001 a small set of key environmental indicators, building on previous work and on experience gained in using environmental indicators in its policy work. The set has been endorsed in May 2001 by environment ministers of OECD countries for systematic use in the OECD's communication and policy work.

The key indicators are updated every year and are available for free. They build on data from the OECD SIREN database that is updated with information provided by Member countries authorities, from internal OECD sources and from other international sources, and published in the biennial OECD Environmental Data Compendium.

SELECTION CRITERIA

These key indicators have been selected from the core indicators included in the OECD Core Set of environmental indicators and are closely related to other environmental indicators sets developed and used by the OECD.

Their selection took into account: their:

- policy relevance with respect to major challenges for the first decade of the 21st century, including pollution issues and issues related to natural resources and assets;
- their analytical soundness;
- and the measurability of underlying data sets.

The indicators selected give a broad overview of environmental issues of common concern in OECD countries, and inform policy makers and the public about progress made and to be made.

It has to be noted that the indicators correspond to varying degrees of policy relevance and policy priority for different countries. Like other indicators they have to be interpreted in context and be complemented with country specific information to acquire their full meaning.

[*] http://www.oecd.org/env/

A DYNAMIC PROCESS

Like other indicator lists, the list of indicators is neither final, nor exhaustive; it will evolve as knowledge and data availability improve. Ultimately, the list is expected to also include key indicators for issues such as toxic contamination, land and soil resources, and urban environmental quality.

OECD set of key environmental indicators

POLLUTION ISSUES		Available indicators*	Medium term indicators**
Climate change	1.	CO_2 emission intensities Index of greenhouse gas emissions	Index of greenhouse gas emissions
Ozone layer	2.	Indices of apparent consumption of ozone depleting substances (ODS)	Same, plus aggregation into one index of apparent consumption of ODS
Air quality	3.	SO_x and NO_x emission intensities	Population exposure to air pollution
Waste generation	4.	Municipal waste generation intensities	Total waste generation intensities, Indicators derived from material flow accounting
Freshwater quality	5.	Waste water treatment connection rates	Pollution loads to water bodies
NATURAL RESOURCES & ASSETS			
Freshwater resources	6.	Intensity of use of water resources	Same plus sub-national breakdown
Forest resources	7.	Intensity of use of forest resources	Same
Fish resources	8.	Intensity of use of fish resources	Same plus closer link to available resources
Energy resources	9.	Intensity of energy use	Energy efficiency index
Biodiversity	10.	Threatened species	Species and habitat or ecosystem diversity Area of key ecosystems

** indicators for which data are available for a majority of OECD countries and that are presented in this report*

*** indicators that require further specification and development (availability of basic data sets, underlying concepts and definitions).*

CLIMATE CHANGE

MAIN POLICY CHALLENGES

- *Main concerns relate to effects of increasing atmospheric greenhouse gas (GHG) concentrations on global temperatures and the earth's climate, and potential consequences for ecosystems, human settlements, agriculture and other socio-economic activities. This is because CO_2 and other GHG emissions are still growing in many countries, despite some progress achieved in de-coupling CO_2 emissions from GDP growth (weak de-coupling).*

- *The main challenges are to limit emissions of CO_2 and other GHG and to stabilise the concentration of GHG in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. This implies strengthening efforts to implement related national and international strategies and to further de-couple GHG emissions from economic growth.*

MEASURING PERFORMANCE

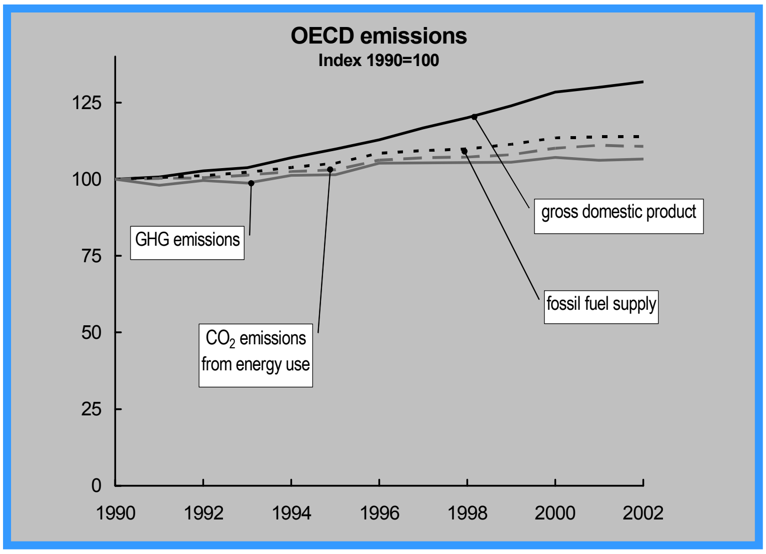
- *Environmental performance can be assessed against domestic objectives and international commitments: The main international agreement is the United Nations Framework Convention on Climate Change (1992). Its 1997 Kyoto Protocol, establishes differentiated national or regional emission reduction or limitation targets for six GHG for 2008-12 with 1990 as the reference year. The Kyoto Protocol which has been ratified by 150 parties, including all but three OECD countries, is in force since the 16th February 2005.*

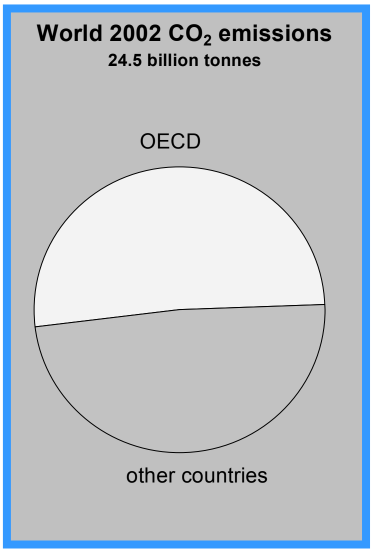
- *The indicators presented here relate to GHG emissions and to CO_2 emissions from energy use. They show emission intensities per unit of GDP and per capita for 2002, and related changes since 1990. All emissions presented here are gross direct emissions, emitted within the national territory and excluding sinks and indirect effects. GHG emissions refer to the sum of the 6 gases of the Kyoto Protocol (CO_2, CH_4, N_2O, PFCs, HFCs and SF_6) expressed in CO_2 equivalents. [Data sources: OECD-IEA, UNFCCC].*

- *When interpreting these indicators it should be noted that CO_2 is a major contributor to the greenhouse effect. They should be read in connection with other indicators from the OECD Core Set and in particular with indicators on global atmospheric concentrations of GHG, on energy efficiency and on energy prices and taxes. Their interpretation should take into account the structure of countries' energy supply, the relative importance of fossil fuels and of renewable energy, as well as climatic factors.*

1

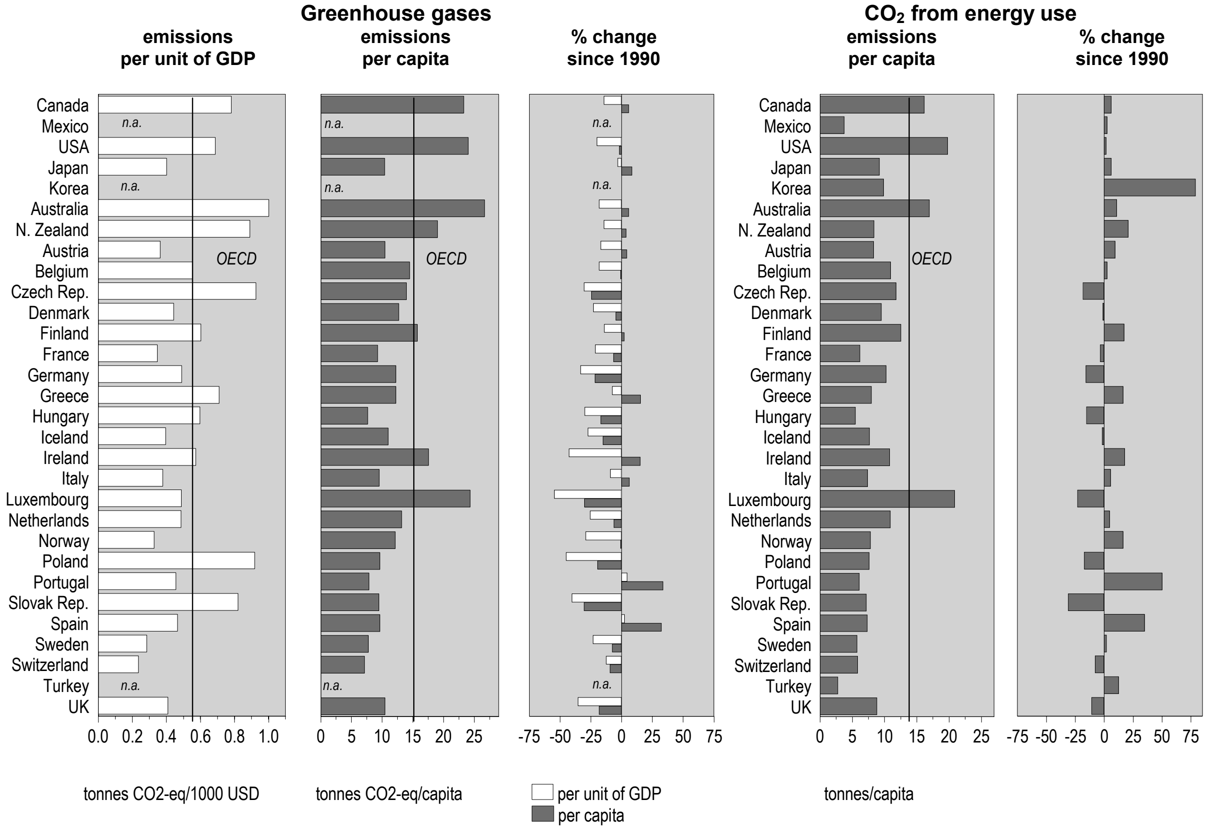
MONITORING TRENDS





- *While a number of OECD countries have de-coupled their CO_2 and other GHG emissions from GDP growth, most countries have not succeeded in meeting their own national commitments. Their emissions continued to increase throughout the 1990s, despite gains in energy efficiency (i.e. weak de-coupling). Overall, since 1980, CO_2 emissions from energy use have grown more slowly in OECD countries as a group than they have world-wide. However, recent data suggest that OECD growth rates are now on par with those world-wide.*

CURRENT STATE – EMISSION INTENSITIES



- *Individual OECD countries' contributions to the greenhouse effect, and rates of progress towards stabilisation, vary significantly.*
- *CO_2 emissions from energy use and other GHG emissions continue to grow, particularly in the OECD Asia-Pacific region and North America. This can be partly attributed to energy production and consumption patterns and trends, often combined with overall low energy prices.*
- *In OECD Europe, CO_2 emissions from energy use stay more or less stable due to changes in economic structures and energy supply mix, energy savings and, in some countries, of decreases in economic activity over a few years.*

1

THE BASIS: THE OECD CORE SET OF ENVIRONMENTAL INDICATORS

Core set indicators		Measurability
ISSUE – CLIMATE CHANGE		
Pressures	♦ **Index of greenhouse gas emissions** – CO_2 emissions – CH_4 emissions – N_2O emissions – PFC, HFC, SF_6 emissions	Data on GHG emissions are reported annually to the Secretariat of the UNFCCC. Significant progress has been made with national GHG inventories, even though data availability remains best for CO_2 emissions from energy use.
Conditions	♦ **Atmospheric concentrations of GHG** ♦ **Global mean temperature**	Continued efforts are needed to further improve the completeness of national GHG inventories and their coherence over time, and in particular to better evaluate sinks and indirect effects and to calculate comparable net GHG emissions for all countries.
Responses	♦ **Energy efficiency** – Energy intensity – Economic and fiscal instruments	More needs also to be done to monitor the effects of the use of international transactions and flexible mechanisms of the Kyoto protocol on emissions outside the national territory.

MAIN POLICY CHALLENGES

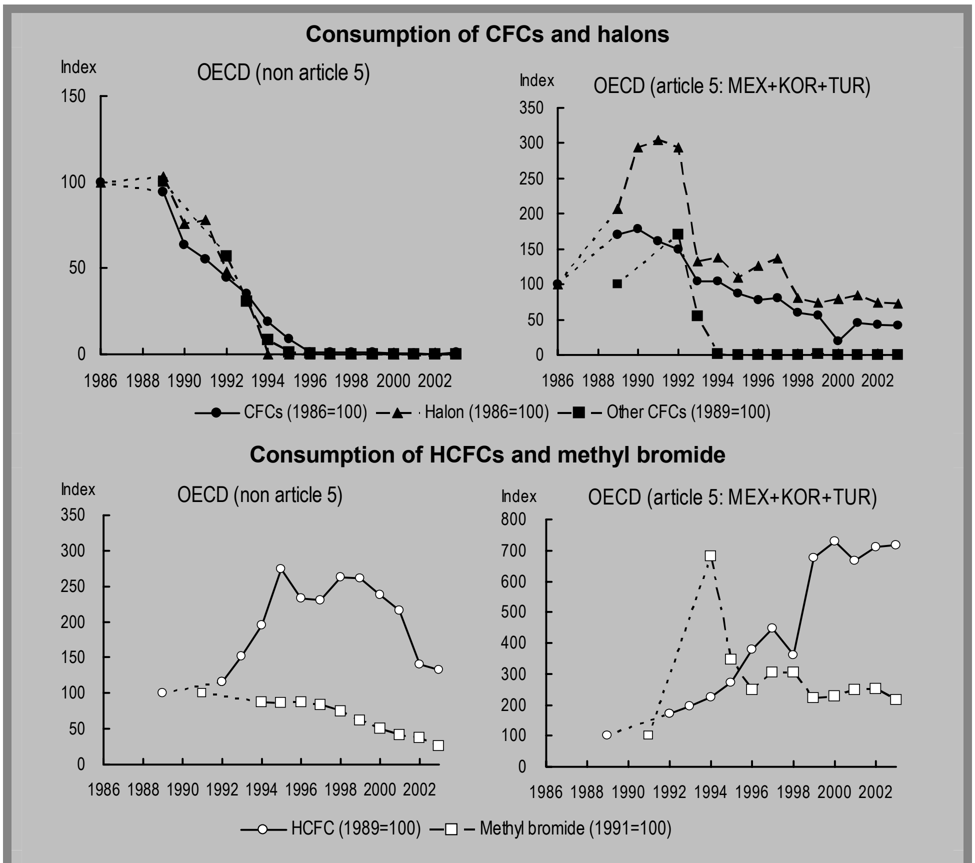
- *Stratospheric ozone depletion (e.g. over the Antarctic and the Arctic oceans) remains a source of concern due to the impacts of increased ultraviolet B radiation on human health, crop yields and the natural environment. This is because of the long time lag between the release of ozone depleting substances (ODS) and their arrival in the stratosphere and despite a considerable decrease in CFC and halon production and consumption as a result of international agreements.*
- *The main challenges are to phase out the production and consumption of methyl bromide and HCFCs (by 2005 and 2030 respectively) in industrialised countries, and to reduce international movements of existing CFCs, including illegal trade.*

MEASURING PERFORMANCE

- *Environmental performance can be assessed against domestic objectives and international commitments. The major international agreements are the Vienna Convention for the Protection of the Ozone Layer (1985), the Montreal Protocol on substances that deplete the ozone layer (1987) and its amendments London (1990), Copenhagen (1992), Montreal (1997) and Beijing (1999). The Montreal Protocol has been ratified by 189 parties, including all OECD countries.*
- *The indicators presented here relate to the consumption (i.e. production + imports - exports) of CFCs, halons, HCFCs, and methyl bromide, as listed in Annex A, B, C and E of the Montreal protocol. Basic data are weighted with the ozone depleting potentials (ODP) of the individual substances. [Data source: UNEP Ozone Secretariat].*
- *When interpreting these indicators it should be kept in mind that they do not reflect actual releases to the atmosphere and that individual substances vary considerably in their ozone-depleting capacity. These indicators should be read in connection with other indicators of the OECD Core Set and with information on ground-level UV-B radiation and on atmospheric concentrations of ODS over cities.*

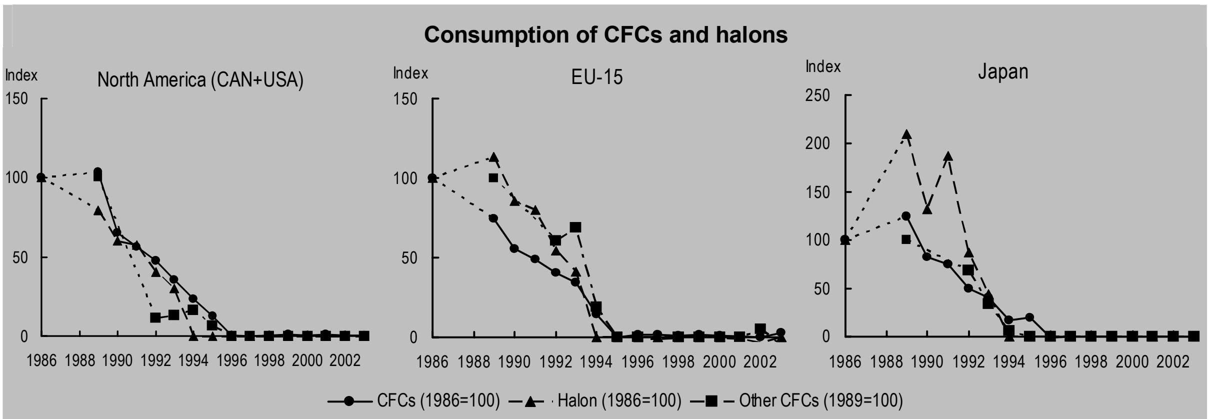
2

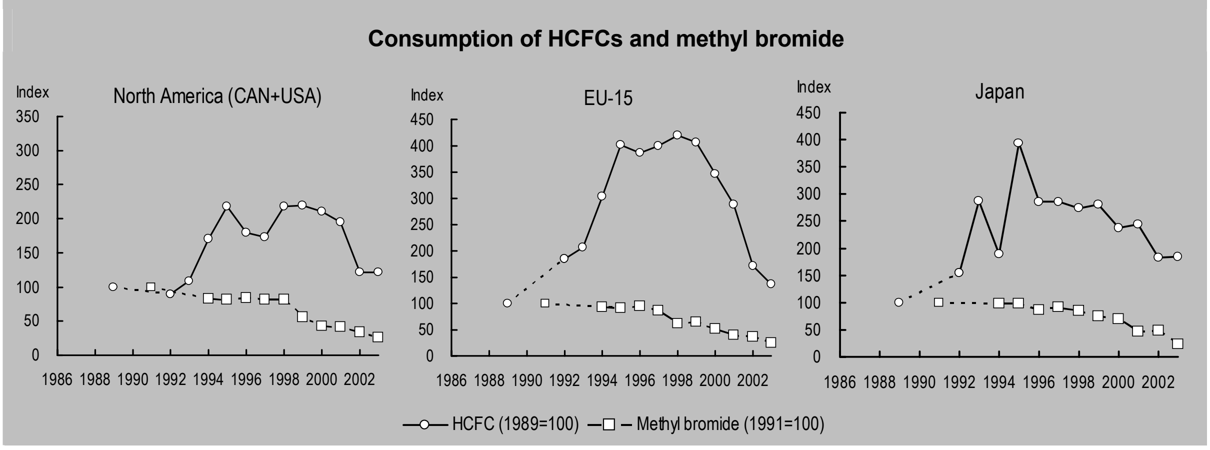
MONITORING TRENDS



Article 5: Parties operating under article 5 of the Montreal Protocol entitling them to delay compliance with certain measures.

REGIONAL TRENDS





- *As a result of the Montreal Protocol, industrialised countries have rapidly decreased their consumption of CFCs (CFC 11, 12, 113, 114, 115) and halons (halon 1211, 1301 and 2402). The targets set have been reached earlier than originally called for, and new and more stringent targets have been adopted.*
- *Many countries reduced consumption to zero by 1994 for halons and by end of 1995 for CFCs, HBFCs, carbon tetrachloride and methyl chloroform. As of 1996, there has been no production or consumption of these substances in industrialised countries except for certain essential uses, but there are still releases to the atmosphere for example from previous production or consumption in industrialised countries, and from production or consumption in countries that were given longer phase out schedules.*
- *Growth rates of HCFC consumption and related concentrations in the atmosphere are still increasing. HCFCs have only 2 to 12% of the ozone depleting potential of CFCs, but have a large global warming potential. Under current international agreements they will not be phased out completely for at least 25 years in industrialised countries and will remain in the stratosphere for a long time thereafter.*

THE BASIS: THE OECD CORE SET OF ENVIRONMENTAL INDICATORS

Core set indicators

ISSUE – OZONE LAYER DEPLETION

Pressures	♦ **Index of apparent consumption of ozone depleting substances (ODS)** ♦ Apparent consumption of CFCs and halons
Conditions	♦ **Atmospheric concentrations of ODS** ♦ **Ground level UV-B radiation** ♦ Stratospheric ozone levels
Responses	♦ **CFC recovery rate**

Measurability

Actual emissions of ODS are difficult to measure and related data are weak. Production or apparent consumption are used as a proxy. Such data are available from the Secretariat of the Montreal Protocol.

To reflect the combined depletion capacity, the apparent consumption of each individual substance, weighted in proportion to its ozone-depleting potential relative to CFC11, can further be aggregated into a consumption index.

AIR QUALITY

MAIN POLICY CHALLENGES

- *Main concerns relate to the effects of air pollution on human health, ecosystems, and buildings, and to their economic and social consequences. Human exposure is particularly high in urban areas where economic activities and road traffic are concentrated. Causes of growing concern are concentrations of fine particulates, NO_2, toxic air pollutants, and acute ground-level ozone pollution episodes in both urban and rural areas. SO_x emissions have decreased significantly in many countries and have often been successfully de-coupled from fossil fuel use and economic growth (strong de-coupling).*

- *The main challenges are to further reduce emissions of NO_x and other local and regional air pollutants in order to achieve a strong de-coupling of emissions from GDP and to limit the exposure of the population to air pollution. This implies implementing appropriate pollution control policies, technological progress, energy savings and environmentally sustainable transport policies.*

MEASURING PERFORMANCE

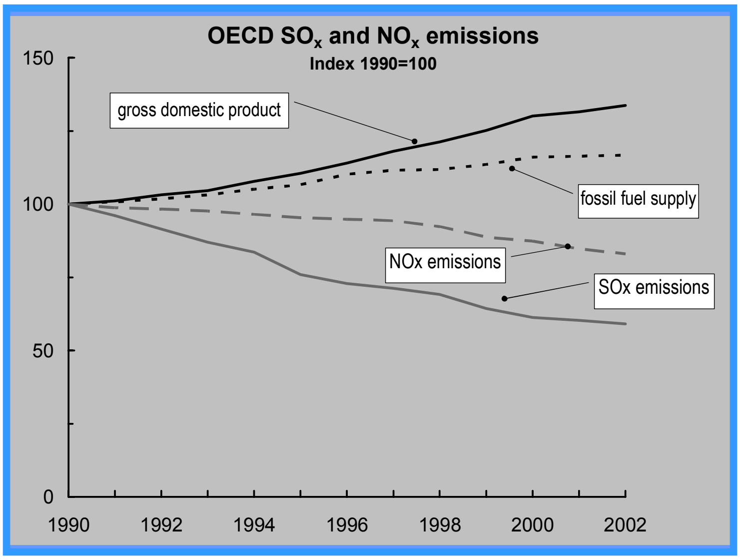
- *Environmental performance can be assessed against domestic objectives and international commitments. In Europe and North America, acidification has led to several international agreements among which the Convention on Long-Range Transboundary Air Pollution (1979), and its protocols to reduce emissions of sulphur (Helsinki 1985, Oslo 1994, Gothenburg 1999), nitrogen oxides (Sofia 1988, Gothenburg 1999), VOCs (Geneva 1991, Gothenburg 1999), and ammonia (Gothenburg 1999). Two other protocols aim at reducing emissions of heavy metals (Aarhus 1998) and persistent organic pollutants (Aarhus 1998).*

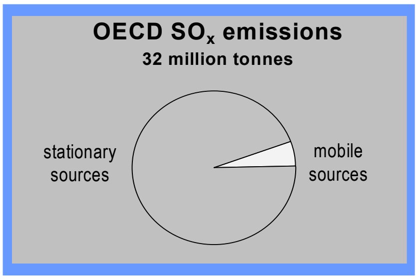
- *The indicators presented here relate to SO_x and NO_x emissions, expressed as SO_2 and NO_2 respectively. They show emission intensities per unit of GDP for 2002, and related changes since 1990. [Data sources: UN-ECE EMEP, UNFCCC].*

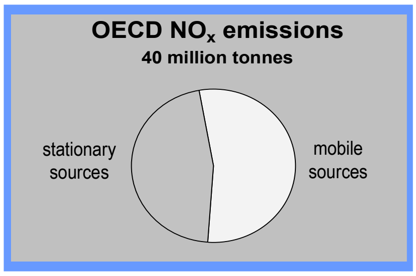
- *When interpreting these indicators it should be kept in mind that SO_x and NO_x emissions only provide a partial view of air pollution problems. They should be read in connection with other indicators of the OECD Core Set and in particular with urban air quality indicators and with information on population exposure to air pollution.*

3

MONITORING TRENDS

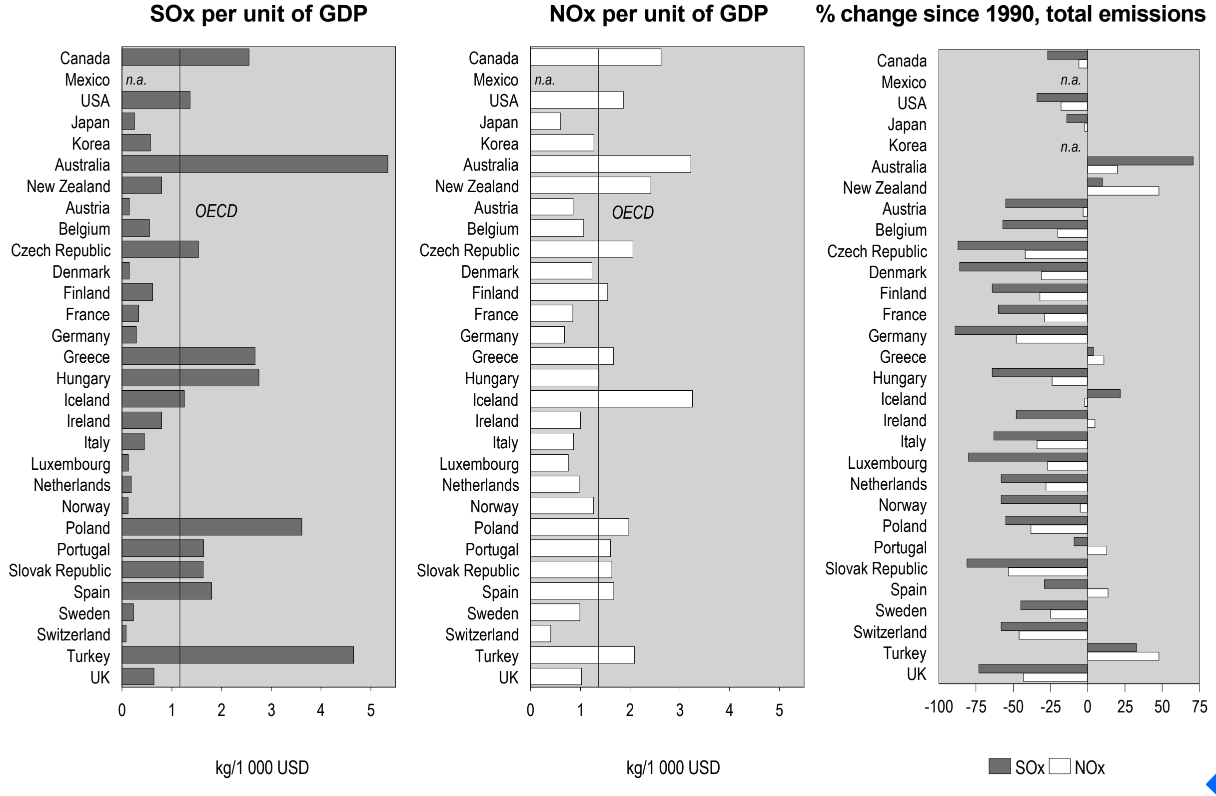






- *Over the past 10 years, emissions of acidifying substances and related transboundary air pollution have continued to fall throughout the OECD. Compared to 1990 levels, SOx emissions have decreased significantly for the OECD as a whole, showing a strong de-coupling from GDP. NOx emissions have been stabilised or reduced more recently, showing only a weak de-coupling from GDP compared to 1990.*

CURRENT STATE – EMISSION INTENSITIES



Emission intensities for SOx show significant variations among OECD countries, depending among others on the countries' economic structure and energy consumption patterns. Total emissions have decreased significantly in a majority of the countries and European countries' early commitments to reduce SOx emissions have been achieved. Some of the countries have already reached the goal they fixed for 2010 in the Gothenburg Protocol but further reductions are necessary for others.

Emission intensities for NOx and related changes over time show important variations among OECD countries. NOx emissions have been reduced in several countries over the 1990s, particularly in OECD Europe. However, with the steady growth of road traffic, the emissions ceilings of the Gothenburg protocol for 2010 may be difficult to attain.

THE BASIS: THE OECD CORE SET OF ENVIRONMENTAL INDICATORS

Core set indicators

ISSUE: ACIDIFICATION

Pressures	♦ **Index of acidifying substances** – Emissions of NOx and SOx
Conditions	♦ **Exceedance of critical loads of pH** – Concentrations in acid precipitation
Responses	♦ **Car fleet equipped with catalytic converters** ♦ **Capacity of SOx and NOx abatement equipment of stationary sources**

ISSUE: URBAN ENVIRONMENTAL QUALITY

Pressures	♦ **Urban air emissions** – Urban traffic density and car ownership
Conditions	♦ **Population exposure to air pollution** – Concentrations of air pollutants
Responses	♦ **Economic, fiscal, regulatory instruments**

Measurability

International data on SOx and NOx emissions are available for all OECD countries and can be obtained from the Secretariats of the UN-ECE CLRTAP and of the UNFCCC. Additional efforts are however needed to further improve timeliness and historical consistency of the data, and to improve the availability, completeness and comparability of data on other air pollutant emissions (PM_{10}, $PM_{2.5}$, VOCs, heavy metals, POPs).

Information on population exposure to air pollution is scattered. Efforts are needed to monitor and/or estimate overall population exposure, and exposure of sensitive groups of the population. Data on concentrations of major air pollutants are available for major cities in OECD countries, but more work is needed to improve international comparability, and to link these data to national standards and to human health issues.

WASTE GENERATION

MAIN POLICY CHALLENGES

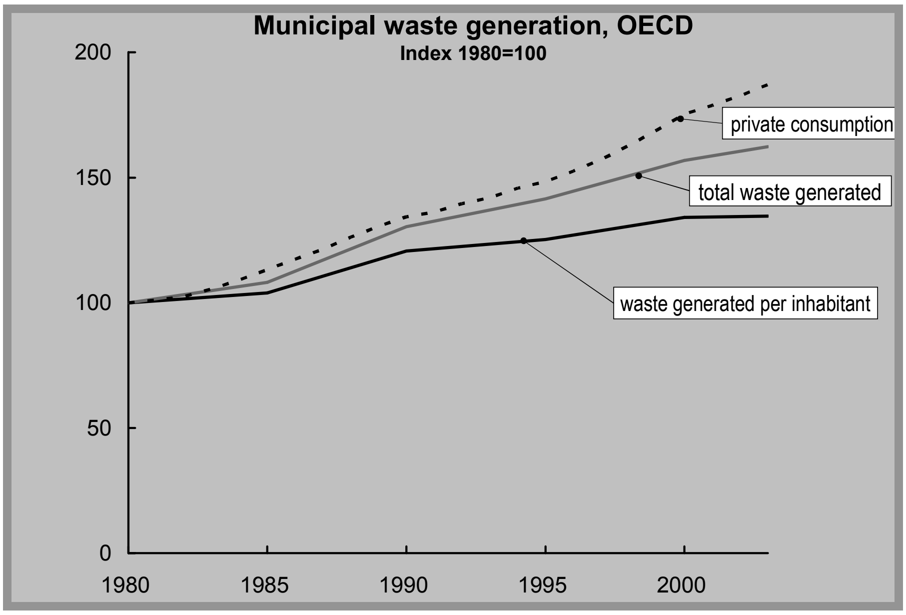
- *Main concerns relate to the potential impact from inappropriate waste management on human health and on ecosystems (soil and water contamination, air quality, land use and landscape). Despite achievements in waste recycling, amounts of solid waste going to final disposal are on the increase as are overall trends in waste generation. This raises important questions as to the capacities of existing facilities for final treatment and disposal and as to the location and social acceptance of new facilities (e.g. NIMBY for controlled landfill and incineration plants).*
- *The main challenge is to strengthen measures for waste minimisation, especially for waste prevention and recycling, and to move further towards life cycle management of products and extended producer responsibility. This implies internalising the costs of waste management into prices of consumer goods and of waste management services; and ensuring greater cost-effectiveness and full public involvement in designing measures.*

MEASURING PERFORMANCE

- *Environmental performance can be assessed against national objectives and international agreements such as OECD Decisions and Recommendations and the Basel Convention (1989).*
- *The indicators presented here relate to amounts of municipal waste generated. They show waste generation intensities expressed per capita and per unit of private final consumption expenditure for the early 2000s, and related changes since 1980 and 1990. [Data source: OECD].*
- *When interpreting these indicators, it should be noted that while municipal waste is only one part of total waste generated, its management and treatment represents more than one third of the public sector's financial efforts to abate and control pollution. It should be kept in mind that waste generation intensities are first approximations of potential environmental pressure; more information is needed to describe the actual pressure. These indicators should be read in connection with other indicators of the OECD Core Set. They should be complemented with information on waste management practices and costs, and on consumption levels and patterns.*

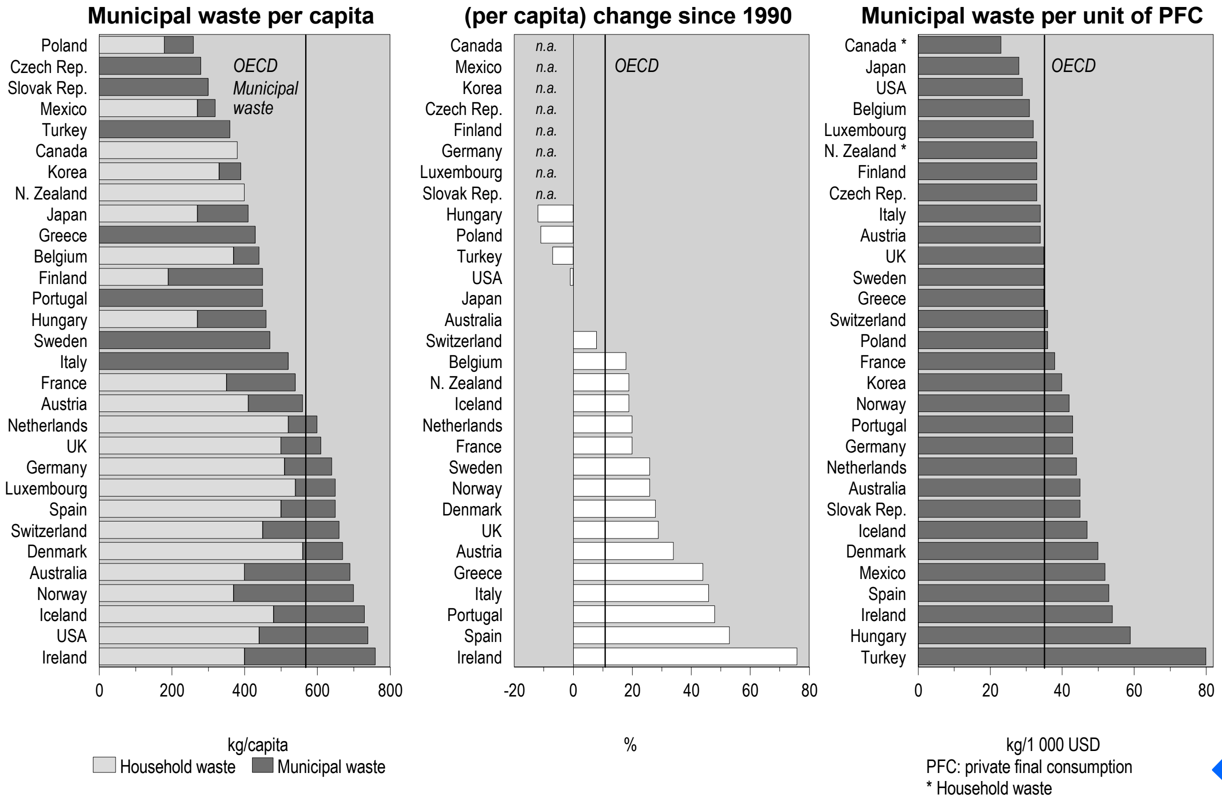
4

MONITORING TRENDS



- *The quantity of municipal waste generated in the OECD area has risen from 1980 and exceeded 590 million tonnes in the early 2000s (570 kg per inhabitant). Generation intensity per capita has risen mostly in line with private final consumption expenditure and GDP, with however a slight slowdown in recent years.*

CURRENT STATE – GENERATION INTENSITIES



- *The amount and the composition of municipal waste vary widely among OECD countries, being directly related to levels and patterns of consumption and also depending on national waste management practices.*
- *Only a few countries have succeeded in reducing the quantity of solid waste to be disposed of. In most countries for which data are available, increased affluence, associated with economic growth and changes in consumption patterns, tends to generate higher rates of waste per capita.*

THE BASIS: THE OECD CORE SET OF ENVIRONMENTAL INDICATORS

Core set indicators

ISSUE – WASTE

Pressures	♦ **Generation of:** – **municipal waste** – **industrial waste** – **hazardous waste** – **nuclear waste** ♦ Movements of hazardous waste
Conditions	Effects on water and air quality; effects on land use and soil quality; toxic contamination
Responses	♦ **Waste minimisation** – Recycling rates ♦ **Economic and fiscal instruments, expenditures**

Measurability

Despite considerable progress, data on waste generation and disposal remains weak in many countries. Further efforts are needed to:

- ensure an appropriate monitoring of waste flows and of related management practices, and their changes over time;
- improve the completeness and international comparability of the data, as well as their timeliness.

More work needs to be done to improve data on industrial and hazardous wastes, and to develop indicators that better reflect waste minimisation efforts, and in particular waste prevention measures.

The usefulness of indicators derived from material flow accounting should be further explored.

FRESHWATER QUALITY

MAIN POLICY CHALLENGES

- *Main concerns relate to the impacts of water pollution (eutrophication, acidification, toxic contamination) on human health, on the cost of drinking water treatment and on aquatic ecosystems. Despite significant progress in reducing pollution loads from municipal and industrial point sources through installation of appropriate waste water treatment plants, improvements in freshwater quality are not always easy to discern, except for organic pollution. Pollution loads from diffuse agricultural sources are an issue in many countries, as is the supply of permanently safe drinking water to the entire population.*

- *The main challenge is to protect and restore all bodies of surface and ground water to ensure the achievement of water quality objectives. This implies further reducing pollution discharges, through appropriate treatment of waste water and a more systematic integration of water quality considerations in agricultural and other sectoral policies. It also implies an integrated management of water resources based on the ecosystem approach.*

MEASURING PERFORMANCE

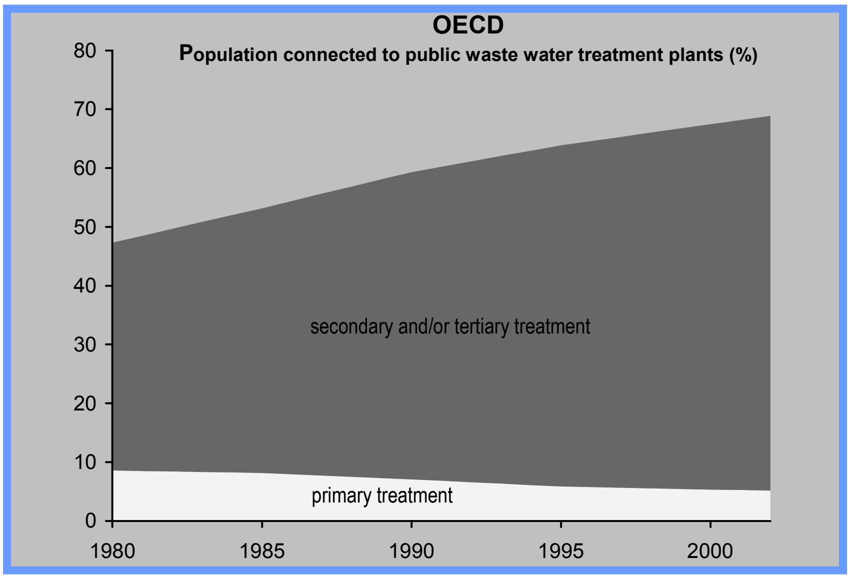
- *Environmental performance can be assessed against domestic objectives (e.g. receiving water standards, effluent limits, pollution load reduction targets) and international commitments. Main international agreements and legislation include the OSPAR Convention on the Protection of the North-East Atlantic Marine Environment, the International Joint Commission Agreement on Great Lakes Water Quality in North America and the EU water directives. Protection of freshwater quality is an important part of Agenda 21, adopted at UNCED (1992) and of the Plan of Implementation adopted at the WSSD in Johannesburg (2002).*

- *The indicator presented here relates to waste water treatment. It shows the percentage of the national population actually connected to public waste water treatment plants in the early 2000s. The extent of secondary (biological) and/or tertiary (chemical) treatment provides an indication of efforts to reduce pollution loads. [Data source: OECD]*

5

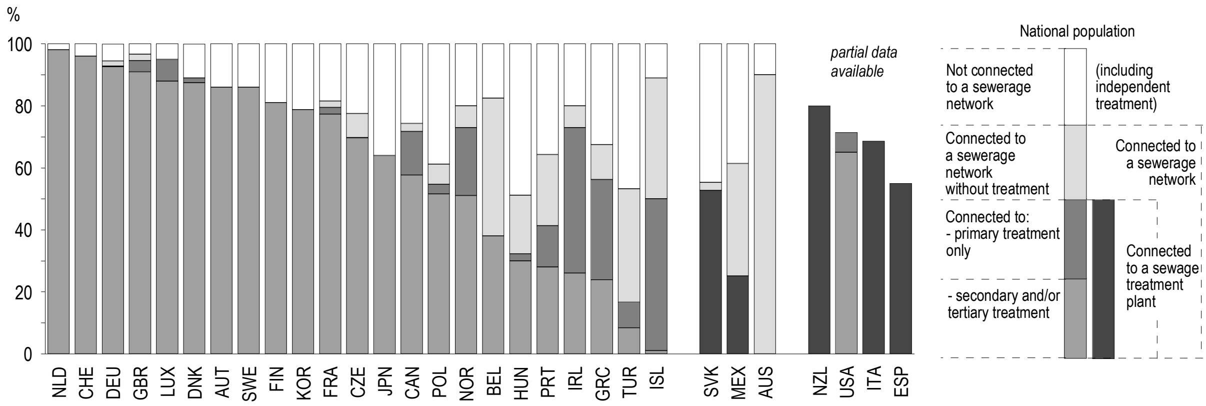
- *When interpreting this indicator it should be noted that waste water treatment is at the centre of countries' financial efforts to abate water pollution. It should be related to an optimal national connection rate taking into account national specificities such as population in remote areas. It should be read in connection with other indicators of the OECD Core Set, including public waste water treatment expenditure and the quality of rivers and lakes.*

MONITORING TRENDS



- *OECD countries continue to progress with basic domestic water pollution abatement. The OECD-wide share of the population connected to a municipal waste water treatment plant rose from about 50% in the early 1980s to almost 70% today. For the OECD as a whole, more than half of public pollution abatement and control expenditure relates to water (sewerage and waste water treatment) representing up to 1% of GDP.*

CURRENT STATE – WASTE WATER TREATMENT CONNECTION RATES



Due to varying settlement patterns, economic and environmental conditions, starting dates, and the rate at which the work was done, the share of population connected to waste water treatment plants and the level of treatment varies significantly among OECD countries: secondary and tertiary treatment has progressed in some, while others are still completing sewerage networks or the installation of first generation treatment plants. Some countries have reached the economic limit in terms of sewerage connection and use other ways of treating waste water from small, isolated settlements.

Those countries that completed their sewer systems long ago, now face considerable investment to renew pipe networks. Other countries may recently have finished an expansion of waste water treatment capacity and their expenditure has shifted to operating costs. Yet other countries must still complete their sewerage networks even as they build waste water treatment stations.

5

THE BASIS: THE OECD CORE SET OF ENVIRONMENTAL INDICATORS

Core set indicators		Measurability
ISSUE: EUTROPHICATION		
Pressures	♦ Emissions of N and P in water and soil ➔ **Nutrient balance** – N and P from fertiliser use & livestock	Data on the share of the population connected to waste water treatment plants are available for almost all OECD countries. Information on the level of treatment and on treatment charges remains partial.
Conditions	♦ **BOD/DO in inland waters** ♦ **Concentration of N & P in inland waters**	More work needs to be done to produce better data on overall pollution generated covering the entire range of emission sources, on related treatment rates, and final discharges to water bodies.
Responses	♦ **Population connected to secondary and/or tertiary sewage treatment plants** – User charges for waste water treatment – Market share of phosphate-free detergents	
ISSUE: TOXIC CONTAMINATION		
Pressures	♦ **Emissions of heavy metals** ♦ **Emissions of organic compounds** – Consumption of pesticides	International data on emissions of toxic compounds (heavy metals, organic compounds) are partial and often lack comparability.
Conditions	♦ **Concentrations of heavy metals and organic compounds in env. Media**	
ISSUE: ACIDIFICATION		
Conditions	♦ **Exceedance of critical loads of PH in water**	

FRESHWATER RESOURCES

MAIN POLICY CHALLENGES

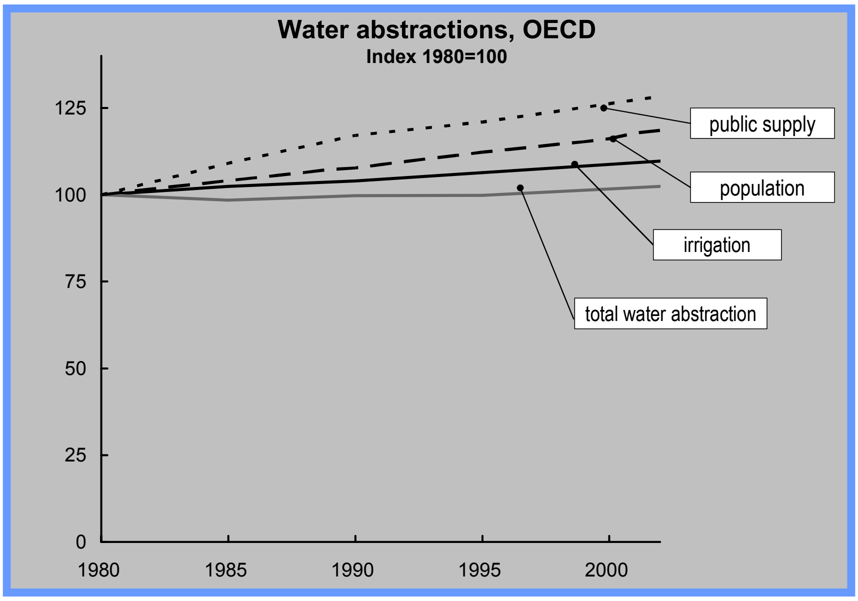
- *Main concerns relate to the inefficient use of water and to its environmental and socio-economic consequences: low river flows, water shortages, salinisation of freshwater bodies in coastal areas, human health problems, loss of wetlands, desertification and reduced food production. Although at the national level most OECD countries show sustainable use of water resource, most still face at least seasonal or local water quantity problems and several have extensive arid or semi-arid regions where water is a constraint to sustainable development and to the sustainability of agriculture.*
- *The main challenge is to ensure a sustainable management of water resources, avoiding overexploitation and degradation, so as to maintain adequate supply of freshwater of suitable quality for human use and to support aquatic and other ecosystems. This implies reducing losses, using more efficient technologies and increase recycling, and applying an integrated approach to the management of freshwater resources by river basin. It further requires applying the user pays principle to all types of uses.*

MEASURING PERFORMANCE

- *Environmental performance can be assessed against domestic objectives and international commitments. Agenda 21, adopted at UNCED (Rio de Janeiro, 1992), explicitly considers items such as the protection and preservation of freshwater resources. This was reaffirmed at the WSSD (Johannesburg, 2002).*
- *The indicators presented here relate to the intensity of use of freshwater resources, expressed as gross abstractions per capita, as % of total available renewable freshwater resources (including inflows from neighbouring countries) and as % of internal resources (i.e. precipitations – evapotranspiration) for the early 2000s. [Data source: OECD].*
- *When interpreting this indicator, it should be noted that relating resource abstraction to renewal of stocks is a central question concerning sustainable water resource management. It should however be kept in mind that it only gives insights into quantitative aspects of water resources and that a national level indicator may hide significant territorial differences and should be complemented with information at sub-national level. This indicator should be read in connection with other indicators of the OECD Core Set and in particular with indicators on water supply prices and on water quality.*

6

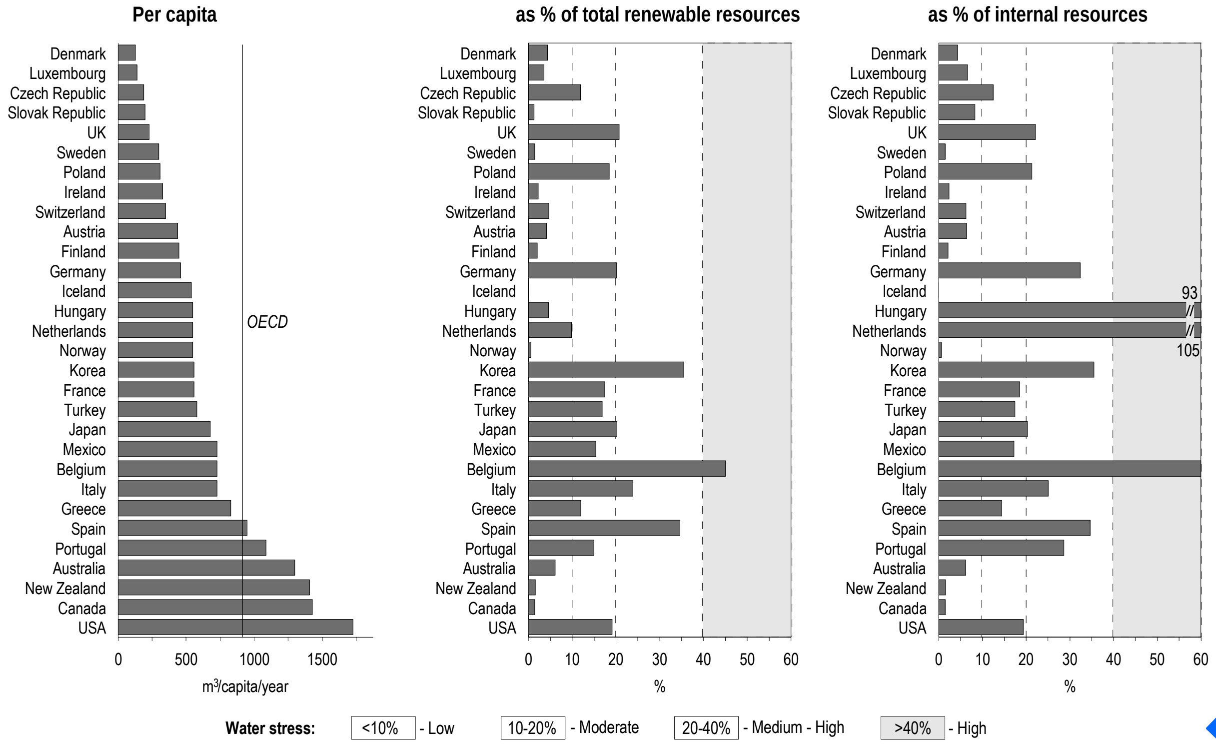
MONITORING TRENDS



- *Most OECD countries increased their water abstractions over the 1970s in response to demand by the agricultural and energy sectors. Since the 1980s, some countries have stabilised their abstractions through more efficient irrigation techniques, the decline of water intensive industries (e.g. mining, steel), increased use of cleaner production technologies and reduced losses in pipe networks. However, the effects of population growth have led to increases in total abstractions, in particular for public supply.*

CURRENT STATE – INTENSITY OF USE OF WATER RESOURCES

Gross freshwater abstractions, early 2000s



Indicators of water resource use intensity show great variations among and within individual countries. The national indicator may thus conceal unsustainable use in some regions and periods, and high dependence on water from other basins. In arid regions, freshwater resources may at times be limited to the extent that demand for water can be met only by going beyond sustainable use in terms of quantity.

At world level, it is estimated that water demand has risen by more than double the rate of population growth in the last century. Agriculture is the largest user of water world-wide; global abstractions for irrigation are estimated to have increased by over 60 % since 1960.

THE BASIS: THE OECD CORE SET OF ENVIRONMENTAL INDICATORS

Core set indicators

ISSUE – WATER RESOURCES

Pressures	♦ **Intensity of use of water resources** (abstractions/available resources)
Conditions	♦ **Frequency, duration and extent of water shortages**
Responses	♦ **Water prices and user charges for sewage treatment**

Measurability

Information on the intensity of the use of water resources can be derived from water resource accounts and is available for most OECD countries.

More work is however needed to improve the completeness and historical consistency of the data, and to further improve estimation methods.

More work is also needed to mobilise data at sub-national level, and to reflect the spatial distribution of resource use intensity. This is particularly important for countries with larger territories where resources are unevenly distributed.

FOREST RESOURCES

MAIN POLICY CHALLENGES

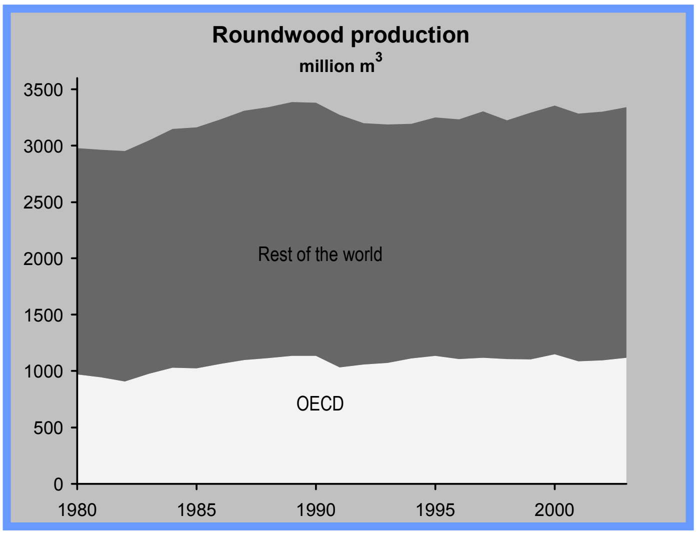
- *Main concerns relate to the impacts of human activities on forest diversity and health, on natural forest growth and regeneration, and to their consequences for the provision of economic, environmental and social forest services. The main pressures from human activities include agriculture expansion, transport infrastructure development, unsustainable forestry, air pollution and intentional burning of forests. Many forest resources are threatened by degradation, fragmentation and conversion to other types of land uses.*
- *The main challenge is to ensure a sustainable management of forest resources, avoiding overexploitation and degradation, so as to maintain adequate supply of wood for production activities, and to ensure the provision of essential environmental services, including biodiversity and carbon sinks. This implies integrating environmental concerns into forestry policies, including eco-certification and carbon sequestration schemes.*

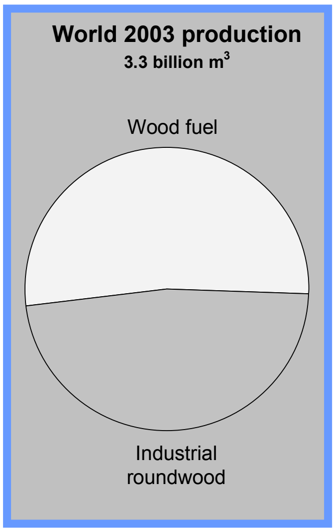
MEASURING PERFORMANCE

- *Environmental performance can be assessed against national objectives and international principles on sustainable forest management adopted at UNCED (Rio de Janeiro, 1992) and reaffirmed at the WSSD (Johannesburg, 2002). Other international initiatives are the Ministerial Conferences for the Protection of Forests in Europe (Strasbourg, 1990; Helsinki, 1993; Lisbon, 1998), which led to the Pan-European Criteria and Indicators for Sustainable Forest Management, the Montreal Process on Sustainable Development of Temperate and Boreal Forests; and the UN Forum on Forests.*
- *The indicator presented here relates to the intensity of use of forest resources (timber), relating actual harvest to annual productive capacity for the late 1990s. Trends in roundwood production are provided as a complement. [Data sources: FAO, UN-ECE, OECD].*
- *When interpreting this indicator, it should be noted that relating resource abstraction to renewal of stocks is a central question concerning sustainable forest resource management. It should however be kept in mind that they only give insights into quantitative aspects of forest resources and that a national average can conceal important variations among forests. They should be read in connection with other indicators of the OECD Core Set, in particular with indicators on land use changes and forest quality (species diversity, forest degradation), and be complemented with data on forest management practices and protection measures.*

7

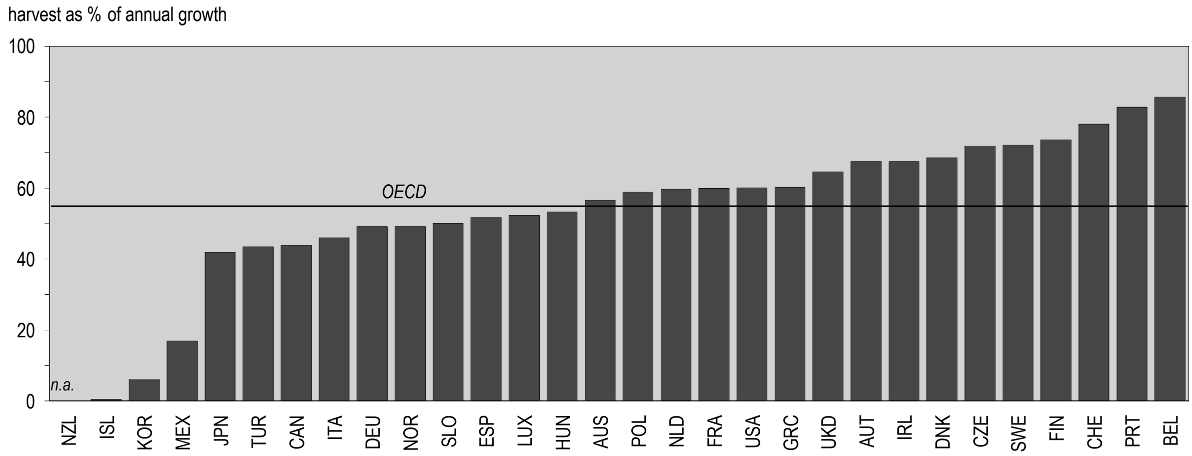
MONITORING TRENDS





- *Commercial exploitation of forests and related roundwood production has been increasing over the past two decades, with some stabilisation over the 1990s, in particular in the OECD region. Over half of the roundwood produced in the world is used as a fuel, the rest for industrial production.*

CURRENT STATE - INTENSITY OF USE OF FOREST RESOURCES



At national levels most OECD countries present a picture of sustainable use of their forest resources in quantitative terms, but with significant variations within countries. For those countries for which trends over a longer period are available, intensity of forest resource use does not generally show an increase and has even decreased in most countries from the 1950s.

Over the same period, the area of forests and wooded land has remained stable or has slightly increased in most OECD countries, but has been decreasing at world level due in part to continued deforestation in tropical countries.

THE BASIS: THE OECD CORE SET OF ENVIRONMENTAL INDICATORS

Core set indicators

ISSUE: FOREST RESOURCES

Pressures
- ♦ **Intensity of forest resource use** (actual harvest/productive capacity)

Conditions
- ♦ **Area and volume distribution of forests (by biome)** (e.g. volume distribution by major tree species group within each biome, share of disturbed/deteriorated forests in total forest area)

Responses
- ♦ **Forest area management and protection** (e.g. % of protected forest area in total forest area; % of harvest area successfully regenerated or afforested)

Measurability

Data on the intensity of use of forest resources can be derived from forest accounts and from international forest statistics and Forest Resource Assessments (e.g. from FAO and UN-ECE) for most OECD countries. Historical data however often lack comparability or are not available.

Data on the area of forests and wooded land are available for all countries with varying degrees of completeness. Trends over longer periods are available but lack comparability due to continued improvements in international definitions.

More work needs to be done to monitor state and trends in the quality of forest resources and in related management and protection measures.

FISH RESOURCES

MAIN POLICY CHALLENGES

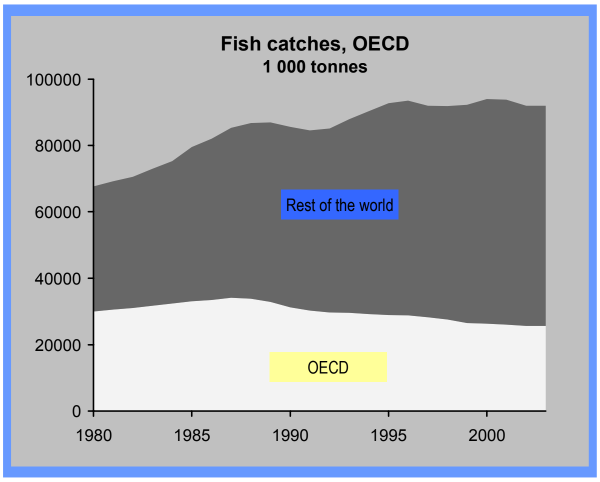
- *Main concerns relate to the impacts of human activities on fish stocks and habitats in marine but also in fresh waters, and to their consequences for biodiversity and for the supply of fish for consumption and other uses. Main pressures include fisheries, coastal development and pollution loads from land-based sources, maritime transport, and maritime dumping. Many of the more valuable fish stocks are overfished, and the steady trend towards increased global fish landings is achieved partly through exploitation of new and/or less valuable species. Unauthorised fishing is widespread and hinders the achievement of sustainable fishery management objectives.*
- *The main challenge is to ensure a sustainable management of fish resources so that resource abstraction in the various catchment areas does not exceed the renewal of the stocks over an extended period. This implies setting and enforcing limits on total catch types, levels and fishing seasons; and strengthening international co-operation.*

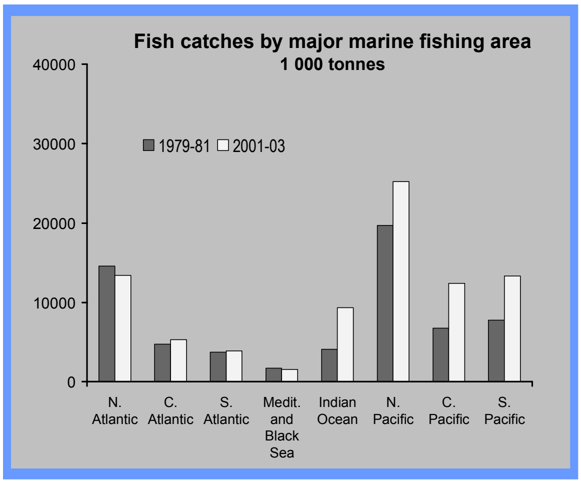
MEASURING PERFORMANCE

- *Environmental performance can be assessed against domestic objectives and bilateral and multilateral agreements such as those on conservation and use of fish resources (Atlantic Ocean, Pacific Ocean, Baltic Sea, etc.), the Rome Consensus on world fisheries, the Code of Conduct for Responsible Fishing (FAO, November 1995), the UN Convention on the Law of the Sea and its implementation agreement on straddling and highly migratory fish stocks. Within the framework of the FAO Code of Conduct for Responsible Fishing, international efforts are being made to address the issue of illegal, unreported and unregulated (IUU) fishing.*
- *The indicator presented here relates to fish catches expressed as % of world captures and changes in total catches since 1979-81. Fish production from aquaculture is not included. The data cover catches in both fresh and marine waters. [Data source: FAO].*
- *When interpreting this indicator it should be kept in mind that it gives insights into quantitative aspects of fish resources. It should be read in connection with other indicators of the OECD Core Set, and in particular be complemented with information on the status of fish stocks and the proportion of fish resources under various phases of fishery development. It can further be related to data on national fish consumption.*

8

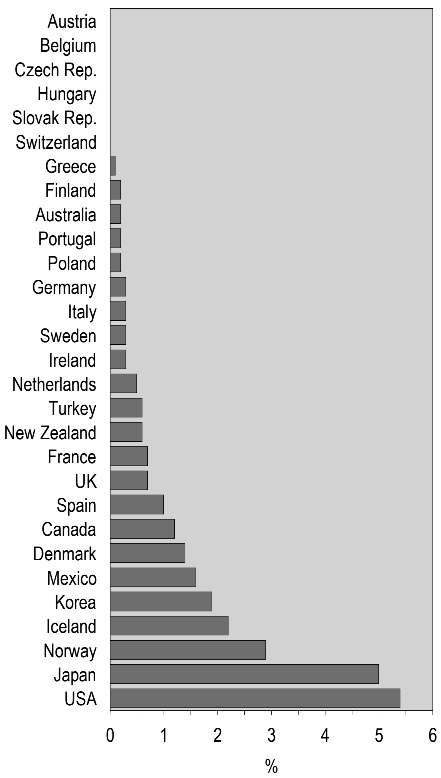
MONITORING TRENDS

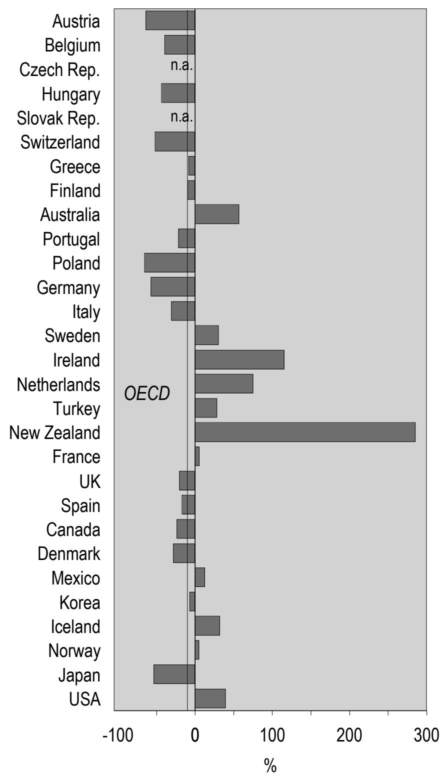




- *Of the major marine stocks fished world-wide, 23 % are estimated to be under or moderately exploited, 52% fully exploited, 17% overexploited and 8 % depleted or recovering. More than two third of stocks is exploited at or beyond maximum sustainable limit. Trend analysis shows large differences in catches among OECD countries and among fishing areas, with significant increases in the Pacific and Indian Oceans.*

CURRENT STATE - FISH CATCHES





- *The intensity of national catches per capita varies widely among OECD countries, reflecting the share of fisheries and associated industries in the economy.*
- *Catches from capture fisheries are generally growing at a slower rate than 30 years ago; they are even in decline in a number of countries, whereas aquaculture has gained considerable importance. Aquaculture helps to alleviate some of the stress from capture fisheries, but it also has negative effects on local ecosystems and its dependence on fishmeal products adds to the demand for catches from capture fisheries.*

THE BASIS: THE OECD CORE SET OF ENVIRONMENTAL INDICATORS

Core set indicators		Measurability
ISSUE – FISH RESOURCES		Fish catches and production data are available from international sources (FAO) at significant detail and for most OECD countries. More work needs to be done to better reflect the composition of the landings and its trophic structure.
Pressures	♦ **Fish catches**	
Conditions	♦ **Size of spawning stocks** – Overfished areas	Data on the size of major fish populations exist but are scattered across national and international sources.
Responses	♦ **Fishing quotas** (Number of stocks regulated by quotas) – Expenditure for fish stock monitoring	More work needs to be done to better reflect the status of fish stocks, and to relate fish captures to available resources.

ENERGY RESOURCES

MAIN POLICY CHALLENGES

- *Main concerns relate to the effects of energy production and use on greenhouse gas emissions and on local and regional air pollution; other effects involve water quality, land use, risks related to the nuclear fuel cycle and risks related to the extraction, transport and use of fossil fuels. While some de-coupling of environmental effects from growth in energy use has been achieved, results to date are insufficient and the environmental implications of increasing energy use remain a major issue in most OECD countries.*

- *The main challenge is to further de-couple energy use and related air emissions from economic growth, through improvements in energy efficiency and through the development and use of cleaner fuels. This requires the use of a mix of instruments including extended reliance on economic instruments.*

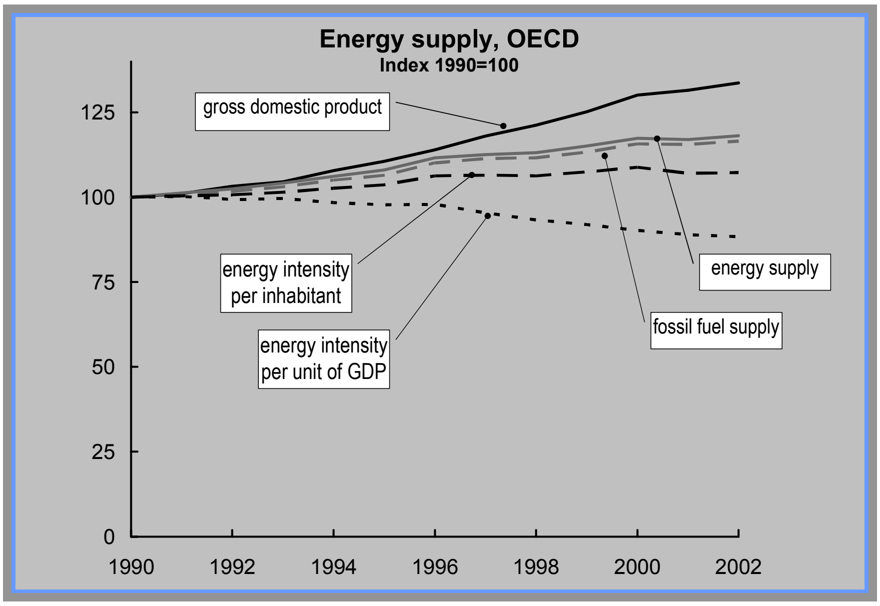
MEASURING PERFORMANCE

- *Environmental performance can be assessed against domestic objectives such as energy efficiency targets, and targets concerning the share of renewable energy sources; and against international environmental commitments that have direct implications for domestic energy policies and strategies. Examples include the United Nations Framework Convention on Climate Change (1992), the Convention on Long-Range Transboundary Air Pollution (1979).*

- *The indicators presented here relate to the intensity of use of energy. They show energy supply intensities for 2002, expressed per unit of GDP and per capita, and related changes since 1990. They reflect, at least partly, changes in energy efficiency and efforts to reduce atmospheric emissions. [Data source: OECD-IEA].*

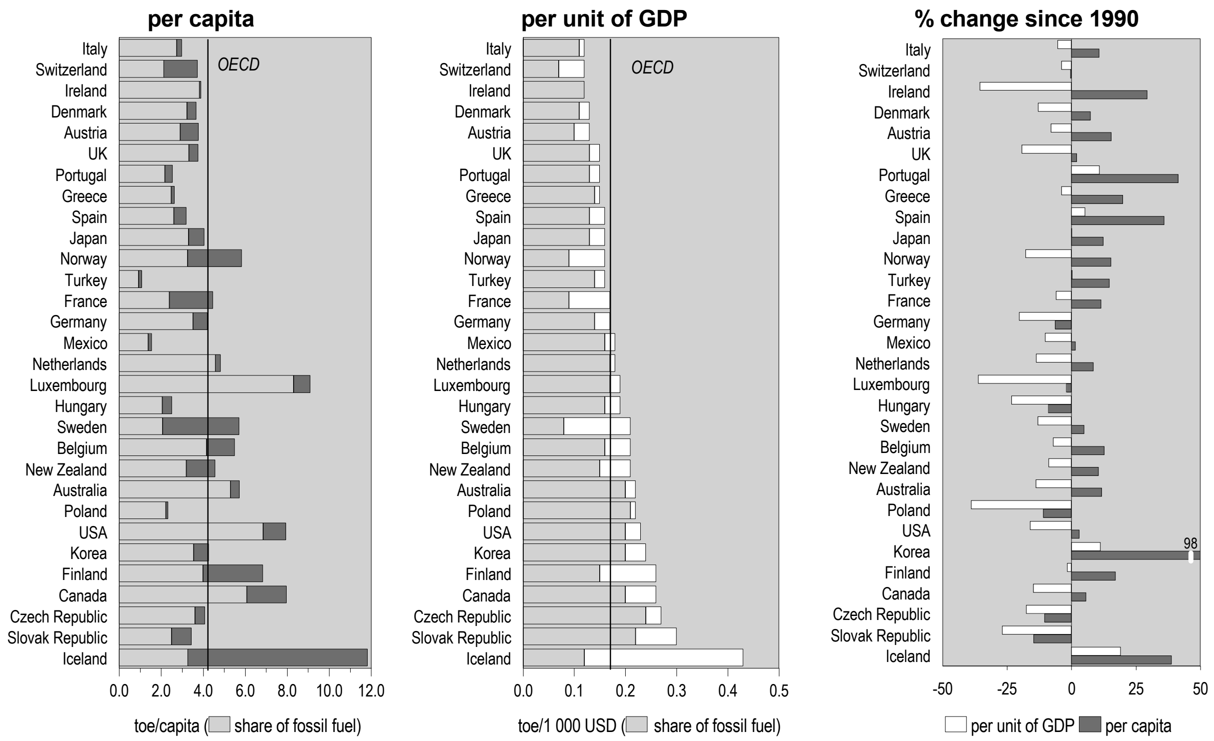
- *When interpreting these indicators, it should be kept in mind that energy intensities reflect structural and climatic factors as well as changes in energy efficiency. They should be read in connection with other indicators of the OECD Core Set and with other energy-related indicators such as energy prices and taxes for households and industry, and the structure of and changes in energy supply. They should further be complemented with information on energy-related air and water emissions and waste generation.*

MONITORING TRENDS



- *During the 1990s, energy intensity per unit of GDP has generally decreased in the OECD, but at a slower pace than during the 1980s. While in the first half of the 1990s, energy intensity did not improve in most countries, due to decreasing prices for energy resources (oil, gas, etc.), it improved slightly in the second half of the 1990s as a consequence of structural changes in the economy, energy conservation measures, and in some countries decreases in economic activity. Progress in per capita terms has even been slower, reflecting an overall increase in energy supply and increasing energy demands for transport activities.*

CURRENT STATE - ENERGY SUPPLY INTENSITIES



- *Variations in energy intensity among OECD countries are wide and depend on national economic structure, geography (e.g. climate), energy policies and prices, and countries' endowment in different types of energy resources.*

- *During the 1990s, growth in total primary energy supply was accompanied by changes in the fuel mix: the shares of solid fuels and oil fell, while those of gas and other sources, including renewable energy sources, rose. This trend is however less marked than between 1980 and the early 1990s, and is particularly visible in OECD Europe.*

THE BASIS: THE OECD CORE SET OF ENVIRONMENTAL INDICATORS

Core set indicators	Measurability
ISSUE – CLIMATE CHANGE **Responses** ♦ **Energy efficiency** – Energy intensity – Economic and fiscal instruments (energy prices and taxes, expenditures) **SOCIO-ECONOMIC AND GENERAL INDICATORS** ♦ **Structure of energy supply** ***To be further supplemented with:*** **The OECD set of indicators for the integration of environmental concerns into energy policies**	Data on energy supply and consumption are available from international sources for all OECD countries. More work needs to be done to further develop appropriate measures of energy efficiency (ref. IEA work).

BIODIVERSITY

MAIN POLICY CHALLENGES

- *Main concerns relate to the impacts of human activities on biodiversity. Pressures can be physical (habitat alteration and fragmentation through changes in land use and cover), chemical (toxic contamination, acidification, oil spills, other pollution) or biological (alteration of population dynamics and species structure through the release of exotic species or the commercial use of wildlife resources). While protected areas have grown in most OECD countries, pressures on biodiversity and threats to global ecosystems and their species are increasing. Many natural ecosystems have been degraded, limiting the ecosystem services they provide.*
- *The main challenge is to maintain or restore the diversity and integrity of ecosystems, species and genetic material and to ensure a sustainable use of biodiversity. This implies strengthening the actual degree of protection of habitats and species, eliminating illegal exploitation and trade, integrating biodiversity concerns into economic and sectoral policies, and raising public awareness.*

MEASURING PERFORMANCE

- *Environmental performance can be assessed against domestic objectives and international agreements such as: the Convention on Biological Diversity (1992), the Convention on the Conservation of Migratory Species of Wild Animals (1979), the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES, 1973), the Convention on Wetlands of International Importance (1971) and the Convention on the Conservation of European Wildlife and Natural Habitats (1979). A target endorsed at the WSSD (Johannesburg, 2002) aims to significantly reduce the rate of loss of biodiversity by 2010 at the global, regional and national levels.*
- *The indicator presented here relates to the number of threatened species compared to the number of known or assessed species. "Threatened" refers to endangered species, critically endangered species and vulnerable species. Trends in protected areas are provided as a complement. [Data sources: OECD, IUCN].*
- *When interpreting this indicator, it should be kept in mind that it only provides a partial picture of the status of biodiversity. It should be read in connection with other indicators of the OECD Core set and in particular with indicators on the sustainable use of biodiversity as a resource (e.g. forest, fish) and on habitat alteration. It should further be complemented with information on the density of population and of human activities.*

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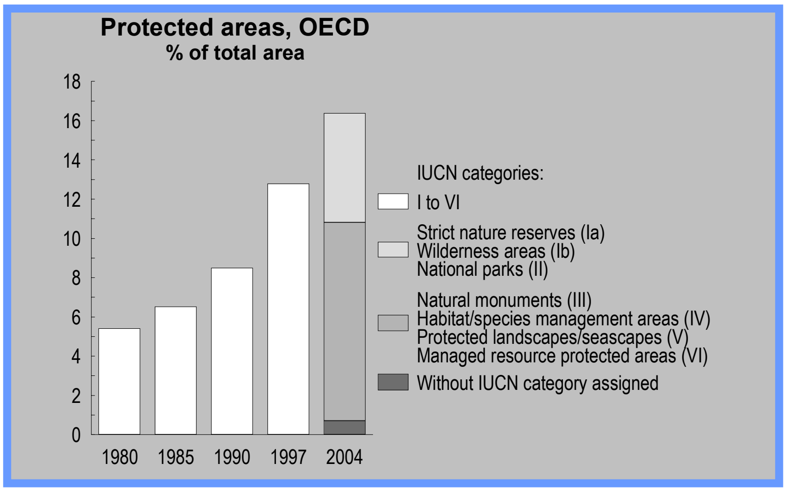
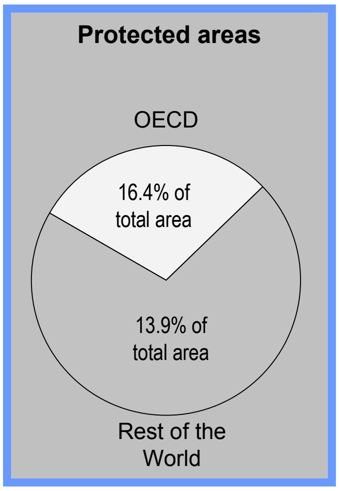
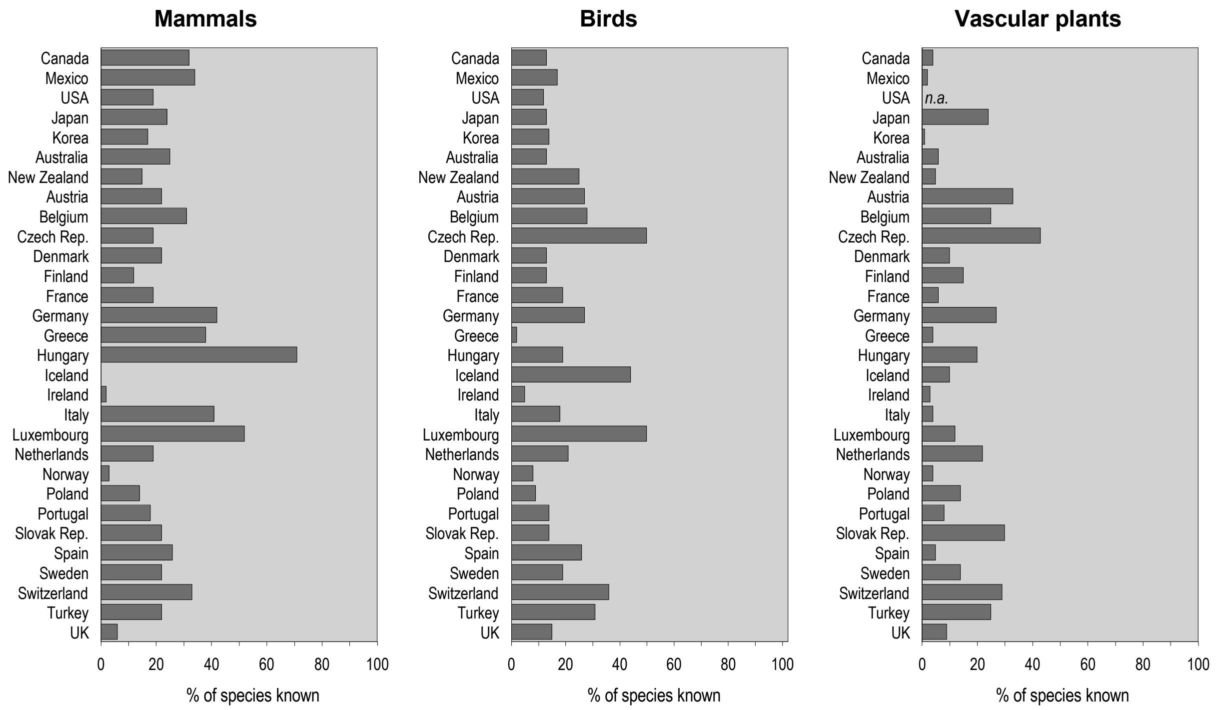
MONITORING TRENDS





- *The number and extent of protected areas has increased significantly since 1980 in almost all countries, reaching 16.4% of total area for the OECD as a whole. Actual protection levels, management effectiveness and related trends are more difficult to evaluate, as protected areas change over time: new areas are designated, boundaries are revised and some sites may be destroyed or changed by pressures from economic development or natural processes.*

CURRENT STATE – THREATENED SPECIES



This indicator still shows a high percentage of species threatened, particularly in countries with a high population density, and a high level of concentration of human activities.

In most countries, a significant share of species are threatened not only by habitat loss or alteration inside protected areas, but also by changes in land use categories and intensity outside protected areas (e.g. agriculture, forestry, etc.). In general, little progress is being made to slow habitat loss and fragmentation outside protected areas.

10

THE BASIS: THE OECD CORE SET OF ENVIRONMENTAL INDICATORS

Core set indicators		Measurability
ISSUE: BIODIVERSITY		Data on threatened species are available for all OECD countries with varying degrees of completeness. The number of species known or assessed does not always accurately reflect the number of species in existence, and the definitions that should follow IUCN standards are applied with varying degrees of rigour in Member countries. Historical data are generally not comparable. On key ecosystems, no OECD-wide data are available. Data on protected areas are available, but not by type of ecosystem. Also, a distinction between areas protected mainly for "biological" reasons and areas protected for aesthetic or cultural reasons is not always easy. More generally, accurate, comprehensive and comparable time-series data on wildlife populations still need to be fully developed. More needs also to be done to monitor ecosystem integrity and to develop indicators that better reflect the state of and changes in biodiversity at the habitat/ecosystem level.
Pressures	♦ **Habitat alteration and land conversion from natural state** to be further developed (e.g. road network density, change in land cover, etc.)	
Conditions	♦ **Threatened or extinct species as a share of total species assessed** ♦ **Area of key ecosystems**	
Responses	♦ **Protected areas as % of national territory and by type of ecosystem** – Protected species	

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II. CORE ENVIRONMENTAL INDICATORS

CLIMATE CHANGE

Industrialisation has increased emissions of greenhouses gases (GHG) from human activities, disturbing the radiative energy balance of the earth-atmosphere system. These gases exacerbate the natural greenhouse effect, leading to temperature changes and other potential consequences for the earth's climate. Land use changes and forestry also contribute to the greenhouse effect by altering carbon sinks. Climate change is of concern mainly as relates to its impact on ecosystems (biodiversity), human settlements and agriculture, and on the frequency and scale of extreme weather events, and to possible consequences for socio-economic activities that could affect global economic output.

Climate change could have major or significant effects on <u>sustainable development</u>. <u>Performance</u> can be assessed against domestic objectives and international commitments. The main international agreement is the United Nations Framework Convention on Climate Change (FCCC) (Rio de Janeiro, 1992), ratified by 189 parties. Industrialised countries, including those in transition to market economies, committed to taking measures aimed at stabilising GHG emissions by 2000 at 1990 levels. The 1997 Kyoto Protocol establishes differentiated national or regional emission reduction or limitation targets for industrialised countries for 2008-12 with 1990 as the reference year. The Kyoto Protocol that has been ratified by 150 countries, including all but three OECD countries, is in force since 16 February 2005. The targets are comprehensive, covering CO_2, CH_4, N_2O, PFCs, HFCs and SF_6. The main <u>challenge</u> is to stabilise GHG concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. This implies strengthening efforts to implement related national and international strategies and to further de-couple GHG emissions from economic growth.

<u>Indicators</u> presented here relate to:

- *<u>CO_2 emissions from energy use</u>, showing total emissions as well as <u>emission intensities</u> per unit of GDP and per capita, and related changes since 1980. CO_2 from combustion of fossil fuels and biomass is a major contributor to the enhanced greenhouse effect and a key factor in countries' ability to deal with climate change. Information on fossil fuel share and intensity is given to reflect, at least partly, changes in energy efficiency and energy mix, which are essential in efforts to reduce atmospheric CO_2 emissions.*
- *<u>total greenhouse gas emissions</u>, i.e. the sum of the six greenhouse gases of the Kyoto Protocol expressed in CO_2 equivalents, as well as emissions intensities per unit of GDP and per capita, and related changes since 1990.*
- *atmospheric <u>concentrations of the greenhouse gases</u> covered by the FCCC (CO_2, CH_4, N_2O) and of selected ozone depleting substances controlled by the Montreal Protocol that also play a role in the greenhouse effect (CFC-11, CFC-12, total gaseous chlorine). Data are from various monitoring sites that provide an indication of global concentrations and trends.*

These indicators should be read in conjunction with other indicators from the OECD Core Set and in particular with indicators on energy efficiency and on energy prices and taxes. Their interpretation should take into account the structure of countries' energy supply, the relative importance of fossil fuels and of renewable energy, as well as climatic factors.

CLIMATE CHANGE: ONGOING WORK AND REFERENCES

♦ **OECD CORE SET AND RELATED INDICATORS**

Pressure		State	Response
Indirect pressures	**Direct pressures**		
☑ Economic growth ❶ ❷ *p.99* ☐ Population growth ❷ *p.100* ☐ Energy supply ❷ *p.107* ☑ Fossil fuel supply ❶ ❷ *p.108, p.53*	☑ GHG emissions ❶ ☑ CO_2 emissions ❶	☑ Global atmospheric concentrations of GHG ❶ ☐ Global mean temperatures ❸	☐ Energy efficiency ❷ *p.107* ☑ Fossil fuel intensities ❶ ☑ Energy prices & taxes ❶ ❷ *p.109*

❶ *indicator presented here* ❷ *indicator presented elsewhere in this publication* ❸ *indicator not presented*

♦ **REFERENCES**

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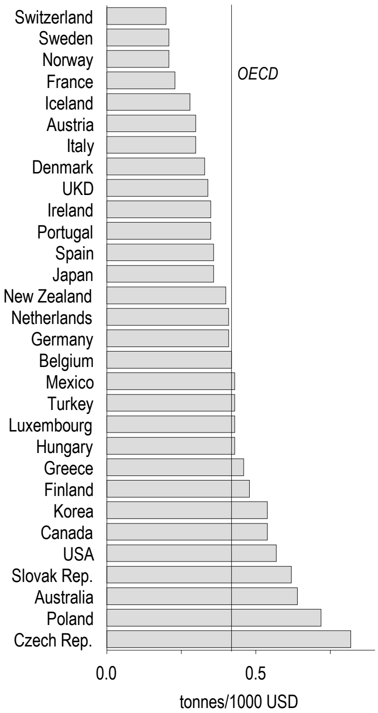
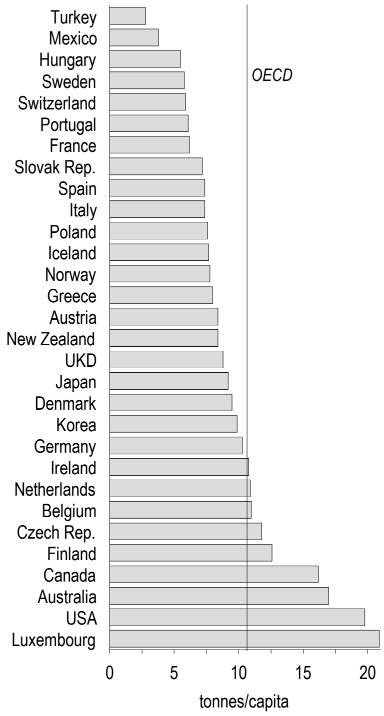
CO_2 EMISSION INTENSITIES 1

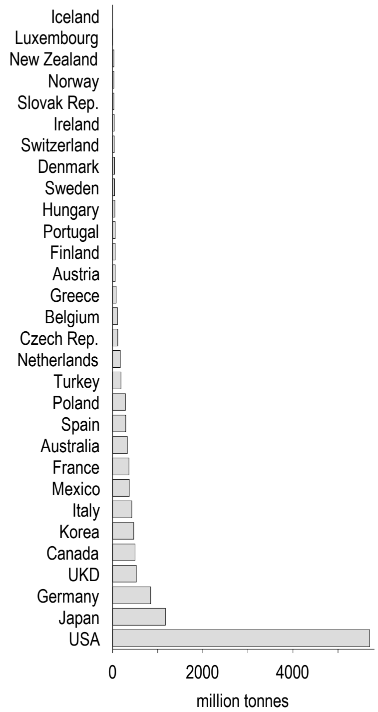
Emission intensities per unit of GDP, 2002



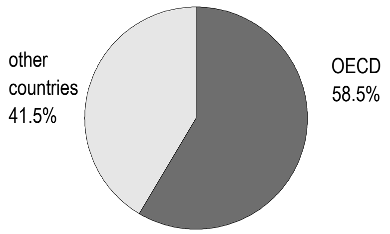
Emission intensities per capita, 2002



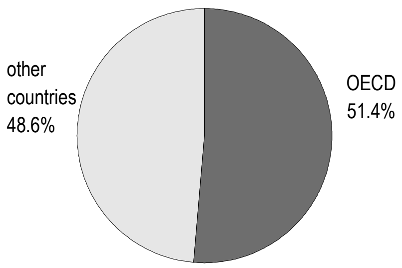
Total emissions 2002



Contribution of OECD countries to world emissions

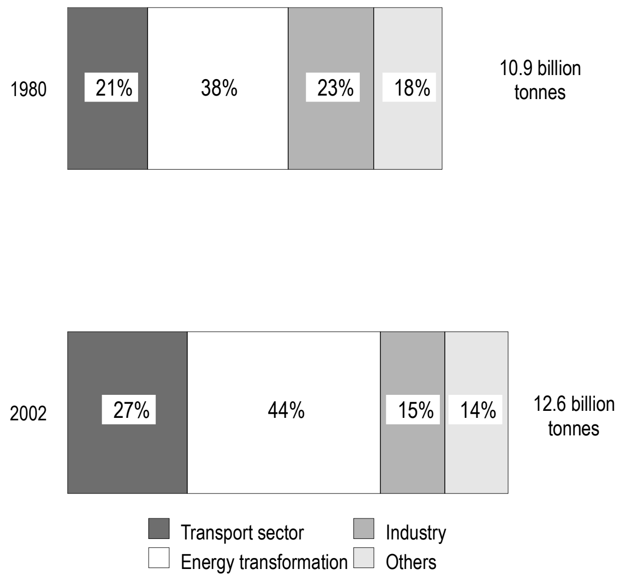


World 1980 emissions 18.7 billion tonnes

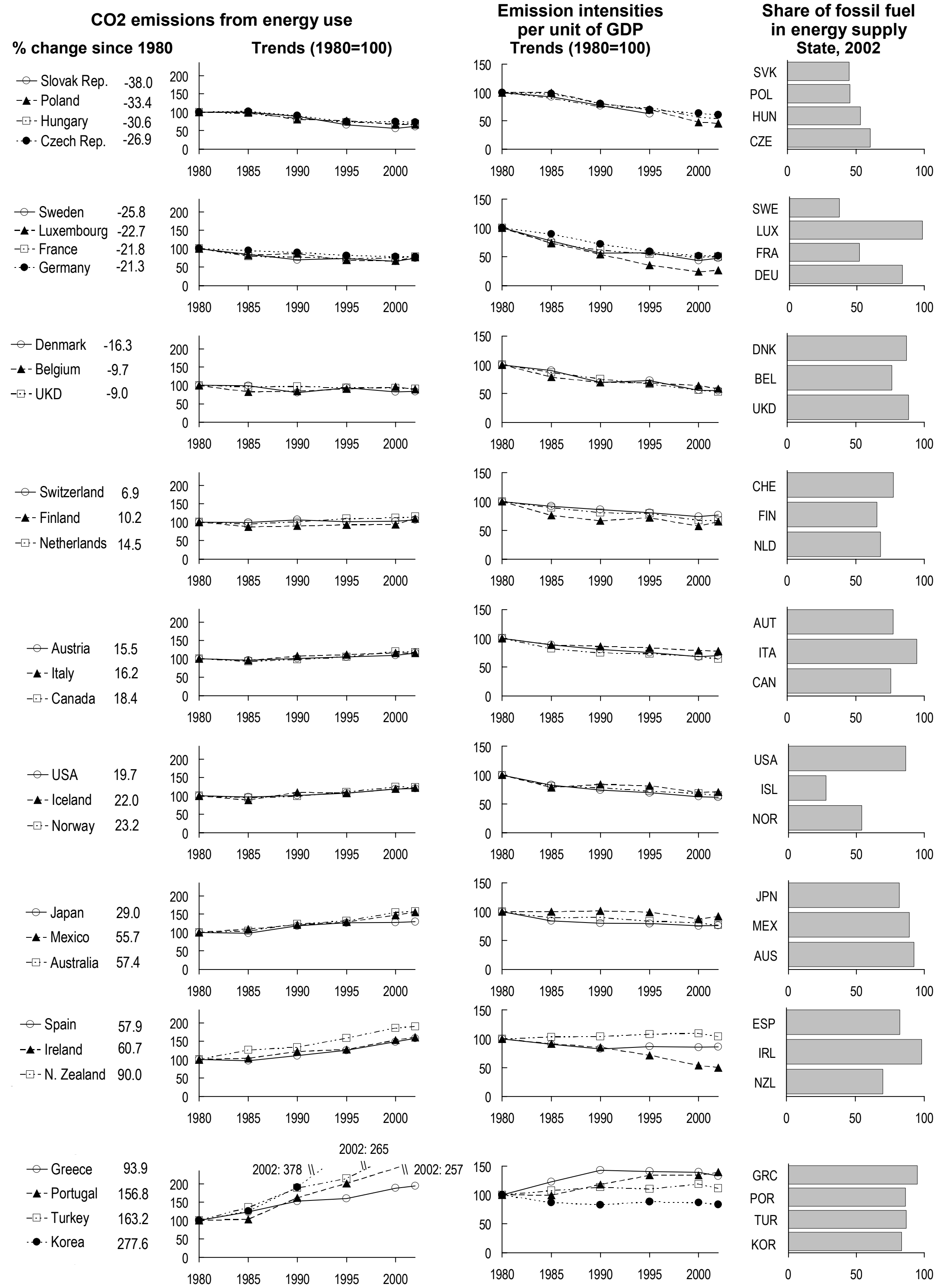


World 2002 emissions 24.5 billion tonnes

Structure of OECD emissions



1 CO_2 EMISSION INTENSITIES



CO_2 EMISSION INTENSITIES 1

	CO_2 emissions from energy use							Fossil fuel supply		Real end-use energy prices	GDP
	Total			Emission intensities				Share of total supply	Intensity per unit of GDP		
				per unit of GDP		per capita					
	million tonnes 2002	% change since 1980	% change since 1990	t./1 000 USD 2002	% change since1980	tonnes/cap. 2002	% change since1980	% 2002	Toe/1 000 USD 2002	% change since 1980	% change since 1980
Canada	507	18	20	0.54	-36	16.2	-7	76	0.24	19	84
Mexico	380	56	28	0.43	-8	3.8	7	89	0.17	67	69
USA	5705	20	18	0.57	-39	19.8	-5	86	0.22	-35	95
Japan	1178	29	10	0.36	-24	9.2	18	82	0.13	-36	70
Korea	472	278	99	0.55	-16	9.9	202	83	0.26	-8	352
Australia	334	57	28	0.64	-23	17.0	18	92	0.23	-4	105
New Zealand	33	90	42	0.39	4	8.4	52	70	0.17	-23	83
Austria	67	15	14	0.29	-30	8.4	8	77	0.11	-26	65
Belgium	113	-10	7	0.42	-41	11.0	-14	76	0.17	-18	54
Czech Rep.	121	-27	-20	0.78	-40	11.8	-26	86	0.26	2	21
Denmark	51	-16	3	0.33	-45	9.5	-20	87	0.12	-1	51
Finland	65	10	22	0.48	-35	12.6	1	60	0.17	-8	68
France	369	-22	1	0.23	-50	6.2	-29	52	0.10	-14	57
Germany	848	-21	-13	0.41	-49	10.3	-25	84	0.15	-9	53
Greece	88	94	27	0.46	33	8.0	70	95	0.17	-31	46
Hungary	56	-31	-17	0.43	-47	5.5	-27	83	0.19	88	30
Iceland	2	22	11	0.28	-29	7.7	-3	28	0.13	..	73
Ireland	42	61	32	0.35	-50	10.8	40	98	0.17	-24	221
Italy	430	16	8	0.30	-22	7.4	13	94	0.12	16	50
Luxembourg	9	-23	-11	0.42	-73	20.9	-36	99	0.20	0	188
Netherlands	177	15	13	0.40	-32	10.9	0	97	0.19	9	70
Norway	36	23	25	0.21	-35	7.8	11	54	0.10	1	91
Poland	292	-33	-17	0.73	-54	7.6	-38	95	0.23	53	45
Portugal	63	157	58	0.35	39	6.1	143	86	0.14	-27	85
Slovak Rep.	39	-38	-30	0.62	-55	7.2	-43	71	0.24	19	37
Spain	303	58	43	0.35	-14	7.4	44	82	0.14	-8	83
Sweden	51	-26	7	0.21	-53	5.8	-31	37	0.09	17	56
Switzerland	43	7	0	0.20	-24	5.9	-7	57	0.08	-31	40
Turkey	193	163	40	0.43	12	2.8	68	87	0.15	37	136
UKD	532	-9	-7	0.34	-47	8.8	-15	89	0.14	-16	72
OECD	12600	15	13	0.45	-36	11.0	-3	83	0.18	-22	79
World	24528	31	15	..	..	3.9	-6	80	..	..	..

♦ *See Technical Annex for data sources, notes and comments.*

STATE AND TRENDS SUMMARY

CO_2 emissions from energy use are still growing in many countries and overall mainly due to increases in the transport and the energy transformation sectors. Since 1980, they have grown more slowly in OECD countries as a group than they have worldwide. But recent data suggest that OECD growth rates are now on par with those world-wide. Individual OECD countries' rates of progress vary significantly.

Many OECD countries have de-coupled their CO_2 emissions from GDP growth (weak decoupling) through structural changes in industry and in energy supply and the gradual improvement of energy efficiency in production processes.

CO_2 emissions from energy use continue to grow, particularly in the OECD Asia-Pacific region and in North America. This can be partly attributed to energy production and consumption patterns and trends, often combined with overall low energy prices.

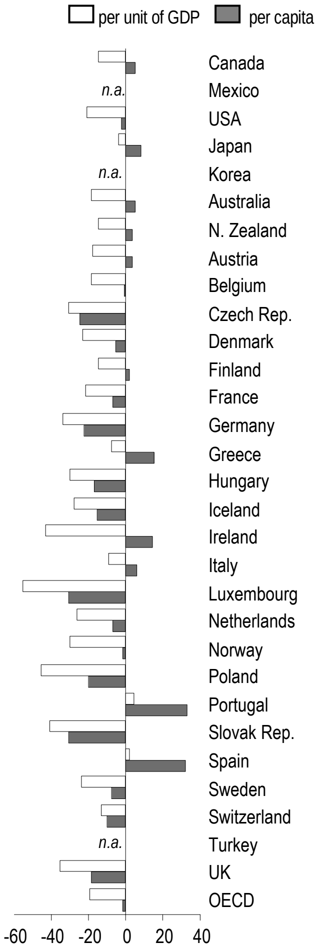
In OECD Europe CO_2 emissions from energy use decreased by almost 5% between 1980 and 2002, as a result of changes in economic structures and energy supply mix, energy savings and, in some countries, decreases in economic activity over the considered period.

2 GREENHOUSE GAS EMISSIONS

		Total GHG emissions		Emission intensities				GDP
		million tonnes CO_2 equivalent 2002	% change since 1990	per unit of GDP t./1000 USD 2002	% change since 1990	per capita t./cap. 2002	% change since 1990	% change since 1990
Canada		731	20	0.78	-14	23.3	6	40
Mexico	♦	..	..	..	..	..	..	41
USA		6935	13	0.69	-20	24.1	-2	42
Japan		1331	12	0.40	-3	10.4	9	16
Korea	♦	..	..	..	..	..	..	97
Australia		526	22	1.00	-18	26.8	6	49
New Zealand		75	22	0.89	-14	19.0	4	42
Austria		85	9	0.37	-17	10.5	4	31
Belgium		150	3	0.56	-18	14.5	-1	26
Czech Rep.		143	-26	0.93	-30	14.0	-24	7
Denmark		68	-0.4	0.44	-23	12.7	-5	29
Finland		82	7	0.60	-14	15.8	2	24
France		553	-2	0.35	-21	9.3	-7	25
Germany		1015	-19	0.49	-33	12.3	-22	22
Greece		135	26	0.71	-8	12.3	16	36
Hungary		78	-19	0.60	-30	7.7	-17	16
Iceland		3	-4	0.40	-27	11.1	-15	32
Ireland		69	29	0.57	-43	17.6	15	125
Italy		554	9	0.38	-9	9.5	6	20
Luxembourg		11	-19	0.49	-55	24.4	-30	78
Netherlands		214	1	0.49	-26	13.2	-6	36
Norway		55	6	0.33	-29	12.2	-1	50
Poland		370	-19	0.92	-45	9.7	-20	46
Portugal		82	40	0.46	5	7.9	34	34
Slovak Rep.		51	-29	0.82	-40	9.5	-30	18
Spain		400	40	0.47	3	9.7	32	37
Sweden		70	-4	0.29	-23	7.8	-7	26
Switzerland		52	-2	0.24	-13	7.2	-9	13
Turkey	♦	..	..	..	..	..	..	42
UKD		635	-15	0.41	-35	10.5	-18	32
OECD	♦	14473	7	0.57	-19	15.6	-1	32

♦ *See Technical Annex for data sources, notes and comments*

GHG emissions % change since 1990



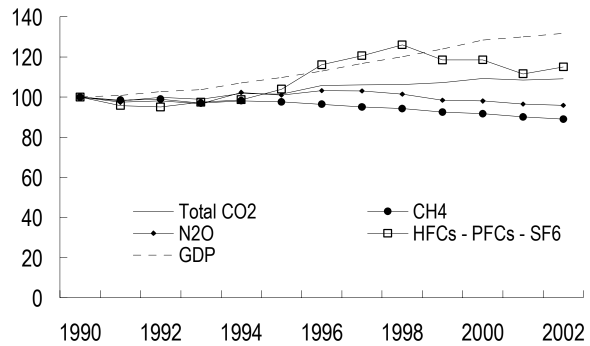
STATE AND TRENDS SUMMARY

Total GHG emissions are still growing in many countries and overall, even though at a slightly lower pace than CO_2 emissions from energy use. Individual OECD countries' contributions to the greenhouse effect, and rates of progress, however, vary significantly. These differences partly reflect different national circumstances like economic growth, population growth and the extent to which the countries have taken steps to reduce emissions from different sources.

Emission intensities per unit of GDP and per capita are decreasing in most OECD countries. Most countries, however, have not succeeded in meeting their earlier commitments.

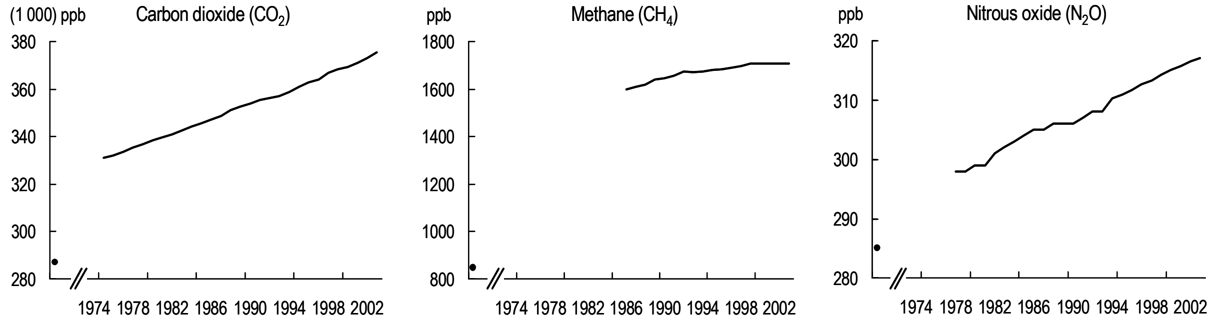
Carbon dioxide remains the predominant greenhouse gas and largely determines the overall trend.

OECD greenhouse gas emissions Index 1990=100

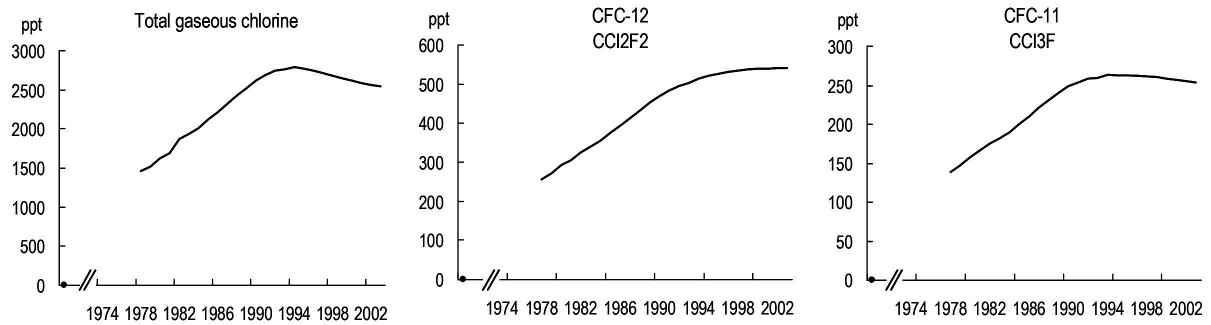


GREENHOUSE GAS CONCENTRATIONS 3

Gases controlled under the Framework Convention on Climate Change



Gases controlled under the Montreal Protocol (substances depleting the ozone layer)



• - Preindustrial level

STATE AND TRENDS SUMMARY

Since the beginning of industrialisation, human activity has substantially raised atmospheric concentrations of GHG. Global CO_2 concentrations have increased along with world population. According to the IPCC (2001), global mean surface temperature has increased by between 0.4 and 0.8 degree Celsius over the 20th century and is expected to rise 1.4° to 5.8°C by 2100 relative to 1990.

Trends also show large increases in concentrations of ozone depleting substances (ODS) in the atmosphere. A number of ODS play a role in the greenhouse effect. However, growth rates of CFC concentrations have decreased since 1989 as a result of the Montreal Protocol and its amendments.

OZONE LAYER DEPLETION

The release into the atmosphere of certain man-made substances containing chlorine and bromine endangers the stratospheric ozone layer, which shields the earth's surface from ultraviolet radiation. The main ozone depleting substances (ODS) are CFCs, halons, methyl chloroform, carbon tetrachloride, HCFCs and methyl bromide. These are man-made chemicals which have been used in air conditioning and refrigeration equipment, aerosol sprays, foamed plastics, and fire extinguishers. They are also used as solvents and pesticides.

The depletion of the ozone layer could have major or significant effects on sustainable development. It remains a source of concern due to the impacts of increased UV-B radiation on human health, crop yields and the natural environment. Performance can be assessed against domestic objectives and international commitments. The major international agreements are the Convention for the Protection of the Ozone Layer (Vienna, 1985), the Montreal Protocol (1987) on substances that deplete the ozone layer and subsequent London (1990), Copenhagen (1992), Montreal (1997) and Beijing (1999) Amendments. The protocol and amendments set out timetables for phasing out ODS. The Montreal Protocol has been ratified by 189 parties, including all OECD countries. Countries are developing alternatives to or substitutes for ODS, recovering and recycling ODS and regulating the emissions of ODS. The main challenges are to phase out the production and consumption of methyl bromide and HCFCs (by 2005 and 2030 respectively) in industrialised countries, and to reduce international movements of existing CFCs.

Indicators presented here relate to:

- *ozone depleting substances, i.e. the production and consumption of CFCs, halons and HCFCs, and the production of methyl bromide, as listed in the Montreal protocol. Basic data are weighted with the ozone depleting potentials (ODP) of the individual substances.*
- *stratospheric ozone levels expressed as the values of total ozone in a vertical atmospheric column over selected stations in OECD cities, presented with a zonal average (from 70N to 70S) taken from satellite data to put trends from individual stations in a global context.*

When interpreting these indicators it should be kept in mind that they do not reflect actual releases to the atmosphere and that individual substances vary considerably in their ozone-depleting capacity. These indicators should be read in connection with other indicators of the OECD Core Set and with information on ground-level UV-B radiation.

OZONE LAYER DEPLETION: ONGOING WORK AND REFERENCES

♦ **OECD CORE SET AND RELATED INDICATORS**

Pressure		State	Response
Indirect pressures	Direct pressures		
☑ Production/consump. of CFCs, halons and other ODS ❶ ☑ Index of apparent consumption of ODS❶	☐ Release of ODS❸	☐ Atmospheric ODS concentrations❷p.43 ☐ Ground-level UV-B radiation ❸ ☑ Stratospheric ozone levels over selected cities ❶	☐ Existing CFC recovery rates ❸

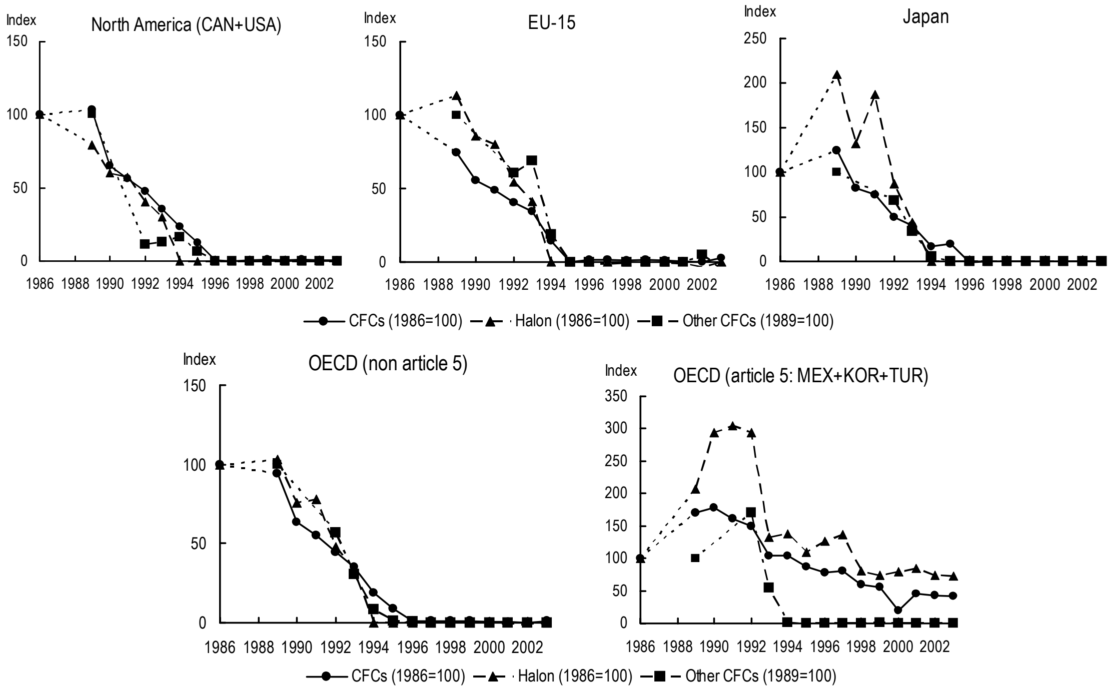
❶ *indicator presented here* ❷ *indicator presented elsewhere in this publication* ❸ *indicator not presented*

♦ **REFERENCES**

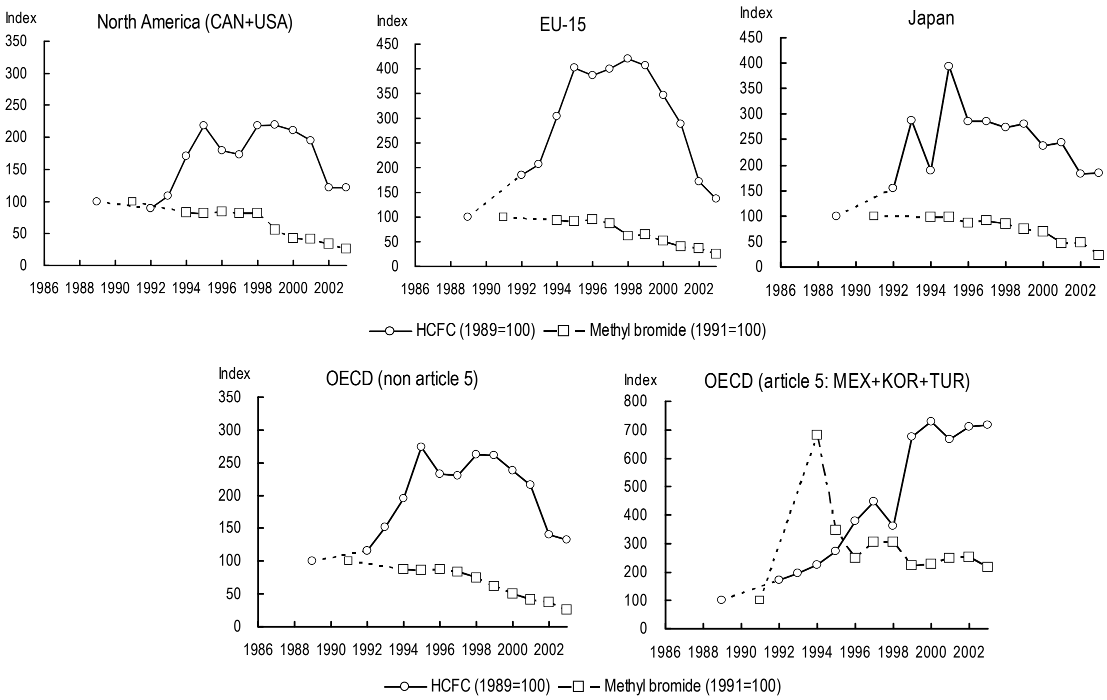
🕮 OECD (2004), OECD Environmental Data — Compendium 2004

🕮 UNEP Ozone Secretariat

Consumption of CFCs and halons



Consumption of HCFCs and methyl bromide



Article 5: Parties operating under article 5 of the Montreal Protocol entitling them to delay compliance with certain measures.

4 OZONE DEPLETING SUBSTANCES

		Consumption										Production	
		CFCs		Halons		HCFCs		Methyl Bromide		Total	Total	Total	Total
		tonnes 2003	% change 86-03	tonnes 2003	% change 86-03	tonnes 2003	% change 89-03	tonnes 2003	% change 91-03	tonnes 2003	g/cap. 2003	tonnes 2003	g/cap. 2003
Canada		-	-100	-	-100	798	119	35	-76	833	26	74	2
Mexico		1983	-78	104	-11	728	432	968	307	3783	37	8975	87
USA		1605	-99	-	-100	7327	15	4053	-74	12419	43	13234	45
Japan		4	-100	-	-100	2699	85	858	-77	3560	28	4636	36
Korea	♦	6647	-22	2187	-26	1638	634	-	..	11746	245	12708	265
Australia		1	-100	-	-100	144	-3	109	-74	254	13	-	-
New Zealand		-	-100	-	-100	23	-1	21	-74	44	11	-	-
Austria		..	..	..	..	..	..	..	..	..	..	-	-
Belgium		..	..	..	..	..	..	..	..	..	..	-	-
Czech Rep.		-4	-100	-	-100	3	78	-	-100	93	9	84	8
Denmark		..	..	..	..	..	..	..	..	..	..	-22	-4
Finland		..	..	..	..	..	..	..	..	..	..	-43	-8
France		..	..	..	..	..	..	..	..	..	..	6307	106
Germany		..	..	..	..	..	..	..	..	..	..	451	5
Greece		..	..	..	..	..	..	..	..	..	..	1481	134
Hungary		-1	-100	-	-100	26	..	10	-70	34	3	-1	-
Iceland		-	-100	-	-100	3	-46	-	-	3	9	-	-
Ireland		..	..	..	..	..	..	..	..	..	..	-	-
Italy		..	..	..	..	..	..	..	..	..	..	7511	129
Luxembourg		..	..	..	..	..	..	..	..	..	..	-	-
Netherlands		..	..	..	..	..	..	..	..	..	..	688	42
Norway		-66	-105	-13	-101	21	-58	1	-78	-56	-12	-79	-17
Poland		114	-98	-	-100	98	78	36	-70	249	7	-	-
Portugal		..	..	..	..	..	..	..	..	..	..	-	-
Slovak Rep.		1	-100	-	-100	3	-3	-	-100	4	1	-	-
Spain		..	..	..	..	..	..	..	..	..	..	5089	122
Sweden		..	..	..	..	..	..	..	..	..	..	-	-
Switzerland	♦	-3	-100	-	-100	14	-21	12	-54	26	4	-48	-7
Turkey		439	-89	41	-67	358	1688	185	-37	1056	15	-	-
UK		..	..	..	..	..	..	..	..	..	..	1315	22
EU-15		8864	-97	-	-100	2584	36	2953	-74	14452	44	22776	69
OECD	♦	10514	-99	-13	-100	13743	32	8087	-74	17462	19	40675	44

♦ See Technical Annex for data sources, notes and comments.

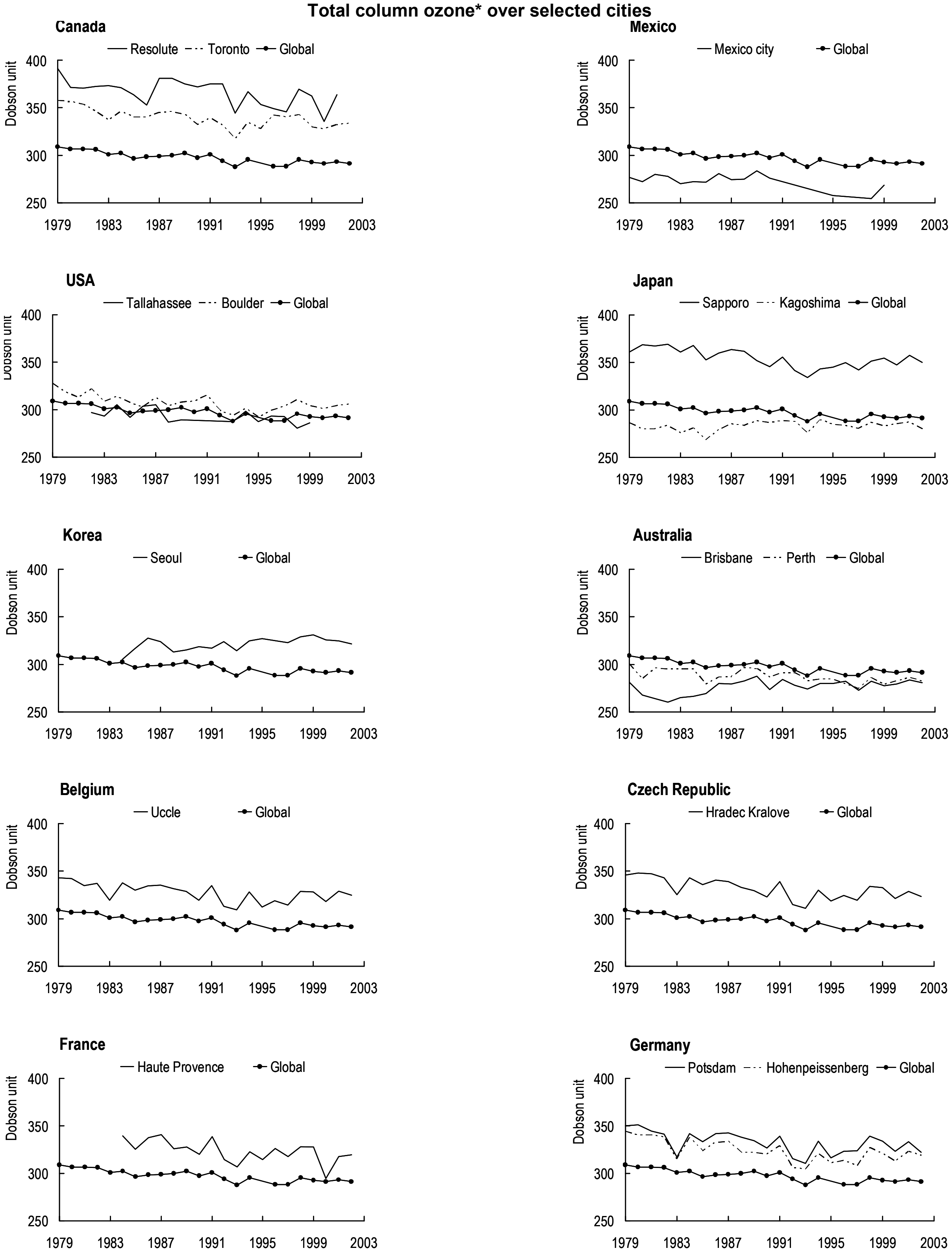
STATE AND TRENDS SUMMARY

As a result of the Montreal Protocol, industrialised countries have rapidly decreased their production and consumption of CFCs (CFC 11, 12, 113, 114, 115) and halons (halon 1211, 1301 and 2402). The targets set have been reached earlier than originally called for, and new and more stringent targets have been adopted. Many countries achieved zero level by 1994 for halons and by end of 1995 for CFCs, HBFCs, carbon tetrachloride and methyl chloroform. Since 1996, there has been no production or consumption (i.e. production + imports - exports) of these substances in industrialised countries except for certain essential uses, but there are still releases to the atmosphere, for example from previous production or consumption in industrialised countries, and from production or consumption in countries that were given longer phase out schedules.

Efforts are being made to reduce international traffic (legal and illegal) in existing CFCs as well as intentional or accidental releases of existing CFCs. Imports and exports from non-Parties to the protocol are banned. Storage banks for existing halons and CFCs have been created in some countries. New measures have been adopted to phase out the production and consumption of HCFCs and methyl bromide by 2030 and 2005 respectively in industrialised countries.

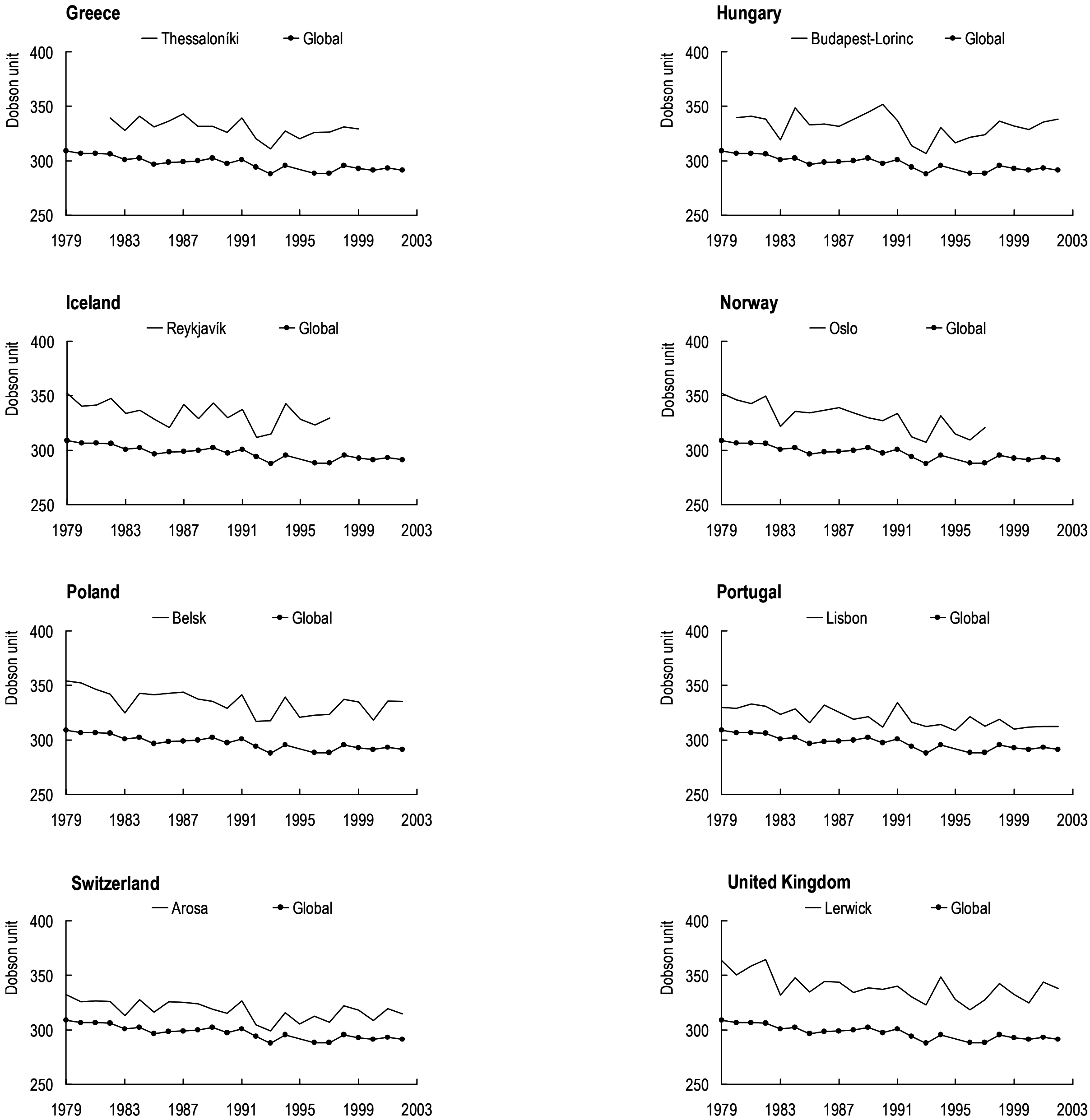
Global atmospheric concentrations of ODS show important changes. Growth rates of CFC concentrations have decreased since 1989, reflecting the impact of the Montreal Protocol and its amendments. Growth rates of HCFC concentrations are increasing. HCFCs have only 2 to 12% of the ozone depleting potential of CFCs, but under current international agreements they will not be phased out for at least 25 years and will remain in the stratosphere for a long time. Stratospheric ozone depletion remains a source of concern due to the long time lag between the release of ODS and their arrival in the stratosphere.

Total column ozone* over selected cities



5 STRATOSPHERIC OZONE

Total column ozone* over selected cities



** See Technical Annex for further details.*

STATE AND TRENDS SUMMARY

Since 1979, the amount of stratospheric ozone over the entire globe has decreased. The eruption of Mount Pinatubo in June 1991 caused levels to sink to record lows in 1992 and 1993. Trends also show a decrease in ozone levels over a number of cities. These trends, however, need continued monitoring and careful interpretation, due to possible interference with ground-level ozone.

AIR QUALITY

Atmospheric pollutants from energy transformation and energy consumption, but also from industrial processes, are the main contributors to regional and local air pollution. Major concerns relate to their effects on human health and ecosystems. Human exposure is particularly high in urban areas where economic activities are concentrated. Causes of growing concern are concentrations of fine particulates, NO_2, toxic air pollutants, and acute ground-level ozone pollution episodes in both urban and rural areas. Air pollution may also damage buildings and monuments, for example through acid precipitation and deposition.

Degraded air quality can result from and cause unsustainable development patterns. It can have substantial economic and social consequences, from health costs and building restoration needs to reduced agricultural output, forest damage and a generally lower quality of life. Performance can be assessed against domestic objectives and international commitments. In Europe and North America, acidification has led to several international agreements. For example, under the Convention on Long-Range Transboundary Air Pollution (Geneva, 1979), protocols to reduce emissions of sulphur (Helsinki, 1985, Oslo, 1994, Gothenburg, 1999), nitrogen oxides (Sofia, 1988, Gothenburg, 1999), VOCs (Geneva, 1991, Gothenburg, 1999) and ammonia (Gothenburg 1999) have been adopted. Two other protocols aim at reducing emissions of heavy metals (Aarhus 1998) and persistent organic pollutants (Aarhus 1998). The main challenges are to further reduce emissions of NO_x and other local and regional air pollutants in order to achieve a strong de-coupling of emissions from GDP and to limit the exposure of the population to air pollution. This implies implementing appropriate pollution control policies, technological progress, energy savings and environmentally sustainable transport policies.

Indicators presented here relate to:

- *SO_x and NO_x emissions and related changes over time, as well as emission intensities expressed as quantities emitted per unit of GDP and per capita, presented with changes in economic growth and fossil fuel supply. These indicators should be supplemented with information on the acidity of rain and snow in selected regions, and the exceedance of critical loads in soils and waters, which reflect the actual acidification of the environment.*
- *air quality expressed as trends in annual SO_2 and NO_2 concentrations for selected cities. In the longer term, indicators should focus on population exposure to air pollution. They should be complemented with information on ground-level ozone and on other air pollutants.*

When interpreting these indicators, it should be kept in mind that SOx and NOx emissions only provide a partial view of air pollution problems.

AIR QUALITY: ONGOING WORK AND REFERENCES

♦ **OECD CORE SET AND RELATED INDICATORS**

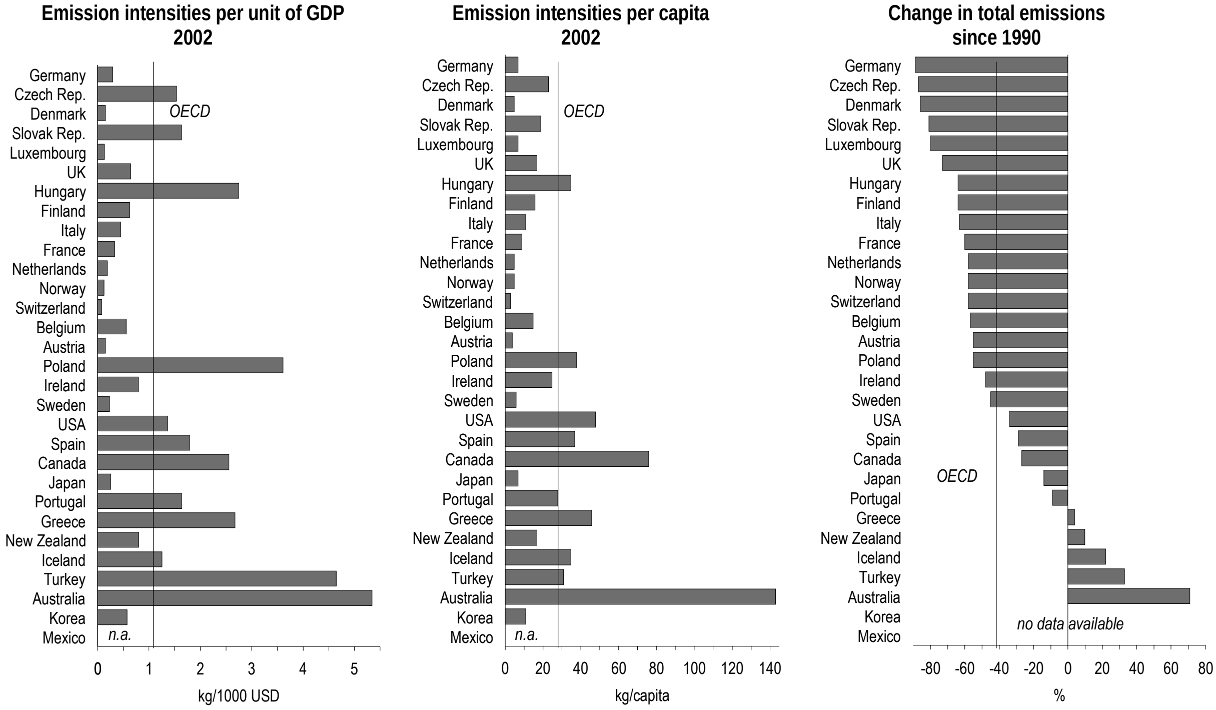
Pressure		State	Response
Indirect pressures	Direct pressures		
☑ Economic growth ❶ ❷*p.99*	☐ Index of acidifying substances ❸	☑ Urban air quality trends ❶	☐ Capacity of air pollution abatement equipment (stationary sources, motor vehicles) ❸
☐ Road traffic ❷ *p.113*	☑ Emissions of air pollutants ❶	☐ Population exposure to air pollution ❸	☐ Expenditure on air pollution abatement and control❷ *p.127*
☑ Fossil fuel supply ❶ ❷ *p.40,108*	☐ Urban air emissions ❸	☐ Exceedance of critical loads of PH ❸	

❶ *indicator presented here* ❷ *indicator presented elsewhere in this publication* ❸ *indicator not presented*

♦ **REFERENCES**

- OECD (1998), Advanced Air Quality Indicators and Reporting
- OECD (2001), OECD Environmental Outlook, Chapter 15, Air Quality
- OECD (2004), OECD Environmental Data — Compendium 2004

Sulphur oxide (SO_x) emissions

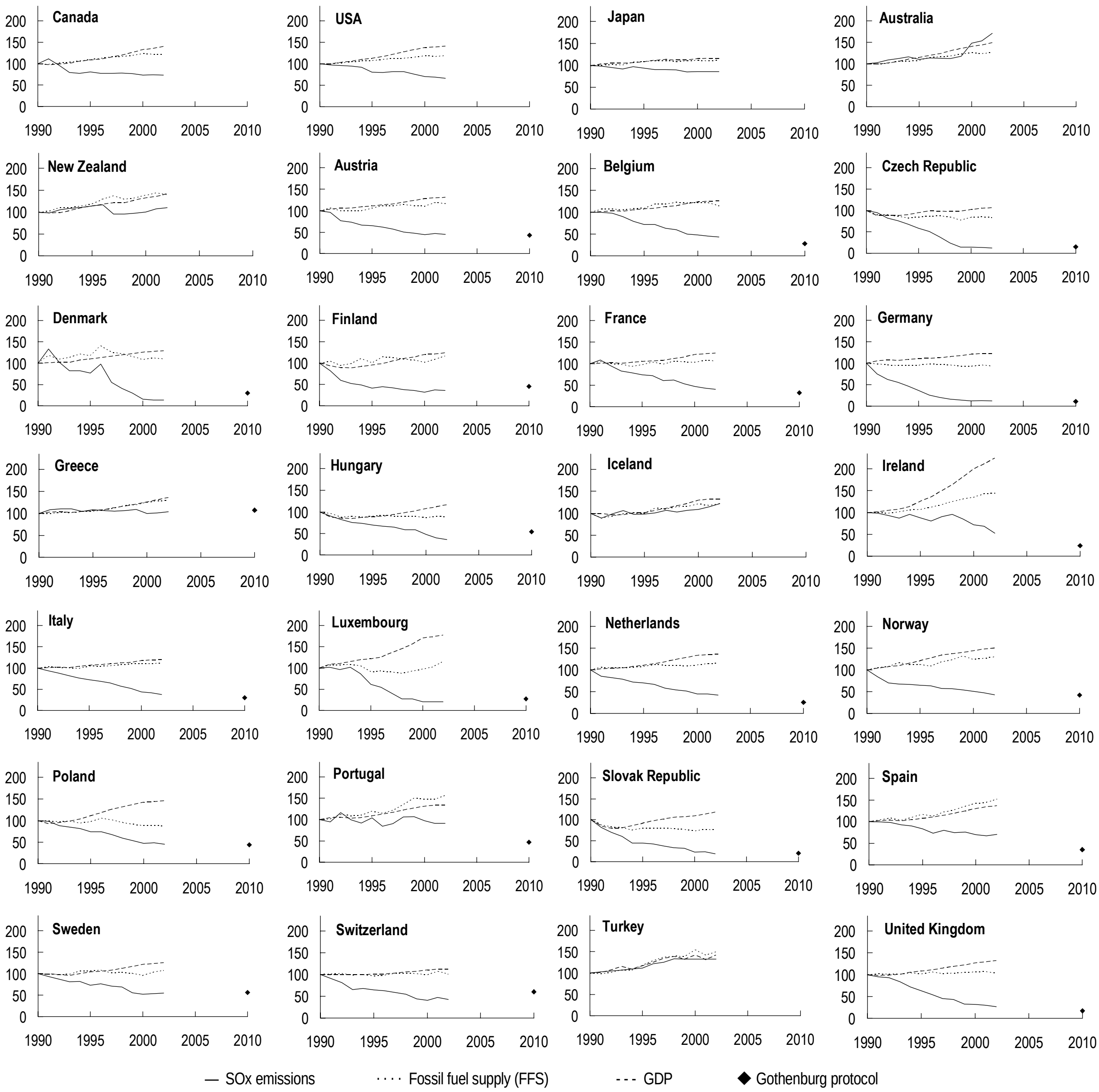


		Total SOx emissions		Intensities per unit of GDP		Intensities per capita		Fossil fuel supply	GDP
		1000 t. 2002	% change since 1990	kg/1000 USD 2002	% change since 1990	kg/cap. 2002	% change since 1990	% change since 1990	% change since 1990
Canada		2394	-27	2.6	-48	76	-35	22	40
Mexico	♦	..	..	..	..	..	..	27	41
USA	♦	13847	-34	1.4	-53	48	-43	19	42
Japan		857	-14	0.3	-26	7	-17	12	16
Korea		501	..	0.6	..	11	..	116	97
Australia		2803	71	5.3	15	143	49	27	49
New Zealand		68	10	0.8	-22	17	-6	40	42
Austria		36	-55	0.2	-66	4	-57	17	31
Belgium		151	-57	0.6	-66	15	-59	16	26
Czech Rep.	♦	237	-87	1.5	-88	23	-87	-16	7
Denmark		24	-86	0.2	-89	5	-87	10	29
Finland		85	-64	0.6	-71	16	-66	17	24
France		537	-60	0.3	-67	9	-61	6	25
Germany		611	-89	0.3	-91	7	-89	-7	22
Greece		509	4	2.7	-24	46	-5	30	36
Hungary	♦	359	-64	2.8	-69	35	-64	-11	16
Iceland		10	22	1.3	-7	35	8	22	32
Ireland		96	-48	0.8	-77	25	-53	44	125
Italy		665	-63	0.5	-69	11	-63	11	20
Luxembourg	♦	3	-80	0.1	-89	7	-82	15	78
Netherlands		85	-58	0.2	-69	5	-61	16	36
Norway		22	-58	0.1	-72	5	-61	29	50
Poland	♦	1455	-55	3.6	-69	38	-55	-13	46
Portugal		295	-9	1.6	-32	28	-13	56	34
Slovak Rep.	♦	102	-81	1.6	-84	19	-81	-24	18
Spain		1541	-29	1.8	-48	37	-33	52	37
Sweden		58	-45	0.2	-57	6	-48	7	26
Switzerland		19	-58	0.1	-62	3	-61	1	13
Turkey	♦	2112	33	4.7	-7	31	11	50	42
UK		1003	-73	0.6	-80	17	-74	4	32
OECD	♦	31654	-41	1.1	-56	28	-46	17	34

♦ *See Technical Annex for data sources, notes and comments.*

6 AIR EMISSION INTENSITIES

Trends in SO_x emissions, Index 1990 = 100



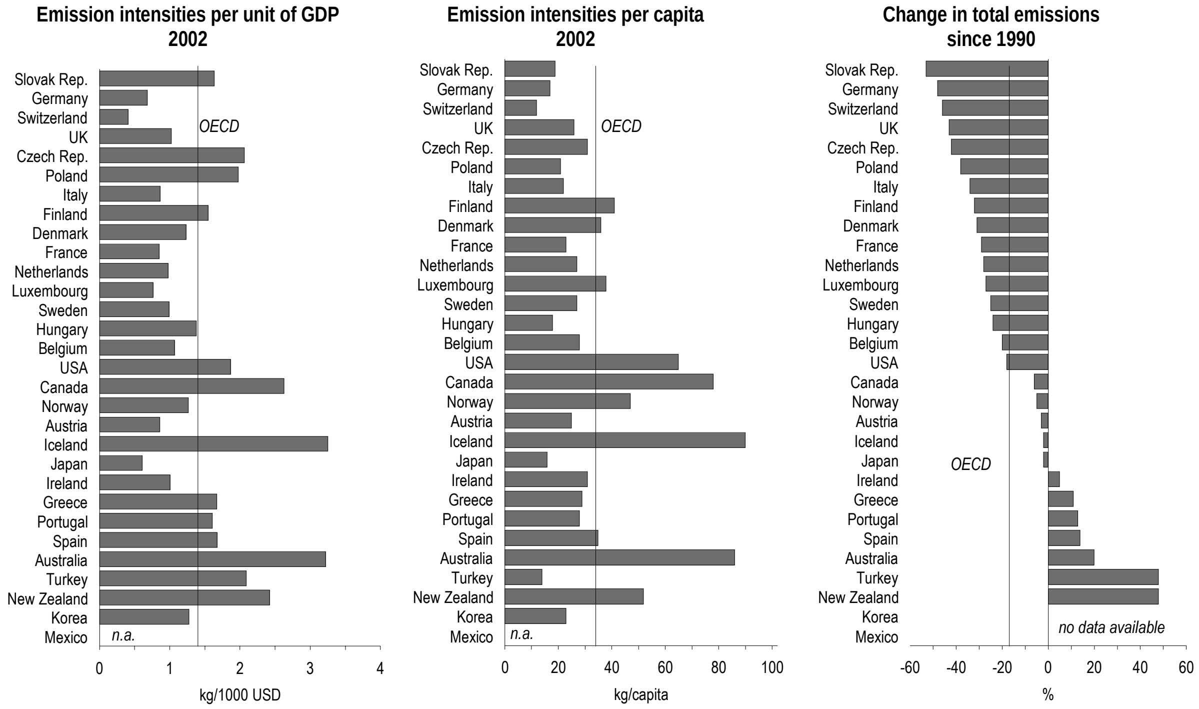
STATE AND TRENDS SUMMARY

SO_x emission intensities per capita and per unit of GDP show significant variations among OECD countries. A strong de-coupling of emissions from GDP is seen in many countries and European countries' early commitments to reduce SO_x emissions have been achieved. The Gothenburg Protocol, adopted in Europe and North America to reduce acid precipitation even further, is in force since May 2005. Some countries (mainly northern and eastern European countries) have already reached the goal they fixed for 2010 but further reductions are necessary for others.

Emissions have decreased significantly for the OECD as a whole, compared to 1990 levels, as a combined result of structural changes in the economy; changes in energy demand through energy savings and fuel substitution; pollution control policies and technical progress, including countries' efforts to control large stationary emission sources.

AIR EMISSION INTENSITIES 6

Nitrogen oxide (NO_x) emissions

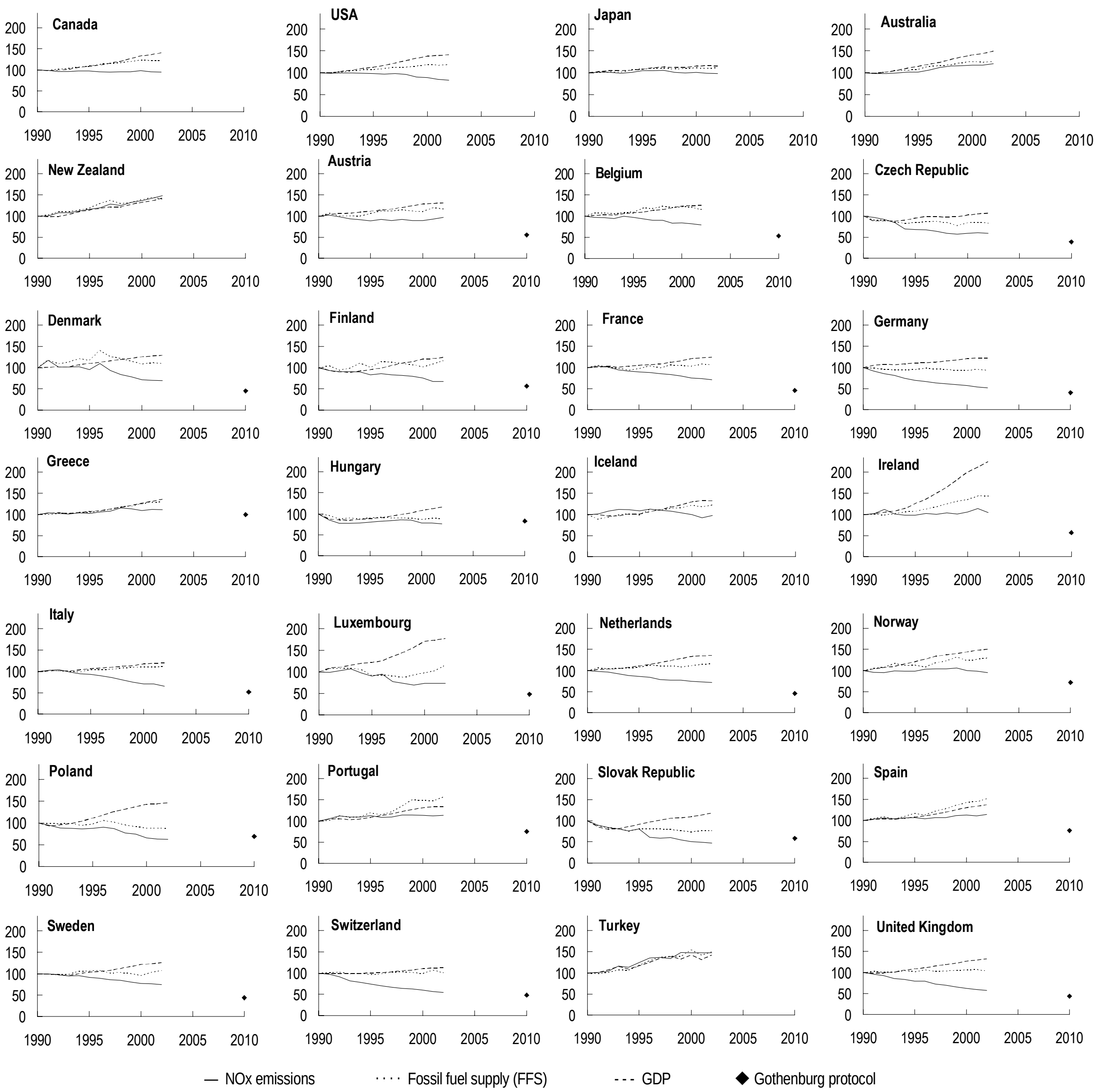


		Total NOx emissions		Intensities per unit of GDP		Intensities per capita		Fossil fuel supply	GDP
		1000 t. 2002	% change since 1990	kg/1000 USD 2002	% change since 1990	kg/cap. 2002	% change since 1990	% change since 1990	% change since 1990
Canada		2459	-6	2.6	-33	78	-17	22	40
Mexico	♦	..	..	..	..	..	..	27	41
USA	♦	18833	-18	1.9	-42	65	-28	19	42
Japan		2018	-2	0.6	-15	16	-5	12	16
Korea		1106	..	1.3	..	23	..	116	97
Australia	♦	1691	20	3.2	-19	86	4	27	49
New Zealand	♦	204	48	2.4	4	52	26	40	42
Austria		200	-3	0.9	-26	25	-7	17	31
Belgium		290	-20	1.1	-37	28	-23	16	26
Czech Rep.	♦	318	-42	2.1	-45	31	-41	-16	7
Denmark		191	-31	1.2	-46	36	-34	10	29
Finland		211	-32	1.6	-46	41	-35	17	24
France		1350	-29	0.9	-43	23	-32	6	25
Germany		1417	-48	0.7	-58	17	-50	-7	22
Greece		318	11	1.7	-19	29	2	30	36
Hungary	♦	180	-24	1.4	-35	18	-23	-11	16
Iceland		26	-2	3.3	-26	90	-13	22	32
Ireland		121	5	1.0	-53	31	-6	44	125
Italy		1267	-34	0.9	-45	22	-36	11	20
Luxembourg	♦	17	-27	0.8	-59	38	-37	15	78
Netherlands		430	-28	1.0	-47	27	-34	16	36
Norway		213	-5	1.3	-37	47	-11	29	50
Poland	♦	796	-38	2.0	-58	21	-38	-13	46
Portugal		288	13	1.6	-16	28	8	56	34
Slovak Rep.	♦	102	-53	1.6	-60	19	-53	-24	18
Spain		1432	14	1.7	-17	35	8	52	37
Sweden		242	-25	1.0	-41	27	-28	7	26
Switzerland		90	-46	0.4	-52	12	-50	1	13
Turkey		951	48	2.1	4	14	23	50	42
UK		1587	-43	1.0	-57	26	-45	4	32
OECD	♦	39500	-17	1.4	-38	34	-24	17	34

♦ *See Technical Annex for data sources, notes and comments.*

6 AIR EMISSION INTENSITIES

Trends in NO_x emissions, Index 1990 = 100



STATE AND TRENDS SUMMARY

NO_x emissions have decreased in the OECD overall compared to 1990, but less than SO_x emissions. Major progress in the early 1990s, particularly in OECD Europe, reflects changes in energy demand, pollution control policies and technical progress. However, these results have not compensated in all countries for steady growth in road traffic, fossil fuel use and other activities generating NO_x. The emissions ceilings of the Gothenburg protocol for 2010 may be difficult to attain.

Emission intensities per capita and per unit of GDP show significant variations among OECD countries, and a weak de-coupling of emissions from GDP in a number of countries.

URBAN AIR QUALITY 7

Trends in SO_2 and NO_2 concentrations in selected cities

			Annual concentrations of sulphur dioxide						Annual concentrations of nitrogen dioxide					
			base reference ($\mu g/m^3$)	(Index 1990 = 100)					base reference ($\mu g/m^3$)	(Index 1990 = 100)				
			1990	1992	1995	1998	2000	2002-3	1990	1992	1995	1998	2000	2002-3
Canada	Toronto	♦	21.0	100	..	48	62	38	47.0	..	100	128	106	111
	Hamilton	♦	18.0	100	117	89	72	72	41.0	88	85	102	100	134
Mexico	Mexico City	♦	144.0	87	31	25	32	22	78.0	101	74	69	72	82
USA	New York	♦	46.6	105	83	67	71	78	87.0	77	90	86	83	83
	Los Angeles	♦	8.7	111	82	78	64	60	76.3	94	93	81	80	71
Japan	Tokyo	♦	24.0	67	79	67	79	67	61.0	103	116	103	90	97
	Kawasaki	♦	29.0	83	72	72	72	66	71.0	97	89	97	86	83
Korea	Seoul	♦	133.5	69	33	16	12	10	56.4	103	107	100	117	127
	Pusan	♦	102.1	85	59	38	26	15	35.7	121	142	126	126	137
Austria	Wien	♦	18.5	75	80	54	30	32	40.2	89	91	87	75	84
	Linz	♦	10.1	90	63	52	56	48	40.7	84	63	61	71	87
Belgium	Bruxelles	♦	22.6	80	72	53	36	35	54.4	74	74	59	59	70
	Antwerpen	♦	34.3	121	76	80	45	47	54.1	87	91	96	89	92
Czech Rep.	Praha	♦	45.0	96	67	33	20	18	29.0	37	44	42	42	51
	Brno	♦	23.0	65	52	35	26	35	26.0	..	100	100	92	88
Denmark	Köbenhavn	♦	17.2	81	42	25	19	22	48.6	107	111	67	65	69
	Aalborg	♦	12.0	59	29	22	..	32	37.0	103	104	69	71	68
Finland	Helsinki	♦	14.9	45	30	29	19	33	42.3	97	82	79	73	74
France	Paris	♦	28.0	71	46	43	36	32	49.0	110	104	102	88	102
	Rouen	♦	29.0	114	86	69	41	30	29.0	152	134	128	97	110
Germany	Berlin	♦	51.0	63	35	16	12	12	36.0	100	83	78	75	89
	München	♦	15.0	80	53	37	28	27	59.0	88	90	84	77	93
Greece	Athens	♦	39.4	154	81	69	56	46	63.2	100	92	92	96	94
Hungary	Budapest	♦	12.8	120	149	160	221	143	36.8	130	135	95	99	100
	Miskolc	♦	25.9	210	145	83	93	67	25.6	133	113	103	96	136
Iceland	Reykjavik	♦	3.8	55	118	71	89	100	14.8	118	281	208	250	173
Ireland	Dublin	♦	26.0	77	85	58	46	27	17.0	..	..	106	96	196
Italy	Milano	♦	46.0	77	43	35	30	25	120.0	93	65	62	59	56
Luxembourg	Luxembourg	♦	32.0	103	63	50	22	..	67.0	76	84	71	70	..
Netherlands	Rotterdam	♦	22.1	96	67	52	40	35	54.0	90	82	83	76	71
Norway	Oslo	♦	13.0	92	54	46	31	31	61.5	80	67	68	68	73
Poland	Lódz	♦	27.0	96	78	37	26	17	59.0	69	73	59	43	69
	Warszawa	♦	19.0	79	84	65	60	39	68.0	68	47	34	24	28
Portugal	Lisboa	♦	20.0	175	45	30	20	15	33.0	127	152	121	119	136
Spain	Madrid	♦	52.9	76	46	37	41	20	96.2	78	64	62	64	57
	Barcelona	♦	27.8	117	64	61	29	14	57.8	93	96	117	97	94
Sweden	Göteborg	♦	9.0	55	67	45	49	47	33.0	97	97	75	85	82
	Stockholm	♦	8.0	63	63	38	30	29	28.6	97	71	67	101	98
Switzerland	Zurich	♦	17.8	88	61	58	34	34	48.7	92	80	80	72	76
	Basel	♦	13.8	78	51	50	36	36	40.5	78	72	71	62	69
Turkey	Ankara	♦	170.0	..	32	21	28	22	50.0	..	86	..	..	202
UK	London	♦	45.6	68	50	23	17	15	71.7	97	88	73	73	78
	Newcastle	♦	30.0	103	73	53	27	17	54.4	..	73	67	54	59

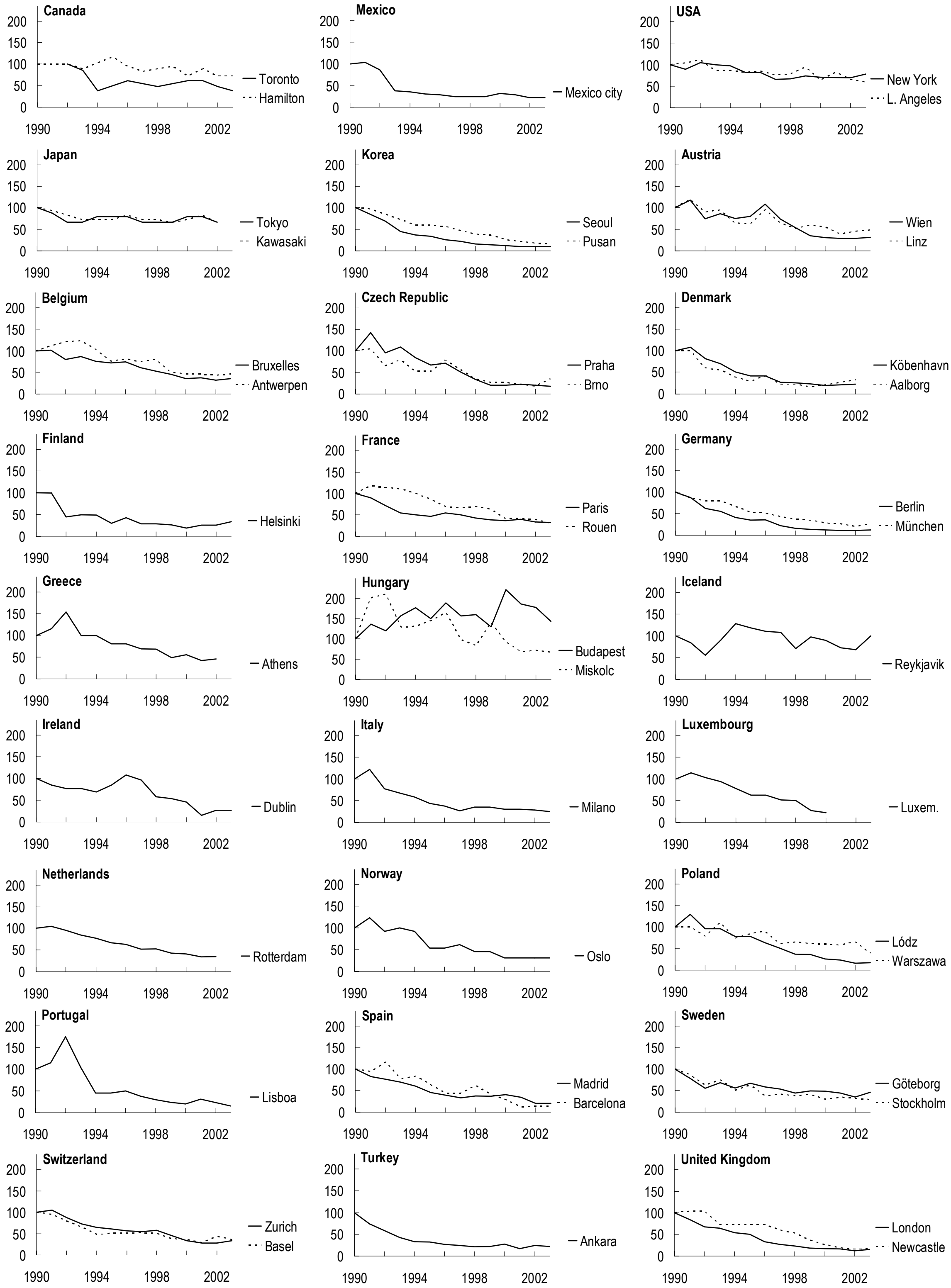
♦ *See Technical Annex for data sources, notes and comments.*

STATE AND TRENDS SUMMARY

Urban air quality has slowly continued to improve, particularly with respect to SO_2 concentrations; but ground-level ozone, NO_2 concentrations, fine particulates and toxic air pollutants and related health effects raise growing concern, largely due to the concentration of pollution sources in urban areas and to the increasing use of private vehicles for urban trips.

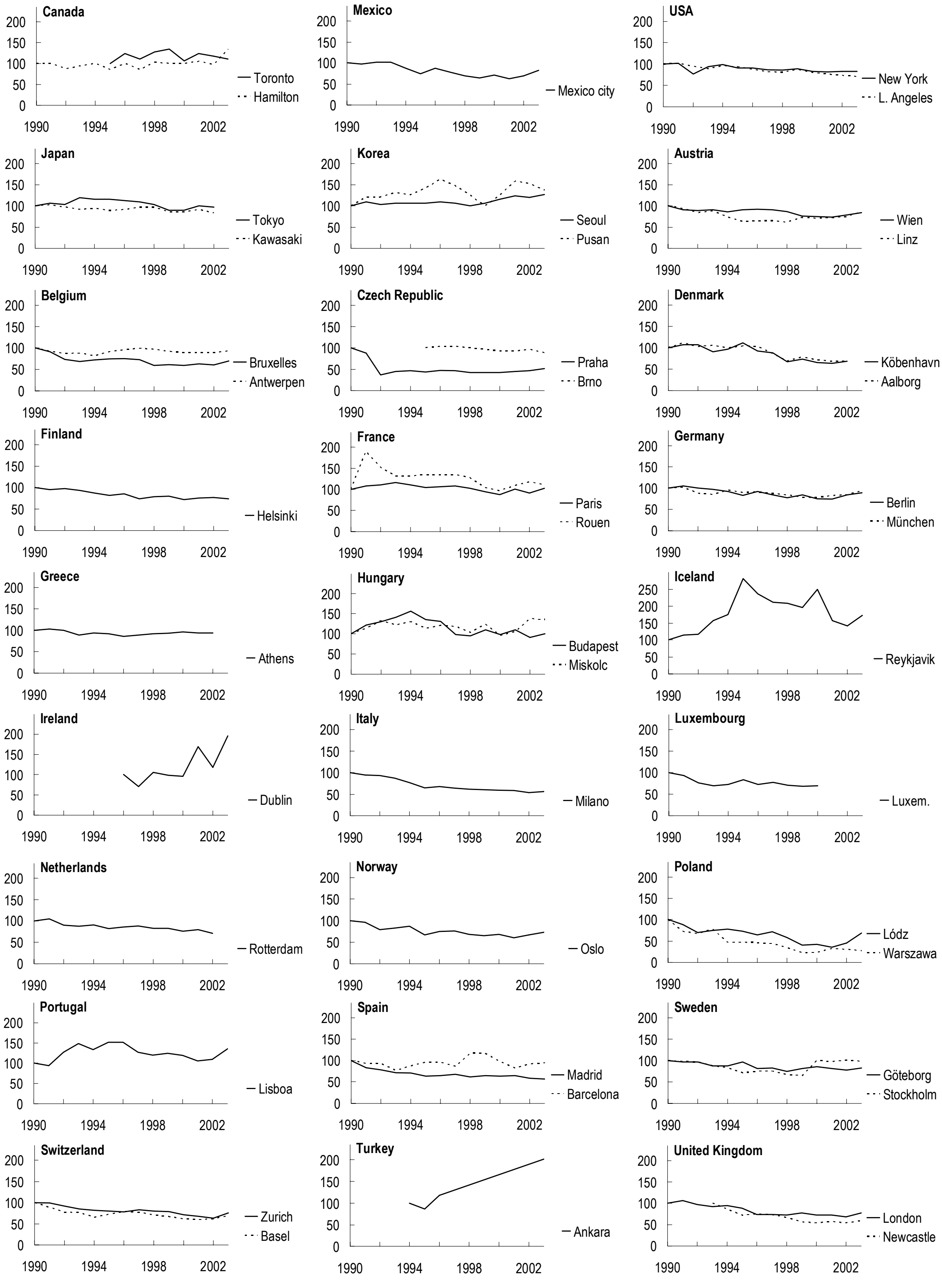
7 URBAN AIR QUALITY

Trends in SO_2 concentrations in selected cities, Index 1990 = 100



URBAN AIR QUALITY 7

Trends in NO_2 concentrations in selected cities, Index 1990 = 100



WASTE

Waste is generated at all stages of human activities. Its composition and amounts depend largely on consumption and production patterns. Main concerns relate to the potential impact from inappropriate waste management on human health and the environment (soil and water contamination, air quality, land use and landscape). Despite achievements in waste recycling, amounts of solid waste going to final disposal are on the increase as are overall trends in waste generation. This raises important questions as to the capacities of existing facilities for final treatment and disposal and as to the location and social acceptance of new facilities (e.g. NIMBY for controlled landfill and incineration plants). Hazardous waste, mainly from industry, is of particular concern since it entails serious environmental risks if badly managed. Also, long-term policies are needed for the disposal of high-level radioactive waste.

Waste management issues are at environmental centre stage in many countries. Responses have been directed mainly towards collection, treatment and disposal. Increasingly, waste minimisation and improved resource productivity are an aim of sustainable development strategies. This can be achieved through waste prevention, reuse, recycling and recovery. More broadly it is necessary to better integrate environmental concerns into consumption and production patterns. Performance can be assessed against domestic objectives and international commitments. Agreements and regulations on waste in general and transfrontier movements of hazardous waste in particular include directives of the European Union, OECD Decisions and Recommendations, the Lomé IV Convention and the 1989 Basel Convention. The main challenge is to strengthen measures for waste minimisation, especially for waste prevention and recycling, and to move further towards life cycle management of products and materials, and extended producer responsibility. This implies internalising the costs of waste management into prices of consumer goods and of waste management services; and ensuring greater cost-effectiveness and full public involvement in designing measures.

Indicators presented here relate to:

- *waste generation, i.e.:*
  - *total amounts of waste by principal source sector (municipal, industrial and nuclear waste), as well as generation intensities expressed per capita and per unit of GDP. Treatment and disposal shares of municipal waste, and private final consumption expenditure, are shown as complementary information;*
  - *hazardous waste produced per unit of GDP (hazardous waste generation is largely driven by production patterns). This indicator does not reflect toxicity levels or other risks posed by such waste, nor its real impact on the environment. Transfrontier movements are shown as complementary information.*
- *waste recycling rates for paper and glass. They present total amounts recycled as percentage of the apparent consumption of the respective material.*

When interpreting these indicators it should be kept in mind that waste generation intensities are first approximations of potential environmental pressure; more information is needed to describe the actual pressure. These indicators should be read in connection with other indicators of the OECD Core Set. They should be complemented with information on waste management practices and costs, and on consumption levels and patterns.

WASTE: ONGOING WORK AND REFERENCES

♦ **OECD CORE SET AND RELATED INDICATORS**

Pressure		State	Response
Indirect pressures ☐ Consumption levels and patterns ❷ *p.103* ☐ Production levels and patterns ❸	Direct pressures ☑ Waste generation trends & intensities ❶ - Municipal waste - Industrial waste - Hazardous waste - Nuclear waste ☑ Movements of hazardous waste ❶	Effects on e.g.: water quality air quality land use and soil quality toxic contamination	<u>Waste minimisation</u>: ☐ Waste prevention ❸ ☐ Product re-use ❸ ☑ Recycling rates ❶ <u>Economic and fiscal instruments, expenditures</u>: ☐ Expenditure on waste ❷*p.127* ☐ Charges for waste disposal ❸

❶ *indicator presented here* ❷ *indicator presented elsewhere in this publication* ❸ *indicator not presented*

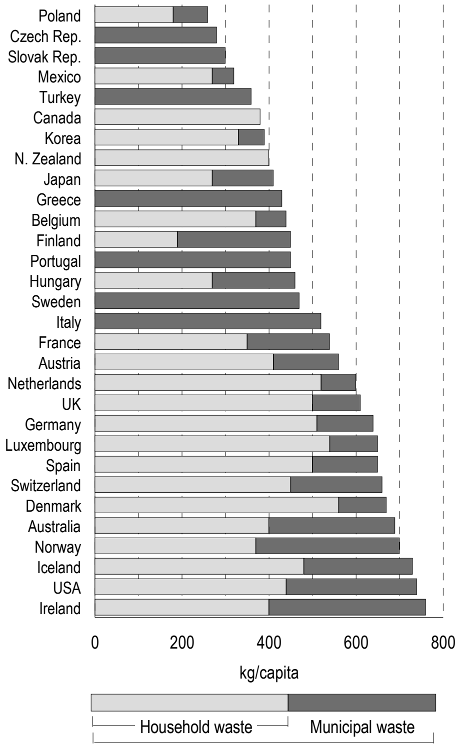
♦ **REFERENCES**

🕮 OECD (1997), Transfrontier Movements of Hazardous Waste, 1992-1993 statistics
🕮 OECD (1996), Washington Waste Minimisation Workshop, Vol. 1, Vol. 2
🕮 OECD (2000), Strategic waste Prevention - OECD Reference Manual
🕮 OECD (2001), OECD Environmental Outlook, Chapter 20, Waste
🕮 Secretariat of the Basel Convention (2002), Global trends in Generation and Transboundary Movements of Hazardous wastes and Other Wastes
🕮 OECD (2004), OECD Environmental Data — Compendium 2004

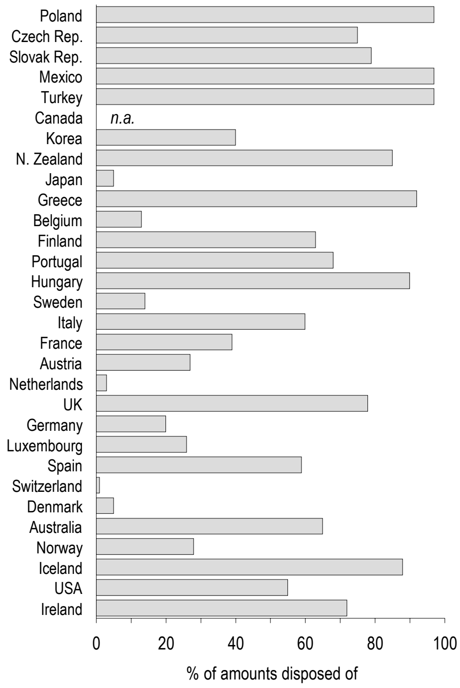
WASTE GENERATION 8

Municipal waste, state

Generation intensities per capita



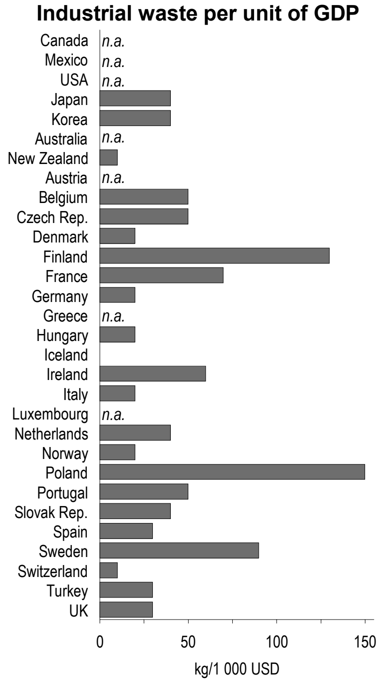
Landfill disposal shares*



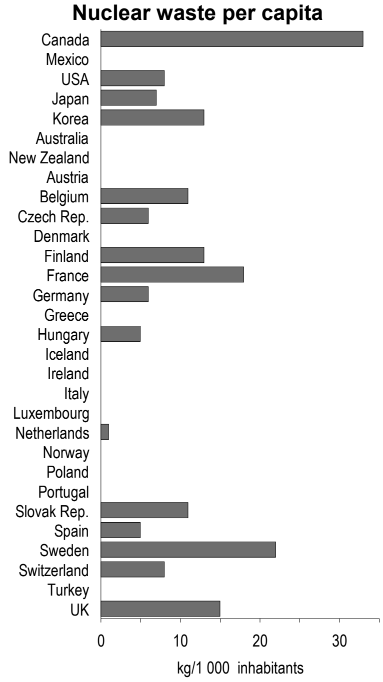
* Might include residues of treatments such as incineration, composting

Industrial, nuclear and hazardous waste, state

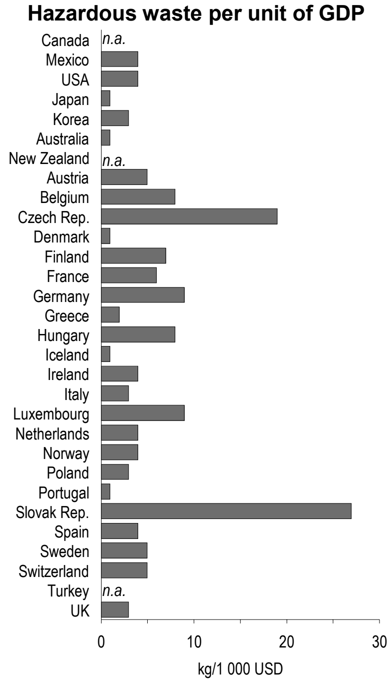
Industrial waste per unit of GDP



Nuclear waste per capita



Hazardous waste per unit of GDP



8 WASTE GENERATION

Municipal waste

		Municipal waste generated per capita		*of which:* Household waste	Private final consumption expenditure, per capita		Management of municipal waste % of amounts disposed of		
		kg/cap. 2003	% change since 1990	kg/cap. early 2000s	1 000 USD/cap. 2003	% change since 1990	Recycling/ compost. 2003	Incineration 2003	Landfill 2003
Canada	♦	..	..	380	17.0	22	28	..	..
Mexico	♦	320	..	270	6.2	15	3	-	97
USA	♦	740	-1	440	25.3	32	31	14	55
Japan	♦	410	-	270	14.9	17	15	74	5
Korea	♦	390	..	330	9.8	64	45	14	40
Australia	♦	690	-	400	16.5	32	35	-	65
New Zealand	♦	..	19	400	13.2	22	15	..	85
Austria	♦	560	34	410	16.2	20	61	11	27
Belgium	♦	440	18	370	14.3	21	60	35	13
Czech Rep.	♦	280	..	..	8.4	25	5	15	75
Denmark	♦	670	28	560	13.5	17	41	54	5
Finland	♦	450	..	190	13.5	17	28	9	63
France	♦	540	20	350	14.9	17	27	34	39
Germany	♦	640	..	510	14.7	18	56	23	20
Greece		430	44	..	12.1	26	8	-	92
Hungary	♦	460	-12	270	7.8	..	3	7	90
Iceland	♦	730	19	480	16.2	22	8	4	88
Ireland	♦	760	76	400	14.2	66	28	..	72
Italy		520	46	..	15.2	19	..	10	60
Luxembourg	♦	650	..	540	20.7	31	19	55	26
Netherlands	♦	600	20	520	13.4	23	56	40	3
Norway	♦	700	26	370	16.4	41	46	26	28
Poland	♦	260	-11	180	7.1	77	3	-	97
Portugal	♦	450	48	..	10.6	30	11	21	68
Slovak Rep.		300	..	..	6.6	..	6	10	79
Spain	♦	650	53	500	12.4	28	35	6	59
Sweden		470	26	..	13.4	15	41	45	14
Switzerland	♦	660	8	450	18.2	7	47	52	1
Turkey	♦	360	-7	..	4.5	10	2	-	97
UK	♦	610	29	500	17.6	35	15	8	78
OECD	♦	570	11	..	16.3	25	..	..	..

♦ *See Technical Annex for data sources, notes and comments.*

STATE AND TRENDS SUMMARY

Although municipal waste is only one part of total waste generated, its management and treatment represents more than one third of the public sector's financial efforts to abate and control pollution. The quantity of municipal waste generated in the OECD area has steadily increased since 1990 and exceeded 590 million tonnes in the early 2000s (570 kg per inhabitant). Generation intensity per capita has risen mostly in line with private final consumption expenditure and GDP, although a slight slowdown has been seen in recent years.

The amount and composition of municipal waste vary widely among OECD countries, being related to levels and patterns of consumption and also depending on national waste management practices. In most countries for which data are available, increased affluence, associated with economic growth and changes in consumption patterns, tends to generate higher rates of waste per capita than 15 years ago.

In a number of OECD countries, incineration and recycling are increasingly used to reduce amounts of waste going to final disposal, and particularly to landfill. Landfill nonetheless remains the major disposal method in most OECD countries.

WASTE GENERATION 8

Industrial, nuclear and hazardous waste

		Industrial waste: Waste from manuf. industry, early 2000s		Nuclear waste: Spent fuel arisings, 2003		Hazardous waste: Production			Net transfrontier movements	Amounts to be managed
		Total 1 000 tonnes	per unit of GDP kg/ 1 000 USD	Total tonnes HM	per capita kg/ 1 000 inh.	Year	Total 1 000 tonnes	per unit of GDP kg/ 1 000 USD	Exports-Imports 1 000 tonnes	1 000 tonnes
Canada	♦	..	..	1049	33.2	2002	..	..	-83	..
Mexico	♦	..	..	18	0.2	2000	3707	4.2	-232	3887
USA	♦	..	..	2417	8.3	2001	37033	3.7	..	41211
Japan	♦	122551	40	834	6.5	1999	3306	1.0	10	3305
Korea	♦	39010	40	606	12.6	2003	2913	3.3	..	..
Australia		..	..	-	-	2001	649	1.3	16	634
New Zealand	♦	800	10	-	-	2000	..	..	-10	..
Austria	♦	..	..	-	-	2000	1023	4.5	..	..
Belgium	♦	14080	50	113	10.9	1997	2016	8.3	-309	2325
Czech Rep.	♦	7960	50	62	6.1	2001	2817	18.6	2	2815
Denmark	♦	2950	20	-	-	2000	183	1.2	109	287
Finland	♦	16800	130	70	13.4	2000	963	7.3	38	963
France	♦	98000	70	1100	18.4	2000	9150	6.0	-577	9727
Germany	♦	46870	20	470	5.7	2003	19477	9.5	-865	..
Greece		..	..	-	-	2000	391	2.2	..	..
Hungary	♦	2610	20	48	4.7	2000	951	7.8	..	..
Iceland	♦	10	-	-	-	2001	8	1.0	2	6
Ireland	♦	5110	60	-	-	2001	492	4.3	275	216
Italy	♦	35050	20	-	-	2002	5025	3.5	..	6706
Luxembourg		..	..	-	-	2000	197	9.3	114	83
Netherlands	♦	19010	40	12	0.7	2000	1785	4.2	334	..
Norway	♦	3430	20	-	-	2001	684	4.1	-166	..
Poland	♦	57750	150	-	-	2002	1029	2.6	..	..
Portugal	♦	8980	50	-	-	2002	205	1.1	61	144
Slovak Rep.	♦	2300	40	58	10.8	2001	1634	27.4	..	1634
Spain	♦	20310	30	203	4.8	2000	3063	3.8	-144	3207
Sweden	♦	19780	90	196	21.9	2000	1100	4.7	-320	..
Switzerland	♦	1470	10	57	7.8	2001	1143	5.2	..	1013
Turkey	♦	12838	30	-	-		..	..	..	..
UK	♦	40240	30	922	15.2	2001	5214	3.4	..	..

♦ *See Technical Annex for data sources, notes and comments.*

STATE AND TRENDS SUMMARY

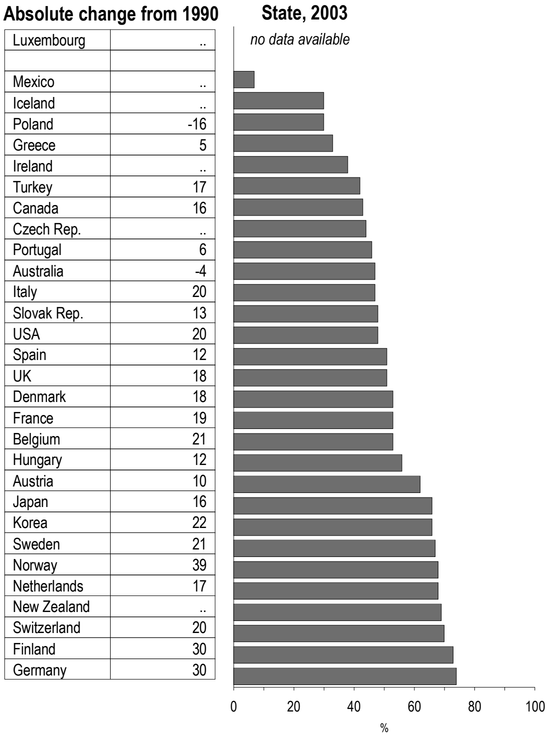
Industry has been generating increasing amounts of waste in recent decades. Changes in production patterns and related technologies, and in waste management practices, have altered the composition of such waste.

Generation intensities per unit of GDP reflect wide variations among OECD countries, in particular for hazardous waste.

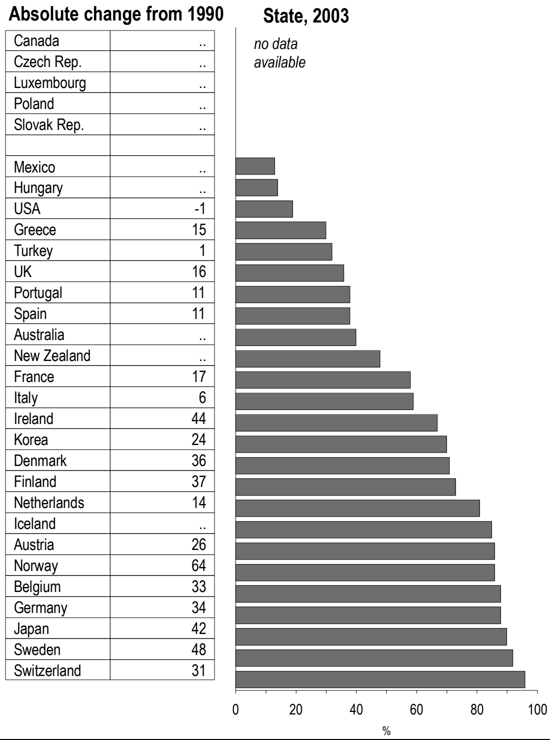
Nuclear waste is directly related to the share of nuclear power in national energy supply and the types of nuclear technology adopted.

9 WASTE RECYCLING

Paper recycling rates



Glass recycling rates



		Paper and cardboard							Glass					
		Recycling rate, %					Absolute change		Recycling rate, %					Absolute change
		1980	1985	1990	1995	2003	since 1990		1980	1985	1990	1995	2003	since 1990
Canada	♦	20	23	28	41	43	16	♦	12	12	..	..	..	..
Mexico	♦	..	..	..	7	7	..	♦	..	..	..	13	13	..
USA	♦	21	21	28	40	48	20	♦	5	8	20	24	19	-1
Japan		48	50	50	51	66	16	♦	35	47	48	61	90	42
Korea	♦	..	..	44	53	66	22	♦	..	..	46	57	70	24
Australia	♦	..	36	51	..	47	-4	♦	..	..	..	42	40	..
New Zealand	♦	..	..	..	47	69	..	♦	..	..	..	30	48	..
Austria		30	37	52	66	62	10	♦	20	38	60	76	86	26
Belgium		..	..	33	37	53	21	♦	33	42	55	67	88	33
Czech Rep.	♦	..	..	..	38	44	..		..	..	..	..	..	..
Denmark		26	31	35	44	53	18	♦	8	19	35	63	71	36
Finland		35	39	43	56	73	30		10	21	36	50	73	37
France	♦	30	35	34	39	53	19	♦	20	26	41	50	58	17
Germany	♦	34	43	44	67	74	30	♦	23	43	54	75	88	34
Greece		22	25	28	32	33	5		15	15	15	35	30	15
Hungary	♦	..	..	44	43	56	12	♦	..	..	..	..	14	..
Iceland	♦	..	..	..	..	30	..	♦	..	..	..	..	85	..
Ireland		..	..	..	11	38	..		8	7	23	39	67	44
Italy	♦	34	25	27	28	47	20	♦	20	25	53	53	59	6
Luxembourg		..	..	..	..	..	..		..	..	..	..	..	..
Netherlands		46	50	50	59	68	17	♦	17	49	67	80	81	14
Norway		..	..	29	46	68	39	♦	..	..	22	75	86	64
Poland		34	34	46	28	30	-16		..	..	..	..	..	..
Portugal		38	37	40	37	46	6		..	10	27	42	38	11
Slovak Rep.		..	..	35	32	48	13		..	..	..	..	..	..
Spain		39	44	39	41	51	12		..	26	27	32	38	11
Sweden	♦	34	..	46	70	67	21	♦	..	20	44	61	92	48
Switzerland		35	39	49	61	70	20	♦	36	46	65	85	96	31
Turkey		..	..	26	34	42	17		..	33	31	24	32	1
UK		32	28	33	35	51	18	♦	5	12	21	26	36	16

♦ *See Technical Annex for data sources, notes and comments.*

STATE AND TRENDS SUMMARY

Recycling of glass and paper is increasing in most OECD countries as a result of evolving consumption patterns and waste management and minimisation practices.

WATER QUALITY

Water quality, closely linked to water quantity, is of economic, environmental and social importance. It has many aspects (physical, chemical, microbial, biological), and can be defined in terms of a water body's suitability for various uses, such as public water supply, swimming or protection of aquatic life. It is affected by water abstractions, by pollution loads from human activities (agriculture, industry, households), and by climate and weather. Pollution loads from diffuse agricultural sources are an issue in many countries, as is the supply of permanently safe drinking water to the entire population.

If pressure from human activities becomes so intense that water quality is impaired to the point that drinking water requires ever more advanced and costly treatment or that aquatic plant and animal species in rivers and lakes are greatly reduced, then the sustainability of water resource use is in question. Performance can be assessed against domestic objectives and international commitments. At national level, countries have set receiving water standards, effluent limits and pollution load reduction targets for a range of parameters (e.g. oxygen, nutrients, micropollutants). In many cases, they are also committed to international agreements such as the OSPAR Convention on the Protection of the North-East Atlantic Marine Environment, the International Joint Commission Agreement on Great Lakes Water Quality in North America or the EU water directives. Protection of freshwater quality and supply is an important part of Agenda 21, adopted at UNCED (Rio de Janeiro, 1992) and of the Plan of Implementation adopted at the WSSD in Johannesburg (2002). The main challenge is to protect and restore all bodies of surface and ground water to ensure the achievement of water quality objectives. This implies further reducing pollution discharges, through appropriate treatment of waste water and a more systematic integration of water quality considerations in agricultural and other policies. It also implies an integrated management of water resources based on the ecosystem approach.

Indicators presented here relate to:

- *river water quality, presenting two parameters (oxygen and nitrate content) for selected rivers. Data are shown for representative sites at the mouth or downstream frontier, giving a summary view of the pollution load and clean-up efforts in the upstream watershed.*
- *waste water treatment, presenting sewage treatment connection rates, i.e. the percentage of the national resident population actually connected to public waste water treatment plants in the early 2000s. The extent of secondary and/or tertiary (chemical and/or biological) sewage treatment provides an indication of efforts to reduce pollution loads. It does not take into account private facilities, used where public systems are not economic. This indicator should be related to an optimal national connection rate taking into account national specificities such as population in remote areas. Sewerage connection rates and public expenditure on waste water treatment are shown as complementary information.*

WATER QUALITY: ONGOING WORK AND REFERENCES

♦ **OECD CORE SET AND RELATED INDICATORS**

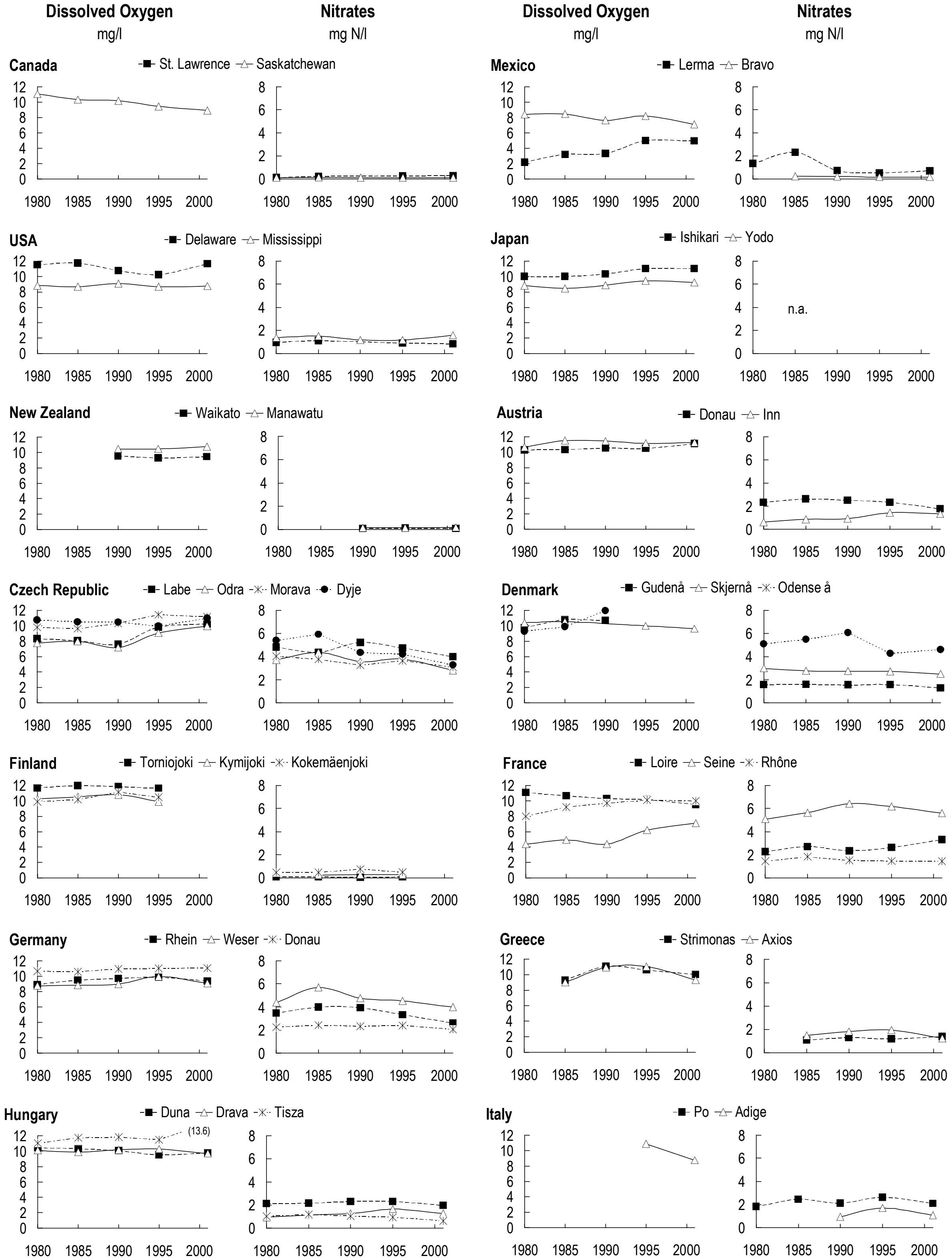
Pressure		State	Response
Indirect pressures ☐ Agricultural inputs and practices ❷*p.119* ☐ Industrial production❸ ☐ Human settlements❸ ☐ Water abstractions ❷ *p.75*	Direct pressures ☐ Discharges of pollutants by major activity❸	Quality of: ☑ Surface waters ❶ ☐ Marine, coastal waters❸ ☐ Groundwater❸ ☐ Drinking water❸	☑ Sewage treatment connection rates ❶ ☑ Expenditures ❶ ❷*p.125* ☐ Charges, fees for waste water discharges & treatment ❸

❶ *indicator presented here* ❷ *indicator presented elsewhere in this publication* ❸ *indicator not presented*

♦ **REFERENCES**

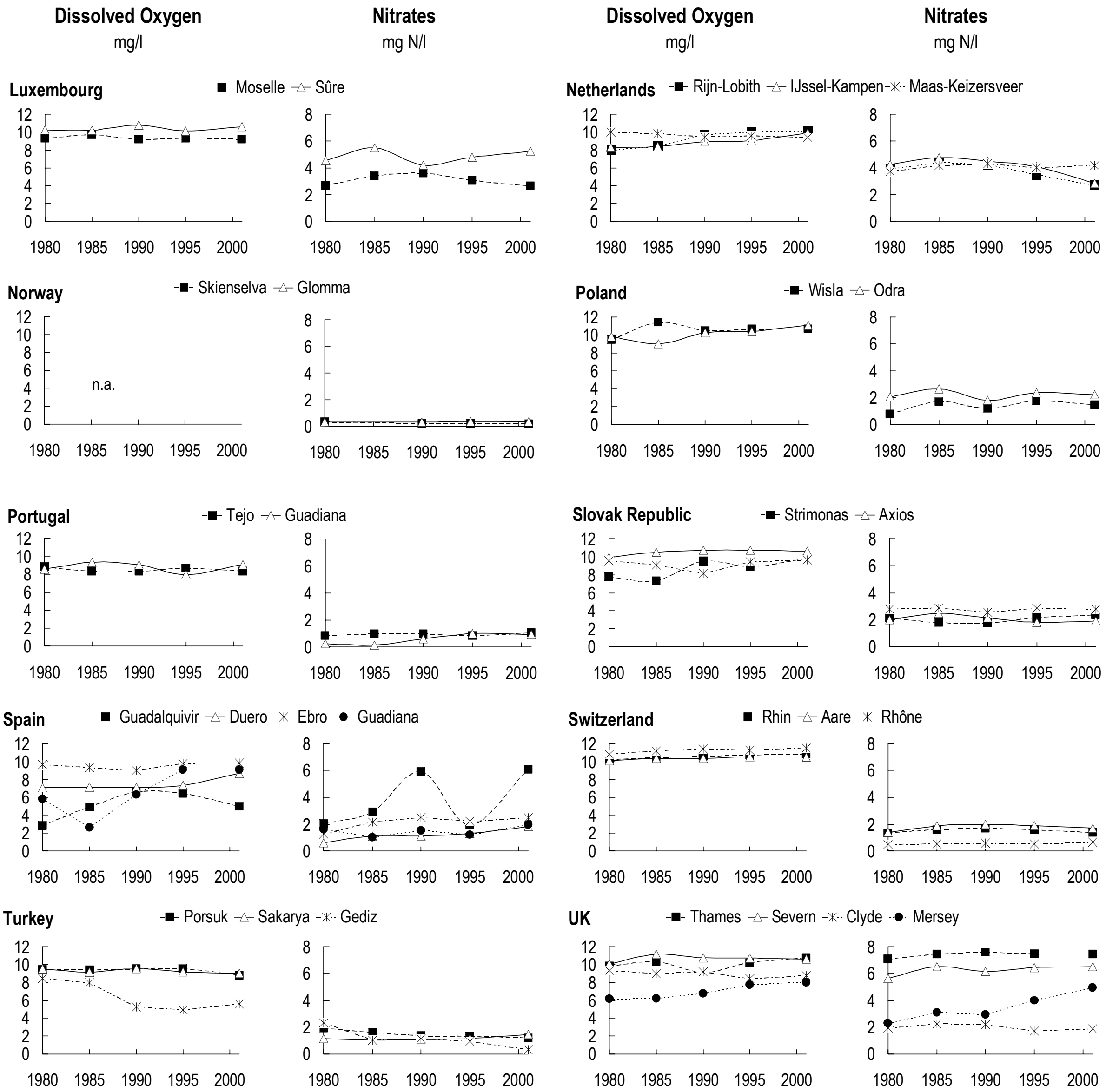
- OECD (1997), Water Subsidies and the Environment
- OECD (1998), Water Management: Performance and Challenges in OECD Countries
- OECD (2001), OECD Environmental Outlook, Chapter 8, Freshwater
- OECD (2003), Improving Water Management
- OECD (2003), Water- Performance and Challenges in OECD Countries
- OECD (2004), OECD Environmental Data — Compendium 2004

RIVER QUALITY 10



Data refer to averages over three years of average annual concentrations. See Technical Annex for data sources, notes and comments.

10 RIVER QUALITY



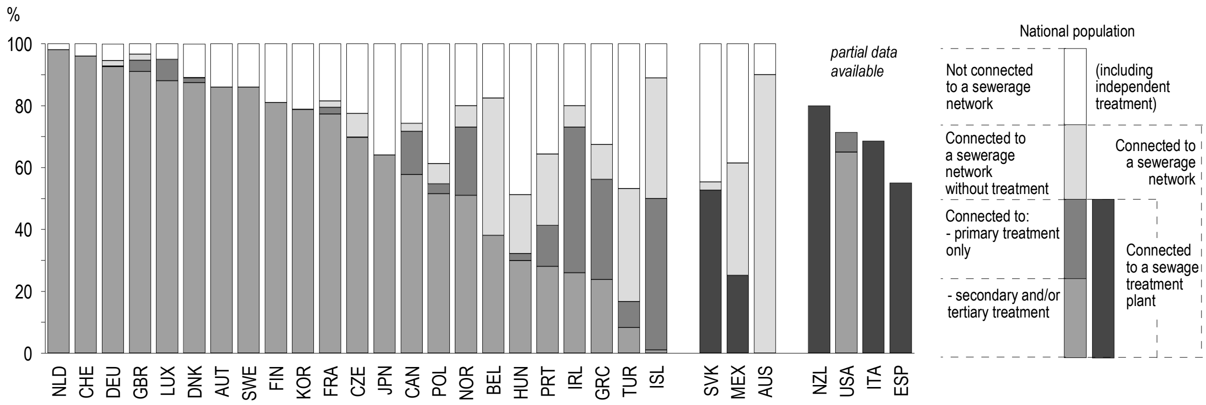
STATE AND TRENDS SUMMARY

Despite significant progress in reducing pollution loads from municipal and industrial point sources through installation of appropriate waste water treatment plants, improvement in surface water quality is not always easy to discern; other factors, such as erosion and pollution from diffuse sources, may continue to reduce water quality. Nevertheless, loads of oxygen demanding substances have diminished: the dissolved oxygen content in the larger rivers is satisfactory for most of the year.

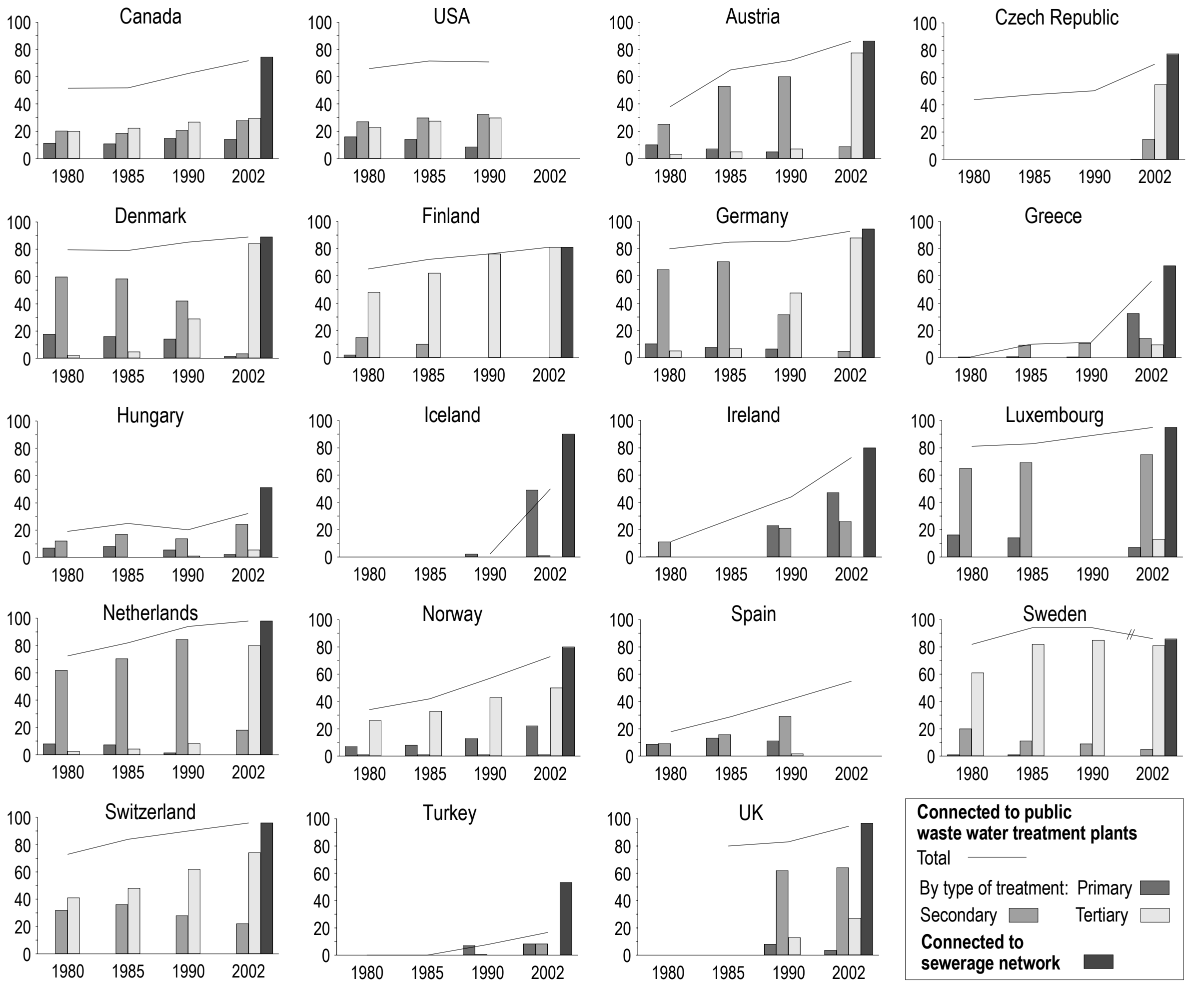
While nitrate concentrations appear to have stabilised locally, probably as a result of nitrogen removal from sewage effluents or a reduction of fertiliser use, in many rivers the trend cannot yet be detected. Furthermore, success in cleaning up the worst polluted waters is sometimes achieved at the cost of failing to protect the few remaining pristine waters, so that all of a country's waters tend to be of average quality.

WASTE WATER TREATMENT 11

Sewerage and sewage treatment connection rates, early 2000s



Trends in sewage treatment connection rates
per cent of national population connected



11 WASTE WATER TREATMENT

		Waste water treatment Public sewage treatment connection rates						Sewerage network connection rates	Public expenditure on waste water treatment	
		early 1980s			early 2000s			early 2000s	early 2000s	
		Total	*of which:* Secondary treatment	*of which:* Tertiary treatment	Total	*of which:* Secondary treatment	*of which:* Tertiary treatment	Total	Total	*of which:* Investment
		% pop.	% pop.	% pop.	% pop.	% pop.	% pop.	% pop.	USD/capita	%
Canada	♦	51.5	20.2	19.9	71.7	28.0	29.7	74.3	67.7	..
Mexico	♦	..	..	..	25.1	..	..	61.4	1.8	26
USA	♦	65.8	27.1	22.8	71.4	30.9	34.1	..	..	..
Japan	♦	30.0	30.0	-	64.0	54.0	10.0	64.0	84.1	..
Korea	♦	8.3	..	..	78.0	67.5	10.4	78.8	80.8	78
Australia	♦	..	..	..	..	..	..	90.0	36.7	43
New Zealand	♦	..	..	..	80.0	..	..	..	..	..
Austria	♦	38.0	25.0	3.0	86.0	8.6	77.4	86.0	100.8	47
Belgium	♦	22.9	22.9	-	38.1	22.0	16.1	82.4	74.3	67
Czech Rep.	♦	43.7	..	..	69.8	14.8	54.9	77.5	27.3	100
Denmark	♦	79.6	59.8	2.2	89.0	3.4	84.0	89.0	123.0	37
Finland	♦	65.0	15.0	48.0	81.0	-	81.0	81.0	58.4	45
France	♦	57.0	..	..	79.4	50.8	26.5	81.5	109.7	47
Germany	♦	79.9	64.7	5.0	92.2	4.7	87.9	94.5	168.7	50
Greece	♦	0.5	0.5	-	56.2	14.2	9.6	67.5	14.3	89
Hungary	♦	19.0	12.0	-	32.2	24.4	5.5	51.2	45.6	100
Iceland	♦	..	-	-	50.0	1.0	-	90.0	17.2	77
Ireland	♦	11.2	11.0	-	73.0	26.0	-	80.0	58.7	69
Italy	♦	30.0	..	..	68.6	..	..	..	3.2	15
Luxembourg	♦	81.0	65.0	-	95.0	75.0	13.0	95.0	96.8	59
Netherlands	♦	72.4	61.9	2.6	98.1	18.1	80.0	98.1	113.5	42
Norway	♦	34.0	1.0	26.0	73.0	1.0	50.0	80.0	81.2	45
Poland	♦	..	..	..	54.7	28.8	22.7	61.2	42.0	81
Portugal	♦	2.3	..	..	41.3	26.0	2.0	64.3	40.0	75
Slovak Rep.		27.3	..	..	52.7	..	..	55.3	..	..
Spain	♦	17.9	9.1	-	55.0	..	..	..	66.2	67
Sweden	♦	82.0	20.0	61.0	86.0	5.0	81.0	86.0	..	..
Switzerland	♦	73.0	32.0	41.0	96.0	22.0	74.0	96.0	131.6	55
Turkey	♦	-	-	-	16.6	8.3	-	53.2	8.7	86
UK	♦	..	..	..	94.6	64.0	27.0	96.6	4.7	4

♦ *See Technical Annex for data sources, notes and comments.*

STATE AND TRENDS SUMMARY

OECD countries have progressed with basic domestic water pollution abatement: the share of the population connected to a municipal waste water treatment plant rose from about 50% in the early 1980s to almost 70% today. Due to varying settlement patterns, economic and environmental conditions, starting dates, and the rate at which the work was done, the share of population connected to waste water treatment plants and the level of treatment varies significantly among OECD countries: secondary and tertiary treatment has progressed in some while primary treatment remains important in others. Some countries have reached the economic limit in terms of sewerage connection and must find other ways of serving small, isolated settlements.

The overall amount spent on sewerage and waste water treatment, and the relative shares of investment and operating expenditure within the total, also differ widely among countries. Some countries completed their sewer systems long ago and now face considerable investment to renew pipe networks. Other countries may recently have finished an expansion of waste water treatment capacity and the weight of expenditure has shifted to operating costs. Yet other countries must still complete their sewerage networks even as they build waste water treatment stations. For the OECD as a whole, half of public pollution abatement and control expenditure relates to water (sewerage & waste water treatment) representing up to 1% of GDP.

WATER RESOURCES

Freshwater resources are of major environmental and economic importance. Their distribution varies widely among and within countries. When consumers do not pay the full cost of water, they tend to use it inefficiently. In some regions, this can result in serious problems, such as low river flows, water shortages, salinisation of freshwater bodies in coastal areas, human health problems, loss of wetlands, desertification and reduced food production. Pressures on water resources are exerted by overexploitation as well as by degradation of environmental quality. Relating resource abstraction to renewal of stocks is a central question concerning sustainable water resource management. If a significant share of a country's water comes from transboundary rivers, tensions between countries can arise, especially if water availability in the upstream country is less than in the downstream one.

Sustainable management of water resources has become a major concern in many countries: it can affect human health and the sustainability of agriculture. The efficiency of water use is key in matching supply and demand. Reducing losses, using more efficient technologies and recycling are all part of the solution, but applying the user pays principle to all types of users and an integrated approach to the management of freshwater resources by river basin will be essentials element of sustainable management. Performance can be assessed against domestic objectives and international commitments. Agenda 21, adopted at UNCED (Rio de Janeiro, 1992), explicitly considers items such as the protection and preservation of freshwater resources. This was reaffirmed at the WSSD (Johannesburg, 2002). The main challenge is to ensure a sustainable management of water resources, avoiding overexploitation and degradation, so as to maintain adequate supply of freshwater of suitable quality for human use and to support aquatic and other ecosystems.

Indicators presented here relate to:

- *the intensity of use of freshwater resources, expressed as gross abstractions as % of total available renewable freshwater resources (including inflows from neighbouring countries) as % of internal resources (i.e. precipitations - evapotranspiration) and per capita. When interpreting this indicator, it should be kept in mind that it only gives insights into quantitative aspects of water resources and that a national level indicator may hide territorial differences and should be complemented with information at sub-national level. Water abstractions by major primary users are given as complementary information.*
- *prices for public water supply to households, expressed in US dollars per cubic metre supplied. Abstractions for public water supply per capita are shown as complementary information. When interpreting this indicator, it should be kept in mind that water prices show important local variations within countries, and that it should be complemented with information on the price structure and on water prices for other major user groups (industry, agriculture).*

These indicators should be read in connection with other indicators of the OECD Core Set and in particular with indicators on the quality of water resources.

WATER RESOURCES: ONGOING WORK AND REFERENCES

♦ **OECD CORE SET AND RELATED INDICATORS**

Pressure		State	Response
Indirect pressures ☑ Irrigated areas ❶ ☐ Food production ❸	Direct pressures ☑ Intensity of use of water resources ❶ ☐ Water consumption rates ❸	☐ Frequency, duration and extent of seasonal water shortages ❸	Water prices and user charges for sewage treatment ☑ Water supply prices ❶ ☐ Water supply taxes ❸

❶ *indicator presented here* ❷ *indicator presented elsewhere in this publication* ❸ *indicator not presented*

♦ **REFERENCES**

- OECD (1994), Natural Resource Accounts: Taking Stock in OECD Countries
- OECD (1997), Water Subsidies and the Environment
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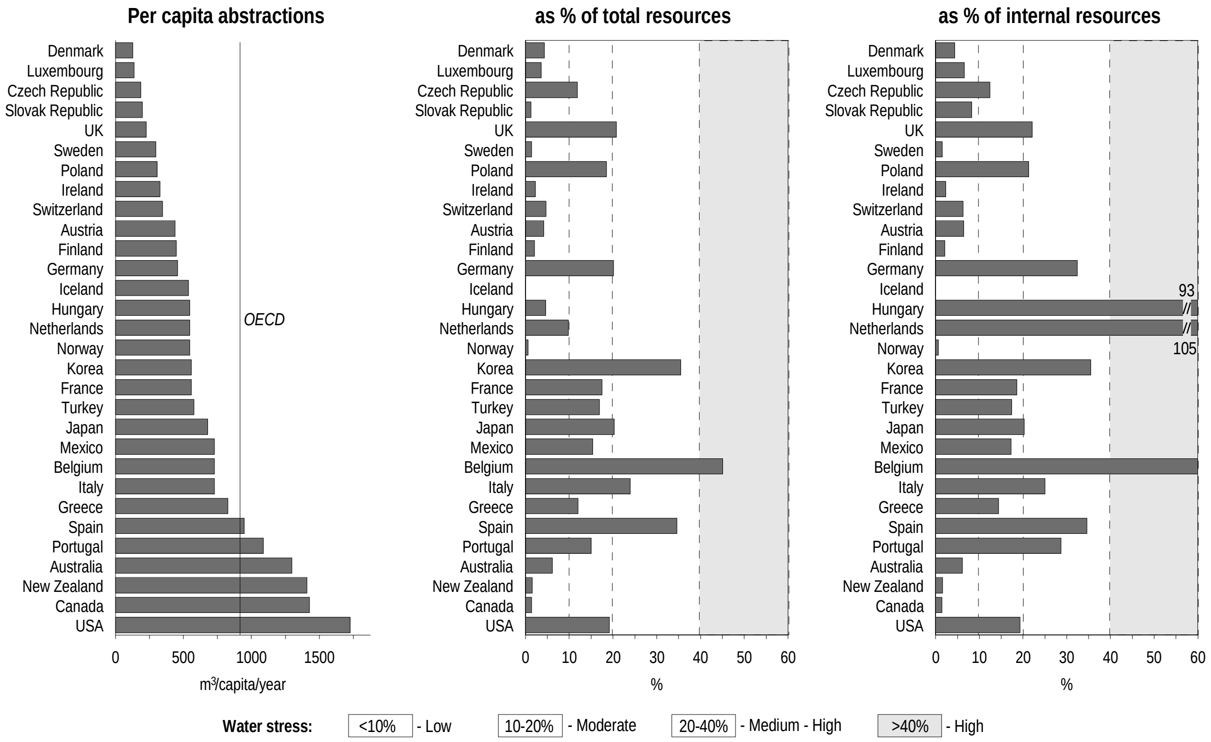
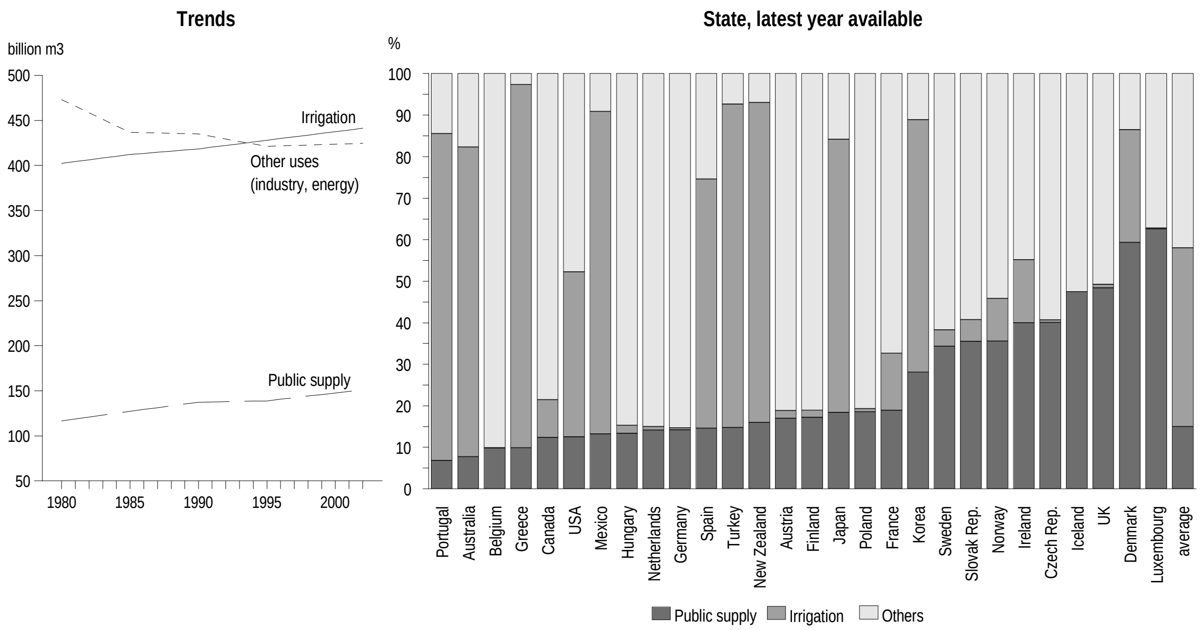
INTENSITY OF USE OF WATER RESOURCES 12

Gross freshwater abstractions, early 2000s



Freshwater abstractions by major primary uses



12 INTENSITY OF USE OF WATER RESOURCES

		Intensity of use of water resources				Irrigation		
		abstractions as % of available resources		abstractions per capita		water abstractions per area of irrigated land	Irrigated areas as a share of cultivated land	
		% early 2000s	absolute change since 1980	m3/cap/year early 2000s	% change since 1980	m3/ha/year 2002	% 2002	% change since 1980
Canada	♦	1.5	0.2	1430	-6	5198	1.9	29
Mexico	♦	15.5	3.5	730	-10	8921	23.2	14
USA	♦	19.2	-1.7	1730	-24	8443	12.7	18
Japan	♦	20.3	-	680	-8	21457	54.0	-4
Korea	♦	35.6	18.1	560	67	13639	60.7	2
Australia	♦	6.2	3.4	1300	75	7545	5.0	51
New Zealand	♦	1.7	..	1410	..	14617	53.4	32
Austria	♦	4.2	0.3	440	-	16876	0.3	11
Belgium	♦	45.1	..	730	..	11	4.3	171
Czech Republic	♦	11.9	-10.7	190	-47	471	0.7	..
Denmark	♦	4.4	-3.1	130	-44	430	19.5	33
Finland	♦	2.1	-1.2	450	-41	625	2.5	6
France	♦	17.5	..	560	..	1744	14.0	89
Germany	♦	20.2	-2.2	460	-14	336	4.0	10
Greece	♦	12.1	5.1	830	58	6248	37.1	53
Hungary	♦	4.7	0.7	550	22	498	4.8	91
Iceland	♦	0.1	-	540	15	-	-	-
Ireland	♦	2.3	0.2	330	4	..	-	-
Italy	♦	24.0	..	730	..	..	28.5	33
Luxembourg	♦	3.7	..	140	..	11	4.3	171
Netherlands	♦	9.9	-0.3	550	-14	135	54.3	-3
Norway	♦	0.7	..	550	..	1969	14.3	58
Poland	♦	18.6	-5.4	310	-28	876	0.7	4
Portugal	♦	15.1	0.8	1090	2	13488	26.3	31
Slovak Republic		1.4	-1.4	200	-55	311	11.6	..
Spain	♦	34.7	-1.2	950	-11	6206	21.1	43
Sweden	♦	1.5	-0.8	300	-39	922	4.3	82
Switzerland	♦	4.8	-0.1	350	-13	..	5.7	-2
Turkey	♦	17.0	10.1	580	59	6219	20.1	109
UK	♦	20.8	-1.9	230	-14	624	3.0	49
OECD	♦	11.5	0.3	920	-11	8135	12.6	26

♦ *See Technical Annex for data sources, notes and comments.*

STATE AND TRENDS SUMMARY

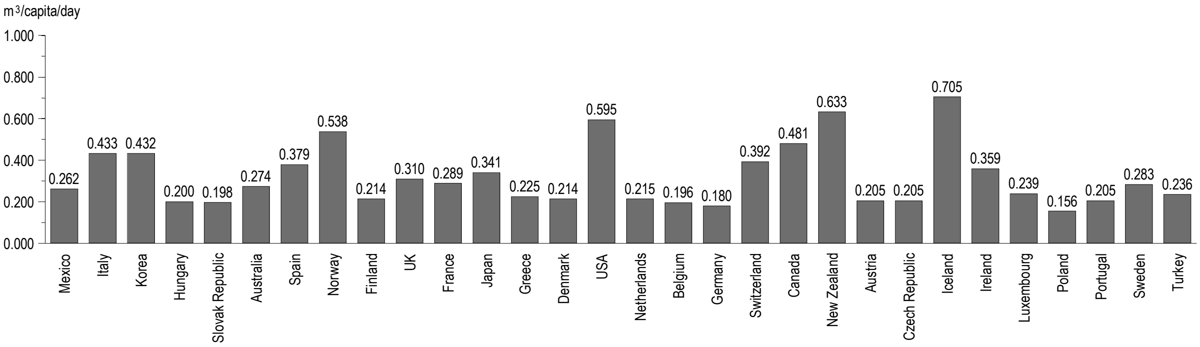
Irrigation, industry and household water use are generally pushing up demand for freshwater worldwide. It is estimated that global water demand rose by more than double the rate of population growth in the last century.

Most OECD countries increased their water abstractions over the 1970s in response to demand by the agricultural and energy sectors. Since the 1980s, some countries have stabilised their abstractions through more efficient irrigation techniques, the decline of water intensive industries (e.g. mining, steel), increased use of cleaner production technologies and reduced losses in pipe networks. Agriculture is the largest user of water worldwide. Global abstractions for irrigation have increased by over 60% since 1960. In OECD countries overall, abstractions for irrigation increased in the 1960s and the 1970s. In nine OECD countries, irrigation accounts for more than 50% of total abstractions.

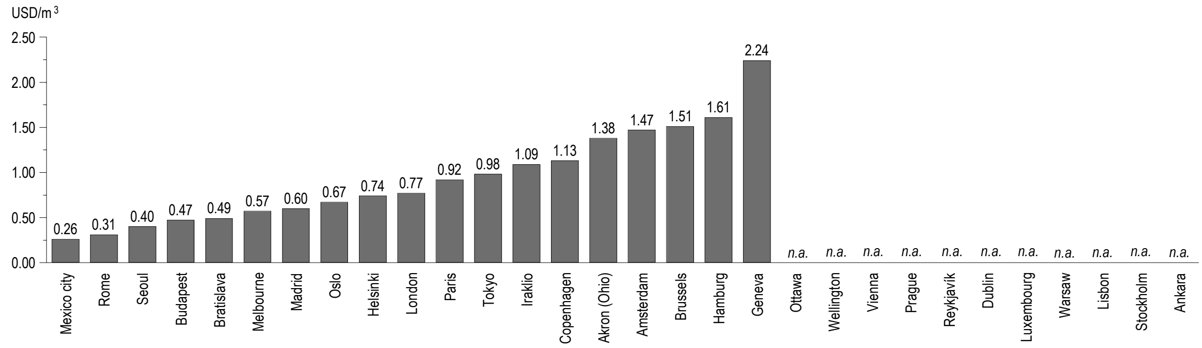
Indicators of water resource use intensity show great variations among and within individual countries. The national indicator may thus conceal unsustainable use in some regions and periods, and high dependence on water from other basins. Although at national level most OECD countries show sustainable use of water resources, several countries have extensive arid or semi-arid regions where development is shaped by water scarcity. In arid regions, freshwater resources mat at time be limited to the extent that demand for water can be met only by going beyond sustainable use in terms of quantity.

PUBLIC WATER SUPPLY AND PRICE 13

Abstractions for public supply per capita, early 2000s



Water prices in major selected cities, 2003



Average prices for public freshwater supply to households, selected cities, 2003

		USD/m³			USD/m³			USD/m³			USD/m³
Canada	Nat.	0.45		Perth	0.65	Germany	Hamburg	1.61	Norway	Oslo	0.67
Mexico	Mexico city	0.26		Darwin	0.66		München	1.42		Bergen	0.74
	Monterrey	2.21	Belgium	Brussels	1.51		Düsseldorf	1.94		Trondheim	0.89
	Cancún	0.02		Antwerp	1.10		Gelsenkirchen	1.98	Slovak	Bratislava	0.49
	Villahermos	0.09		Liège	1.64	Greece	Iraklio	1.09	Republic	Košice	0.49
	La Paz	0.86	Denmark	Copenhagen	1.13		Rethymno	1.54		Prešov	0.49
USA	Akron	1.38		Århus	1.06	Hungary	Budapest	0.47		Žilina	0.49
Japan	Tokyo	0.98		Odense	1.05		Miskolc	0.58		Tmava	0.49
	Yokohama	1.06		Aalborg	1.19		Pécs	0.93	Spain	Madrid	0.60
	Osaka	0.86		Esbjerg	1.29	Italy	Rome	0.31		Barcelona	0.88
	Nagoya	0.95	Finland	Helsinki	0.74		Milan	0.13		Valencia	0.50
	Sapporo	1.46		Espoo	1.26		Naples	0.60		Seville	0.60
Korea	Seoul	0.40		Tampere	0.84		Turin	0.36		Bilbao	0.43
	Pusan	0.47		Vantaa	1.09		Bologna	0.81	Switzerland	Geneva	2.24
	Inchon	0.42		Turku	1.20	Netherlands	Amsterdam	1.47	UK	London	0.77
	Daegu	0.38	France	Paris	0.92		Rotterdam	1.28		Bristol	0.82
	Daejeon	0.35		Lyon	1.43		The Hague	1.56		Manchester	0.83
Australia	Sydney	0.73		Bordeaux	1.16		Utrecht	1.07		Cardiff	0.96
	Melbourne	0.57		Lille	1.03		Eindhoven	1.03		Newcastle	0.69
	Brisbane	0.73									

♦ *See Technical Annex for data sources, notes and comments.*

STATE AND TRENDS SUMMARY

Policies for pricing water supply and waste water treatment are important in matching supply and demand and improving the cost-effectiveness of water services. Prices charged to domestic and industrial users sometimes include an abstraction tax and increasingly cover full investment and operating costs. Domestic price levels and structures vary widely among and within countries; the cost of delivering clean water to urban areas depends, inter alia, on the proximity of water sources, the degree of purification needed and the settlement density of the area served. Increasingly social aspects, such as the affordability of the water bill for low income households are taken into account.

FOREST RESOURCES

Forests are among the most diverse and widespread ecosystems on earth, and have many functions: they provide timber and other products; deliver recreation benefits and ecosystem services including regulation of soil, air and water; are reservoirs for biodiversity; and commonly act as carbon sinks. The impact from human activities on forest health and on natural forest growth and regeneration raises widespread concern. Many forest resources are threatened by overexploitation, fragmentation, degradation of environmental quality and conversion to other types of land uses. The main pressures result from human activities: they include agriculture expansion, transport infrastructure development, unsustainable forestry, air pollution and intentional burning of forests.

To be sustainable, forest management must strive to maintain timber value as well as environmental, social and aboriginal values. This includes optimal harvest rates, avoiding excessive use of the resource, and at the same time not setting harvest rates too low (particularly where age classes are unbalanced), which can reduce productive capacity. Performance can be assessed against national objectives and international principles on sustainable forest management adopted at UNCED (Rio de Janeiro, 1992). Other international initiatives are the Ministerial Conferences for the Protection of Forests in Europe (Strasbourg, 1990; Helsinki, 1993; Lisbon, 1998), which led to the Pan-European Criteria and Indicators for Sustainable Forest Management, the Montreal Process on Sustainable Development of Temperate and Boreal Forests; and the UN Forum on Forests. The main challenge is to ensure a sustainable management of forest resources, avoiding overexploitation and degradation, so as to maintain adequate supply of wood for production activities, and to ensure the provision of essential environmental services, including biodiversity and carbon sinks. This implies integrating environmental concerns into forestry policies, including eco-certification and carbon sequestration schemes.

Indicators presented here relate to:

- *the intensity of use of forest resources (timber), relating actual harvest to annual productive capacity. Annual productive capacity is either a calculated value, such as annual allowable cut, or an estimate of annual growth for existing stock. The choice depends on forest characteristics and availability of information. It should be noted that a measure based on a national average can conceal variations among forests. Changes in annual harvest and annual growth, and exports of forestry products are given as complementary information.*
- *area of forest and wooded land, as a percentage of total land area and per capita, along with changes in the area of forest and wooded land since 1970.*

These indicators give insights into quantitative aspects of forest resources. They present national averages that may conceal important variations among forests. They should be related to information on forest quality (e.g. species diversity, forest degradation, forest fragmentation), on output of and trade in forest products, and be complemented with data on forest management practices and protection measures.

FOREST RESOURCES: ONGOING WORK AND REFERENCES

♦ **OECD CORE SET AND RELATED INDICATORS**

Pressure		State	Response
Indirect pressures ☐ Production of wood & wood products ❸ ☑ Trade in wood and wood products ❶ ❸	Direct pressures ☑ Intensity of use of forest resources ❶	☑ <u>Area</u>, volume and structure of forests ❶ ☐ Disturbed and deteriorated forests ❸	Forest area management and protection: ☐ Protected forest areas ❸ ☐ Regeneration or afforestation rate of harvested areas ❸

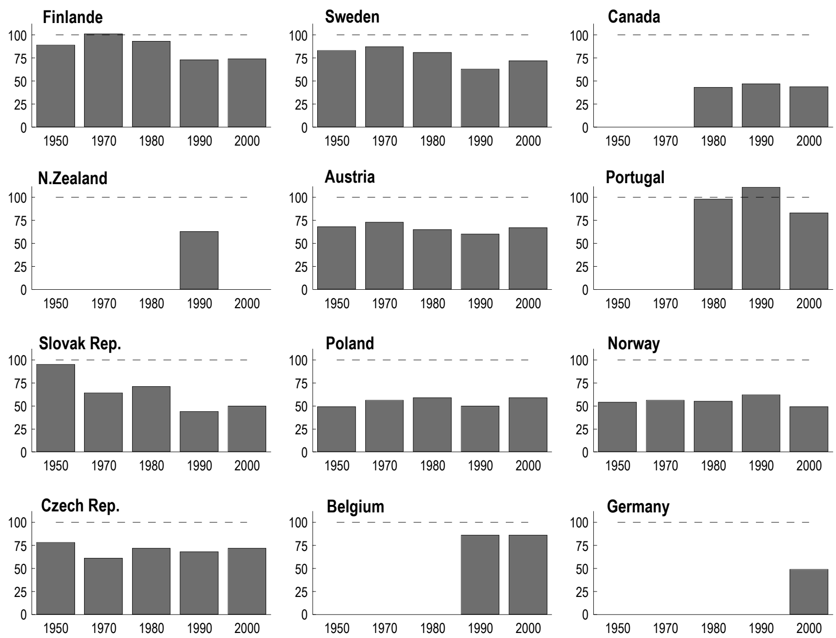
❶ *indicator presented here* ❷ *indicator presented elsewhere in this publication* ❸ *indicator not presented*

♦ **REFERENCES**

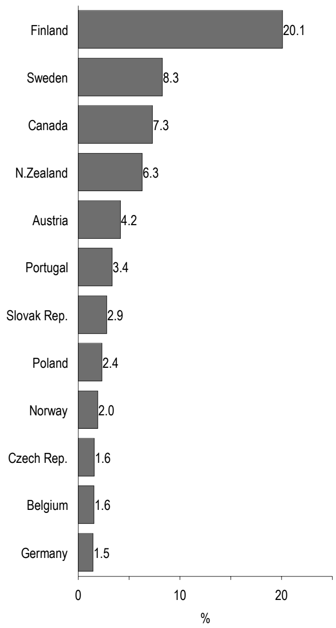
🕮 OECD (1995), Forestry, Agriculture and the Environment
🕮 OECD (1995), Workshop on Forestry, Agriculture and the Environment — Country Case Studies
🕮 OECD (2001), OECD Environmental Outlook, Chapter 10, Forestry
🕮 OECD (1999), OECD Environmental Data — Compendium 1999

INTENSITY OF USE OF FOREST RESOURCES 14

Intensity of use of forest resources (harvest as % of annual growth)



Forest products as % of national exports of goods, 2003



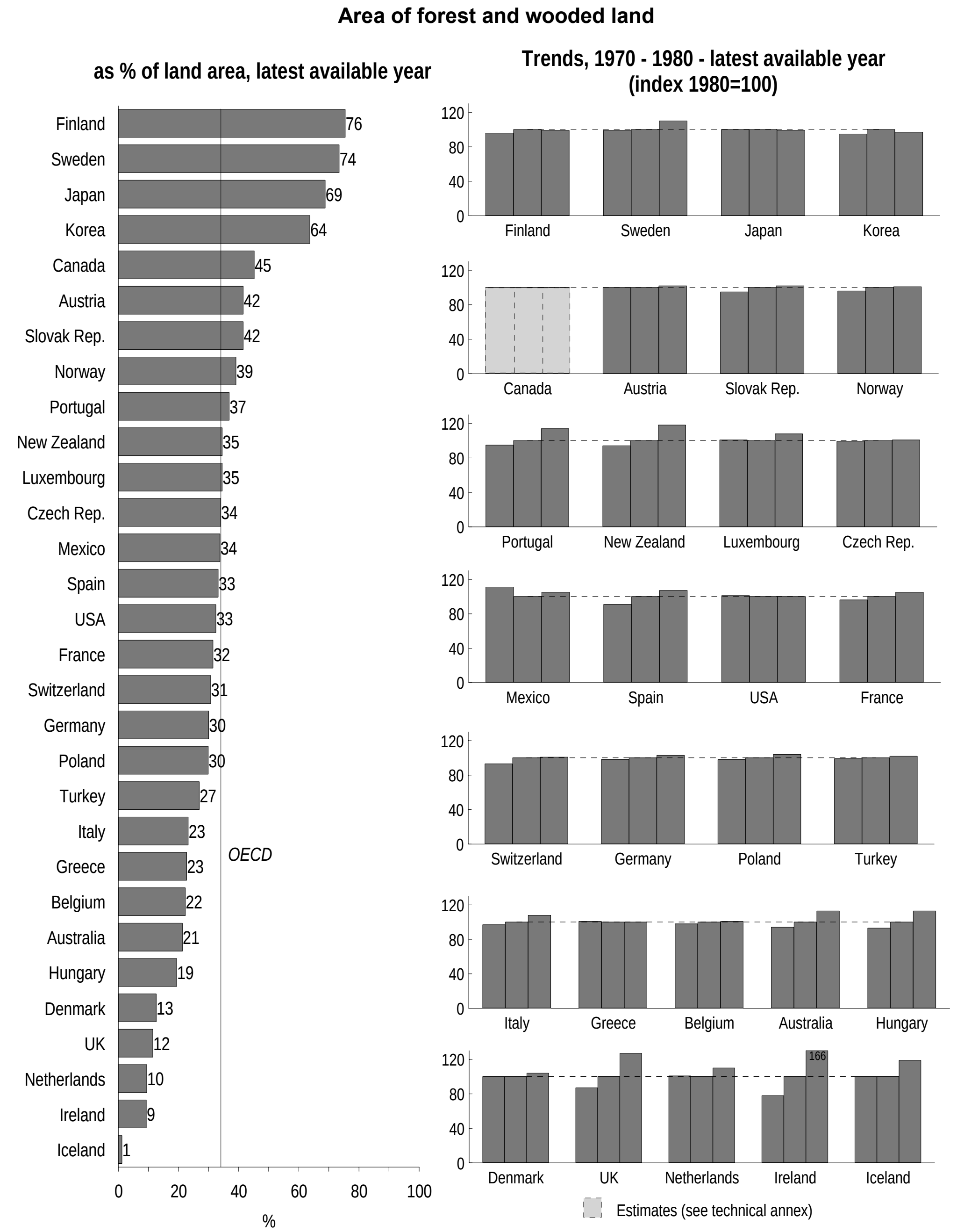
		Intensity of use of forest resources harvest as % of annual growth					Annual harvest % change since 1980	Annual growth % change since 1980	Exports of forestry products % of national exports 2003
		1950s	1970s	1980s	1990s	2000s			
Canada	♦	..	..	43	47	44	14.6	12.0	7.3
Mexico	♦	..	..	23	24	17	-35.1	-10.4	0.1
USA	♦	61	56	56	60	..	..	..	1.4
Japan	♦	..	..	..	54	42	-32.5	..	0.2
Korea	♦	..	42	..	7	6	-16.6	..	0.7
Australia	♦	..	..	40	..	57	15.7	-17.6	1.5
N.Zealand	♦	..	..	..	63	..	70.9	..	6.3
Austria	♦	68	73	65	60	67	53.3	47.8	4.2
Belgium	♦	..	..	..	86	86	..	..	1.6
Czech Rep.	♦	78	61	72	68	72	3.7	4.5	1.6
Denmark	♦	85	118	75	60	69	2.6	12.2	0.4
Finland	♦	89	101	93	73	74	-7.2	17.4	20.1
France	♦	..	..	81	82	60	8.3	46.9	1.4
Germany	♦	..	..	..	..	49	..	..	1.5
Greece	♦	..	..	71	..	60	-12.2	2.9	0.3
Hungary	♦	..	60	70	67	53	-22.0	2.2	1.1
Ireland	♦	27	28	35	68	68	144.5	27.3	0.3
Italy		88	..	43	..	46	-2.7	-9.7	1.0
Luxembourg	♦	..	..	49	72	52	5.8	-0.2	0.3
Netherlands	♦	..	..	41	42	60	..	..	1.0
Norway	♦	54	56	55	62	49	11.3	25.6	2.0
Poland	♦	49	56	59	50	59	-1.2	-0.5	2.4
Portugal	♦	..	..	98	111	83	..	..	3.4
Slovak Rep.	♦	95	64	71	44	50	12.5	60.4	2.9
Spain	♦	..	59	46	40	52	94.3	72.7	1.1
Sweden	♦	83	87	81	63	72	..	..	8.3
Switzerland	♦	..	..	71	78	78	..	..	1.3
Turkey	♦	..	67	82	52	43	-40.2	13.4	0.3
UK	♦	..	..	48	59	65	72.7	27.9	0.5
OECD	♦	..	..	57	..	56	8.0	9.5	1.8

♦ *See Technical Annex for data sources, notes and comments.*

STATE AND TRENDS SUMMARY

At national level most OECD countries present a picture of sustainable use of their forest resources in quantitative terms, but with significant variations within countries. For those countries for which trends over a longer period are available, intensity of forest resource use does generally not show an increase and has even decreased in most countries from the 1950s.

15 FOREST AND WOODED LAND



STATE AND TRENDS SUMMARY

The area of forests and wooded land has remained stable or has slightly increased at national level in most OECD countries and has remained stable in the OECD as a whole, but has been decreasing at world level due in part to continued deforestation in tropical countries.

FISH RESOURCES

Fish play key roles for human food supply and aquatic ecosystems. Main pressures include fisheries, coastal development and pollution loads from land-based sources, maritime transport, and maritime dumping. This affects both freshwater and marine fish stocks and habitats and has consequences for biodiversity and for the supply of fish for consumption and other uses. Aquaculture has been developed to an extent where its dependence on fishmeal products puts it in competition with other commercial markets and could become a limiting factor of aquaculture development.

The sustainable management of fish resources has become a major concern. With continual growth in fish catches, many of the more valuable stocks are overfished and new or less valuable species are being exploited as several fish stocks have collapsed. Unauthorised fishing is widespread and hinders the achievement of sustainable fishery management objectives. Performance can be assessed against domestic objectives and bilateral and multilateral agreements such as those on conservation and use of fish resources (Atlantic Ocean, Pacific Ocean, Baltic Sea, etc.), the Rome Consensus on world fisheries, the Code of Conduct for Responsible Fishing (FAO, November 1995), the UN Convention on the Law of the Sea and its implementation agreement on straddling and highly migratory fish stocks. Within the framework of the FAO Code of Conduct for Responsible Fishing, efforts are being made to address the issue of illegal, unreported and unregulated (IUU) fishing. The main challenge is to ensure a sustainable management of catchment areas so that resource abstraction in these areas does not exceed the renewal of the stocks over an extended period. This implies setting and enforcing limits on total catch types, levels and fishing seasons; and strengthening international co-operation.

Indicators presented here relate to:

- *national fish catches expressed as % of world captures and as amounts per capita, and related changes since 1979-81. Fish production from aquaculture is not included. National fish consumption (food supply from fish per capita) is given as additional information.*
- *global and regional fish catches and related changes since 1979-81. Fish production from aquaculture is not included. Changes in the proportion of fish resources under various phases of fishery development are given as additional information.*

These indicators give insights into quantitative aspects of fish resources; they should be related to information on the status of fish stocks.

FISH RESOURCES: ONGOING WORK AND REFERENCES

♦ **OECD CORE SET AND RELATED INDICATORS**

Pressure		State	Response
Indirect pressures ☑ Fish consumption ❶ ☐ Exports of fish and fish products ❸	Direct pressures ☑ Intensity of fish catches ❶ ☐ Intensity of use of fish resources ❸	☐ Size of spawning stocks ❸ ☐ Overfished areas ❸	☐ Regulation of stocks (quotas) ❸ ☐ Expenditure for fish stock monitoring ❸

❶ *indicator presented here* ❷ *indicator presented elsewhere in this publication* ❸ *indicator not presented*

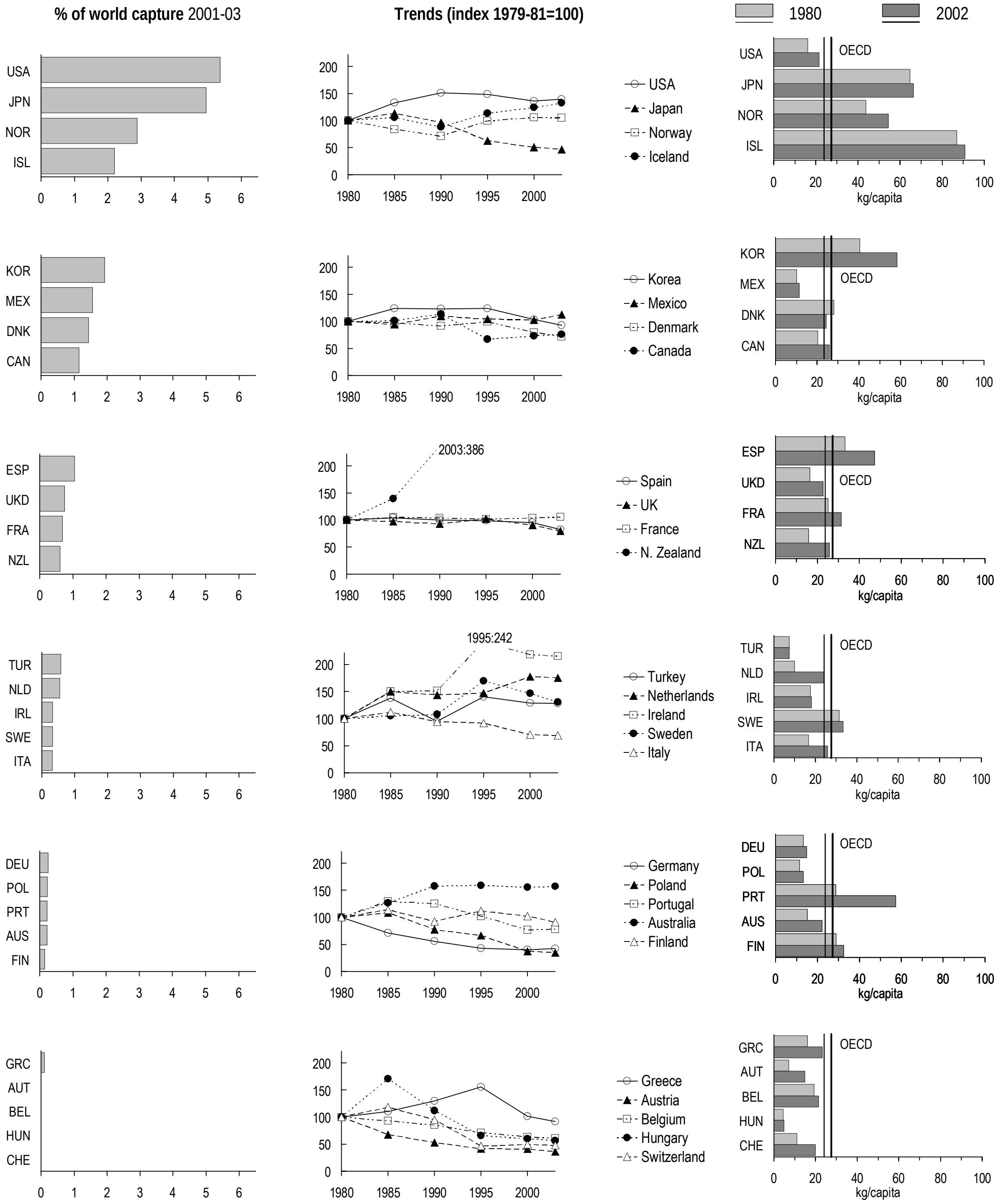
♦ **REFERENCES**

- OECD (2001), OECD Environmental Outlook, Chapter 9, Fisheries
- OECD (2000), Review of Fisheries in OECD countries
- FAO (2005), Review of the State of World Marine Fishery Resources
- FAO (2005), FAO yearbook, Fishery statistics, Capture production 2003, Vol. 96/1

FISH CATCHES AND CONSUMPTION: NATIONAL 16

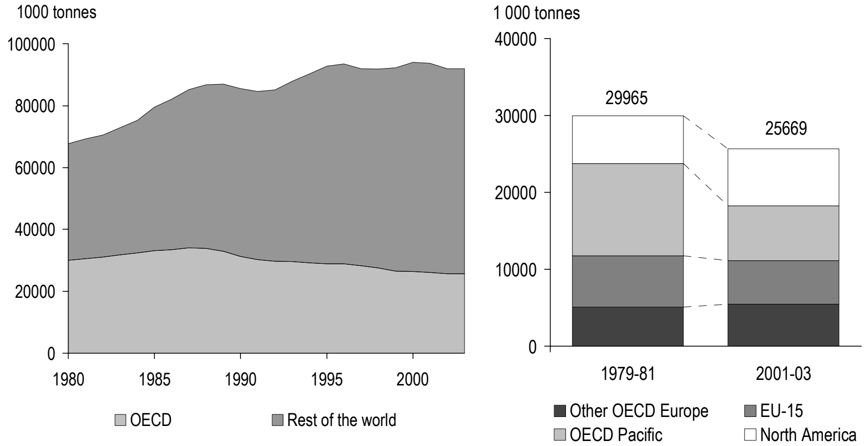
Fish catches in marine and inland waters

Fish consumption per capita

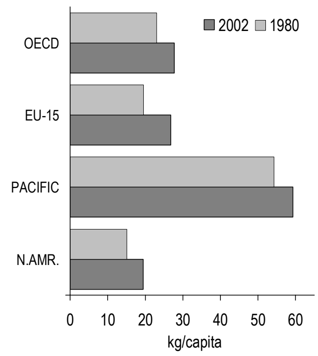


17 FISH CATCHES AND CONSUMPTION: GLOBAL AND REGIONAL

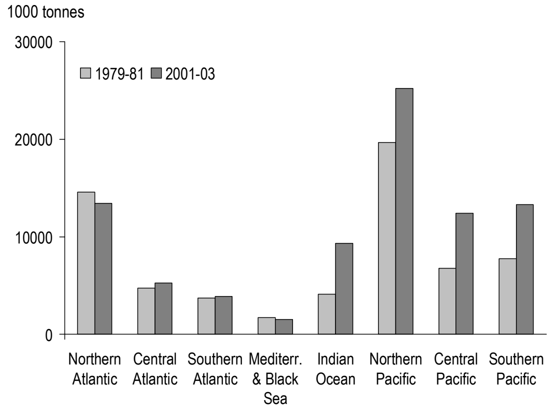
Fish catches, 1979-81 to 2001-03



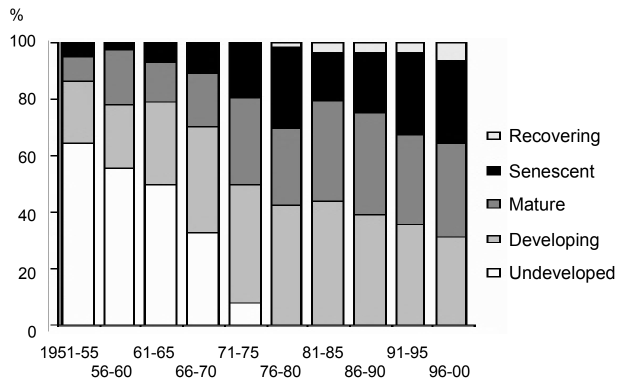
Fish consumption, 1980-2002



Fish catches by major marine fishing area



World marine fish resources by phase of fishery development



Fish catches by major marine fishing area

	Total		share of world catches		Cod, hake, haddock		Herring, sardine, anchovy		Miscellaneous pelagic fishes		Tuna, bonito, billfish, etc.	
	1 000 t. 2001-03	% change since 1979-81	% 1979-81	% 2001-03	1 000 t. 2001-03	% change since 1979-81	1 000 t. 2001-03	% change since 1979-81	1 000 t. 2001-03	% change since 1979-81	1 000 t. 2001-03	% change since 1979-81
Northern Atlantic	13419	-8	23	16	3858	-24	2870	43	2596	-28	37	-39
Central Atlantic	5276	11	8	6	28	-31	2533	32	481	-22	397	16
Southern Atlantic	3899	5	6	5	915	8	715	-30	477	-44	114	46
Mediterr. & Black Sea	1533	-10	3	2	53	-11	773	-10	122	-17	66	47
Indian Ocean	9322	127	7	11	11	710	958	47	888	72	1402	350
Northern Pacific	25205	28	31	30	3460	-21	2666	-22	2726	14	839	88
Central Pacific	12396	83	11	15	1	23	1868	34	1846	112	2762	134
Southern Pacific	13300	71	12	16	656	164	8239	81	2701	29	416	181
Total	84351	34	100	100	8983	-16	20620	30	11836	6	6033	131

♦ See Technical Annex for data sources, notes and comments.

FISH CATCHES AND CONSUMPTION 16&17

		Total fish catches					Marine fish catches	Fish consumption	
		Total		per capita		share of world catches	share of total catches	per capita	
		1 000 t. 2001-03	% change since 1979-81	kg/cap. 2001-03	% change since 1979-81	% 2001-03	% 2001-03	kg/cap. 2002	% change since 1980
Canada		1 061	-24	33.5	-41	1.2	92	25.7	27
Mexico		1 433	13	14.0	-24	1.6	94	11.4	12
USA		4 940	40	17.0	9	5.4	93	21.6	34
Japan		4 560	-54	35.7	-57	5.0	93	66.3	2
Korea		1 770	-7	36.9	-26	1.9	99	58.4	45
Australia		200	57	10.0	16	0.2	99	22.2	48
New Zealand	♦	564	286	140.7	202	0.6	100	25.9	64
Austria		-	-64	-	-66	-	n.app.	14.8	108
Belgium	♦	29	-39	2.7	-43	-	98	21.6	12
Czech Rep.		5	..	0.5	..	-	n.app.	13.7	..
Denmark	♦	1 330	-28	246.8	-32	1.4	100	24.2	-13
Finland		138	-9	26.5	-17	0.2	65	32.6	12
France		623	6	10.4	-5	0.7	100	31.5	26
Germany		232	-57	2.8	-60	0.3	90	14.9	12
Greece		95	-8	8.6	-20	0.1	95	23.2	44
Hungary		7	-44	0.7	-40	-	n.app.	4.9	15
Iceland		2 030	32	7015.3	4	2.2	100	90.8	4
Ireland		302	116	76.3	86	0.3	100	18.0	2
Italy		292	-31	5.0	-33	0.3	98	25.9	56
Netherlands		503	75	31.0	53	0.5	100	24.3	144
Norway		2 659	5	582.6	-6	2.9	100	54.4	24
Poland		210	-66	5.5	-68	0.2	89	13.2	16
Portugal		203	-22	19.4	-26	0.2	100	57.5	100
Slovak Rep.		2	..	0.3	..	-	n.app.	7.3	..
Spain		961	-17	22.9	-26	1.0	99	47.2	42
Sweden		298	30	33.3	21	0.3	99	33.4	6
Switzerland		2	-52	0.2	-58	-	n.app.	19.9	81
Turkey		534	29	7.6	-19	0.6	95	7.4	1
UK		689	-20	11.4	-26	0.7	99	22.8	39
OECD		25 669	-14	22.2	-28	27.9	96	27.7	20
World		92 012	36	14.6	-4	100.0	90	16.2	65

♦ See Technical Annex for data sources, notes and comments... not available - nil or negligible n.app. not applicable

STATE AND TRENDS SUMMARY

Of 441 marine stocks fished worldwide, 23 % are estimated to be under or moderately exploited, 52% fully exploited, 17% overexploited and 8 % depleted or recovering. From 1980 there was a consistent downward trend in the proportion of stocks offering potential for expansion and an increasing trend in the share of overexploited and depleted stocks. More than two third of stocks is exploited at or beyond maximum sustainable limit.

Trend analysis shows large differences in catches among OECD countries and among fishing areas, with significant increases in the Pacific and Indian Oceans.

The intensity of national catches per unit of GDP and per capita varies widely among OECD countries, reflecting the share of fisheries and associated industries in the economy.

Catches from capture fisheries are generally growing at a slower rate than 30 years ago; they are even in decline in a number of countries, whereas aquaculture has gained considerable importance. While aquaculture helps to alleviate some of the stress from capture fisheries, it also has negative effects on local ecosystems and its dependence on fishmeal products adds to the demand for catches from capture fisheries.

BIODIVERSITY

Biodiversity can be defined as the variety of and variability among living organisms; it covers both diversity at the ecosystem and species levels and genetic diversity within species. Conservation of biodiversity has become a key concern nationally and globally. Pressures on biodiversity can be physical (e.g. habitat alteration and fragmentation through changes in land use and land cover), chemical (toxic contamination, acidification, oil spill, other pollution from human activities) or biological (e.g. alteration of population dynamics and species structure through the release of exotic species or the commercial use of wildlife resources).

The conservation and sustainable use of biodiversity form an integral part of sustainable development, encompassing the integration of biodiversity concerns into economic policies as well as measures to protect areas, habitats and species. Protection levels range from full to partial protection in actual protected areas to promotion of biodiversity conservation outside such areas (e.g. on farms or in forests). Performance can be assessed against domestic objectives and international agreements such as: the Convention on Biological Diversity (Rio de Janeiro, 1992), the Convention on the Conservation of Migratory Species of Wild Animals (Bonn, 1979), the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES, Washington, 1973), the Convention on Wetlands of International Importance (Ramsar, 1971) and the Convention on the Conservation of European Wildlife and Natural Habitats (Bern, 1979). A target endorsed at the WSSD (Johannesburg, 2002) aims to significantly reduce the rate of loss of biodiversity by 2010 at the global, regional and national levels. The main challenge is to maintain or restore the diversity and integrity of ecosystems, species and genetic material and to ensure a sustainable use of biodiversity. This implies strengthening the actual degree of protection of habitats and species, eliminating illegal exploitation and trade, and raising public awareness.

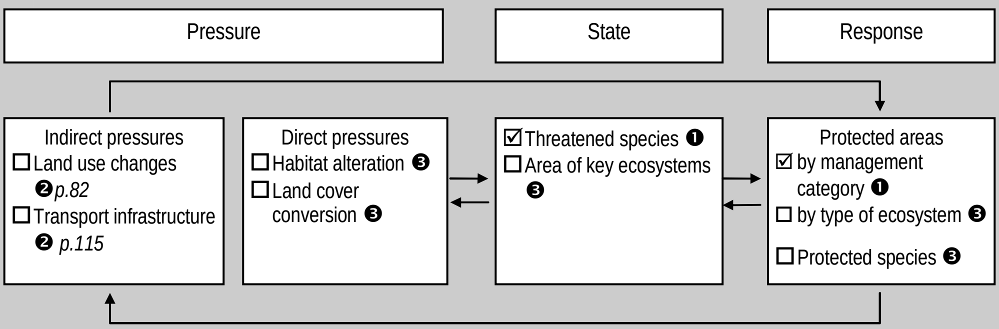
Indicators presented here relate to selected aspects of biodiversity conservation and concern:

- *the number of threatened species compared to the number of known or assessed species. "Threatened" refers to the "endangered", "critically endangered" and "vulnerable" species, i.e. species in danger of extinction and species soon likely to be in danger of extinction. Data cover mammals, birds, fish, reptiles, amphibians and vascular plants. Other major groups (e.g. invertebrates, fungi) are not covered at the present time.*
- *protected areas, i.e. areas under management categories I to VI of the World Conservation Union (IUCN) classification that refer to different levels of protection, and protected areas without a specific IUCN category assignment. Categories I and II (wilderness areas, strict nature reserves and national parks) reflect the highest protection level. Protected areas are a form of defence against change in land use and in other human activities, which, if unsustainable, can pose a threat to ecosystems and landscapes, and lead to biodiversity changes including natural habitat loss.*

These indicators need to be complemented with indicators on the sustainable use of biodiversity as a resource (e.g. forest, fish), and on habitat alteration. They should be read in connection with information on the density of population and of human activities.

BIODIVERSITY: ONGOING WORK AND REFERENCES

♦ **OECD CORE SET AND RELATED INDICATORS**



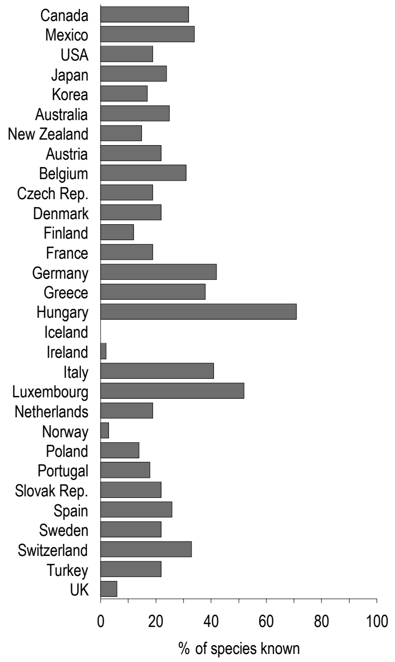
❶ *indicator presented here* ❷ *indicator presented elsewhere in this publication* ❸ *indicator not presented*

♦ **REFERENCES**

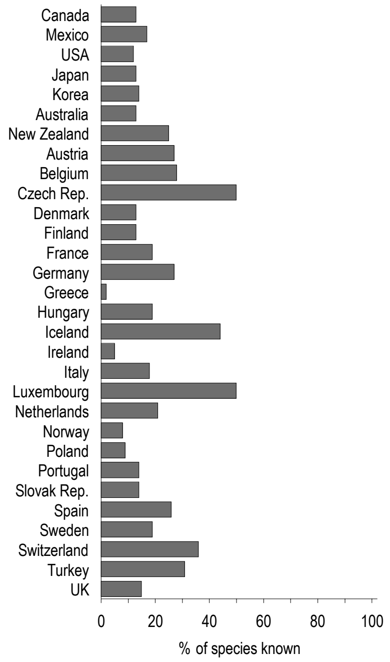
🕮 OECD (2004), OECD Environmental Data — Compendium 2004
🕮 OECD (1996), Saving biological diversity: Economic incentives
🕮 OECD (2001), OECD Environmental Outlook, Chapter 11, Biological Diversity

THREATENED SPECIES 18

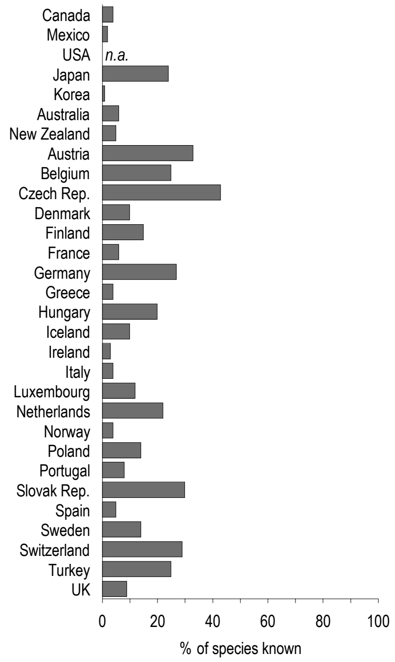
Mammals



Birds



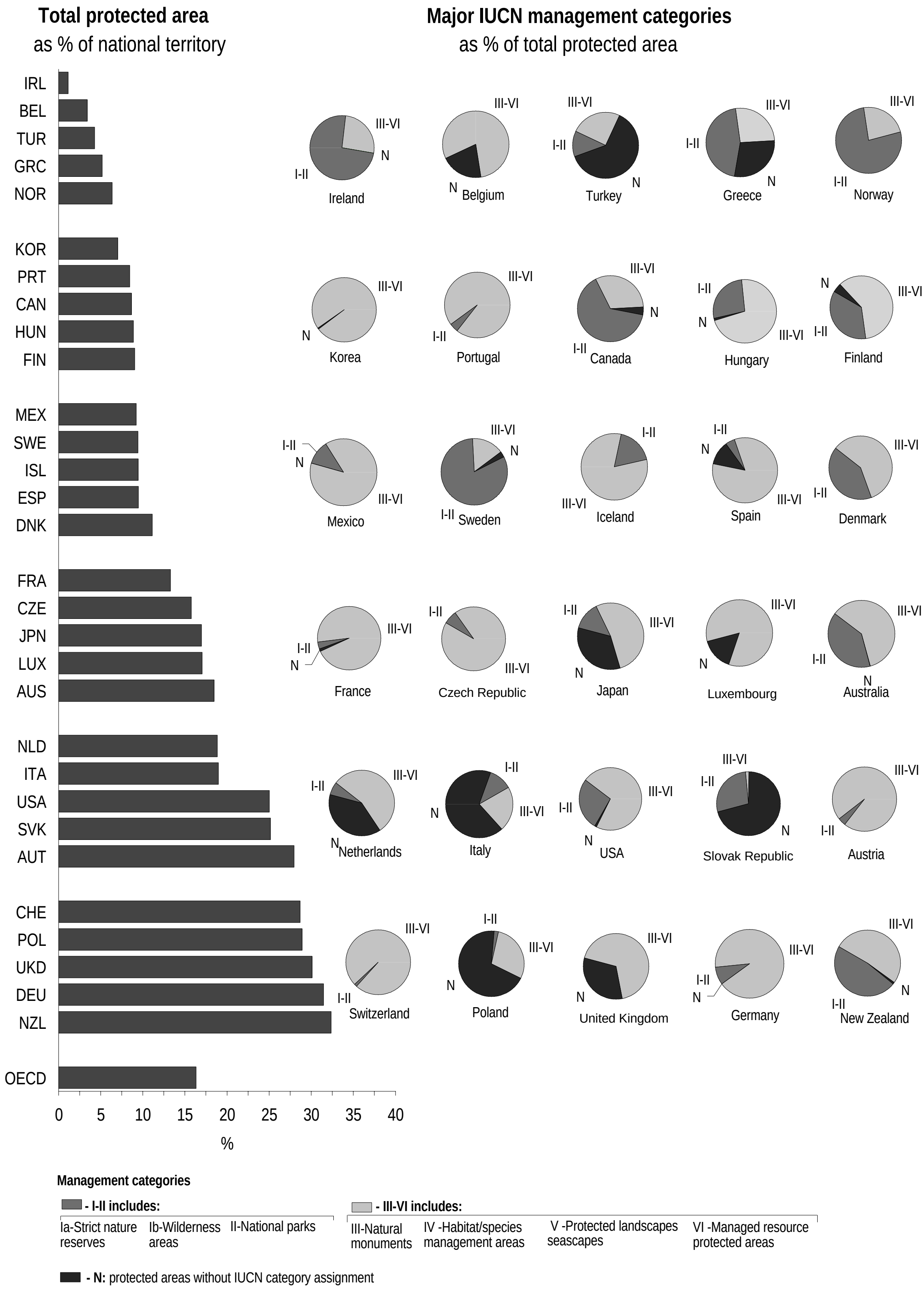
Vascular plants



		Mammals		Birds		Fish		Reptiles		Amphibians		Vascular plants	
		species known	species threatened	species known	species threatened	species known	species threatened	species known	species threatened	species known	species threatened	species known	species threatened
		number	%	number	%	number	%	number	%	number	%	number	%
Canada	♦	193	32	426	13	1021	7	42	69	42	43	4120	4
Mexico	♦	491	34	1054	17	384	34	704	17	361	13	23507	2
USA	♦	416	19	773	12	791	14	287	13	252	8	..	..
Japan	♦	200	24	700	13	300	25	97	19	64	22	7000	24
Korea	♦	100	17	417	14	905	1	24	13	17	12	3971	1
Australia	♦	348	25	816	13	4368	1	851	6	213	13	20000	6
New Zealand	♦	46	15	170	25	1048	1	61	18	4	25	2400	5
Austria	♦	100	22	242	27	60	42	16	75	21	100	2950	33
Belgium	♦	59	31	171	28	42	24	7	71	15	60	1550	25
Czech Rep.	♦	90	19	220	50	65	40	11	55	21	43	2700	43
Denmark	♦	50	22	219	13	38	16	5	-	14	14	1000	10
Finland	♦	59	12	240	13	68	12	5	40	5	20	1240	15
France	♦	121	19	375	19	420	8	40	15	40	28	6067	6
Germany	♦	87	42	238	27	268	31	14	79	21	62	3272	27
Greece	♦	111	38	422	2	126	26	60	12	20	5	5700	4
Hungary	♦	83	71	373	19	81	32	16	100	16	100	2500	20
Iceland	♦	4	-	75	44	5	-	-	-	-	-	485	10
Ireland	♦	57	2	610	5	26	23	3	33	3	-	2100	3
Italy	♦	118	41	473	18	93	29	60	35	39	41	6759	4
Luxembourg	♦	64	52	130	50	43	28	6	100	14	93	1258	12
Netherlands	♦	59	19	205	21	119	27	7	86	16	56	1490	22
Norway	♦	88	3	222	8	195	-	5	20	6	50	2492	4
Poland	♦	92	14	395	9	129	7	8	38	18	..	2500	14
Portugal	♦	96	18	313	14	35	23	34	9	17	-	3095	8
Slovak Rep.	♦	90	22	341	14	83	24	13	38	18	44	3352	30
Spain	♦	118	26	368	26	68	53	56	41	25	40	8000	5
Sweden	♦	67	22	246	19	55	16	6	50	13	46	2272	14
Switzerland	♦	82	33	195	36	54	39	15	73	20	80	2554	29
Turkey	♦	135	22	455	31	192	10	106	16	22	14	10000	25
UK	♦	64	6	221	15	54	11	9	..	14	..	2230	9

♦ *See Technical Annex for data sources, notes and comments.*

19 PROTECTED AREAS



PROTECTED AREAS 19

		Major protected areas, 2004				Strict nature reserves, wilderness areas, national parks, 2004			
		Number of sites	Total size 1 000 km²	% of territory	per capita km²/1 000 inh.	Number of sites	Total size 1 000 km²	% of territory	per capita km²/1 000 inh.
Canada		5354	866	8.7	27.6	1946	559	5.6	17.8
Mexico		187	181	9.2	1.8	100	21	1.1	0.2
USA	♦	7882	2414	25.1	8.4	856	651	6.8	2.3
Japan		961	64	17.0	0.5	93	9	2.3	0.1
Korea		44	7	7.1	0.1	-	-	-	-
Australia	♦	5655	1426	18.5	72.5	2686	564	7.3	28.7
New Zealand		3891	87	32.4	22.2	167	42	15.4	10.6
Austria		1087	23	28.0	2.9	10	1	1.1	0.1
Belgium		618	1	3.4	0.1	-	-	-	-
Czech Republic		1768	12	15.8	1.2	5	1	1.1	0.1
Denmark	♦	339	5	11.1	0.9	35	2	4.6	0.4
Finland		3466	31	9.1	5.9	62	11	3.2	2.1
France	♦	1327	73	13.3	1.2	5	3	0.5	-
Germany		7242	112	31.5	1.4	13	9	2.6	0.1
Greece		147	7	5.2	0.6	17	3	2.3	0.3
Hungary		236	8	8.9	0.8	5	2	2.4	0.2
Iceland	♦	79	10	9.5	34.1	5	2	1.7	6.2
Ireland		90	1	1.2	0.2	6	1	0.9	0.2
Italy		752	57	19.0	1.0	24	6	2.1	0.1
Luxembourg		63	0	17.1	1.0	-	-	-	-
Netherlands	♦	1596	8	18.9	0.5	15	1	1.2	-
Norway	♦	1795	21	6.4	4.6	119	16	4.9	3.5
Poland		1822	91	29.0	2.3	17	2	0.6	0.1
Portugal	♦	68	8	8.5	0.8	6	0	0.4	-
Slovak Republic		1176	12	25.2	2.3	614	3	7.0	0.6
Spain	♦	602	48	9.5	1.2	38	2	0.4	0.1
Sweden		4878	43	9.5	4.8	752	35	7.7	3.9
Switzerland		2190	12	28.7	1.6	1	0	0.4	-
Turkey		474	34	4.3	0.5	36	4	0.5	0.1
UK	♦	7723	74	30.1	1.2	-	-	-	-
OECD		63512	5736	16.4	5.0	7633	1949	5.6	1.7
World		104628	19551	14.6	3.1	10810	6070	4.5	1.0

♦ *See Technical Annex for data sources, notes and comments.*

STATE AND TRENDS SUMMARY

Protected areas have grown significantly since 1980 in almost all countries, reaching 16.4 per cent of total area for the OECD as a whole.

Actual protection levels and related trends are more difficult to evaluate, as protected areas change over time: new areas are designated, boundaries are revised and some sites may be destroyed or changed by pressures from economic development or natural processes. Environmental performance depends both on the designation of the area (e.g. the representativeness of species or ecosystems protected) and on management effectiveness.

III. CORE SOCIO-ECONOMIC AND SECTORAL INDICATORS

GDP AND POPULATION

Economic activity is a key determinant of sustainable development and its economic, social and environmental dimensions. Economic growth and production patterns have major effects on environmental issues and on environmental performance. They imply use of energy and other natural resource assets, as well as pollutant discharges and waste production. The sustainability of development depends on the evolution of the stock and quality of natural resources or "natural capital" and on pollution constraints. Economic growth also provides opportunities to finance public expenditure for environmental protection and to replace man-made capital, thus introducing cleaner, less resource-intensive technologies and environmentally friendly goods.

Population influences production and consumption patterns, and hence the sustainability of development. It is an important determinant of environmental conditions and trends. Population density implies density of human activity. Overall population growth puts pressure on natural resources and adds to the challenge of providing sanitation and other environmental infrastructure. Population also affects the environment in the ways that its structural elements (age classes, active population, size of households, etc.) influence consumption patterns and waste production.

Indicators presented here relate to:

- *gross domestic product (GDP), in total and per capita, as well as the change in GDP compared to the change in population over the same period.*
- *population growth and density, presenting changes in national resident population, as well as population densities and an "ageing index" (the ratios between the population over 64 and under 15).*

GDP AND POPULATION: REFERENCES

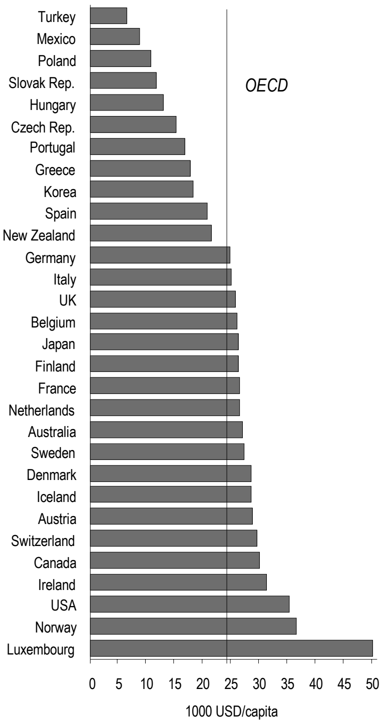
- 🕮 OECD (biannual publication), OECD Economic Outlook
- 🕮 OECD (annual publication), National Accounts of OECD Countries
- 🕮 OECD (annual publication), Labour Force Statistics
- 🕮 OECD (monthly publication), Main Economic Indicators
- 🕮 OECD (2001), OECD Environmental Outlook, Chapter 4, Economic Development
- 🕮 OECD (2004), OECD Environmental Data — Compendium 2004

GROSS DOMESTIC PRODUCT 20

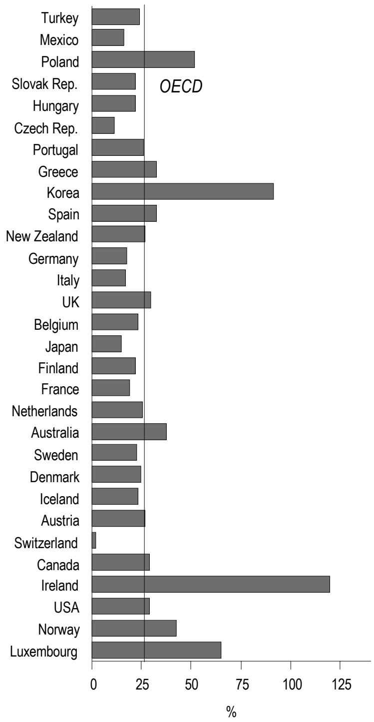
GDP per capita, change since 1990 (%)

Turkey	19.2
Mexico	13.2
Poland	51.6
Slovak Rep.	21.6
Hungary	22.5
Czech Rep.	11.9
Portugal	25.2
Greece	30.1
Korea	81.9
Spain	30.3
New Zealand	23.1
Germany	17.3
Italy	17.2
UK	28.7
Belgium	22.5
Japan	14.7
Finland	21.4
France	18.8
Netherlands	24.1
Australia	32.5
Sweden	22.2
Denmark	23.8
Iceland	20.7
Austria	26.4
Switzerland	2.5
Canada	25.4
Ireland	106.5
USA	25.4
Norway	40.1
Luxembourg	55.6

GDP per capita, state, 2003



% change GDP-% change population



	Gross Domestic Product				Structure of GDP, value added as % of GDP		
	Total Billion USD 2000 2003	per capita 1 000 USD/cap. 2003	per capita change (%) since 1990	% change GDP-% change population 2003-1990	Agriculture % early 2000s	Industry % early 2000s	Services % early 2000s
Canada	953.7	30.2	25.4	29.1	2.5	31.8	65.7
Mexico	905.9	8.8	13.2	16.7	4.1	27.1	68.7
USA	10381.4	35.7	25.4	29.5	1.6	22.8	75.6
Japan	3375.2	26.4	14.7	15.2	1.4	31.0	67.7
Korea	890.1	18.6	81.9	91.6	4.1	42.5	53.3
Australia	541.5	27.2	32.5	37.9	3.8	25.6	70.6
New Zealand	86.8	21.6	23.1	27.5	7.0	25.3	67.8
Austria	233.3	28.9	26.4	27.6	2.4	32.0	65.6
Belgium	273.5	26.4	22.5	23.4	1.3	27.0	71.7
Czech Rep.	158.8	15.6	11.9	11.7	3.8	39.6	56.7
Denmark	154.9	28.7	23.8	25.0	2.6	26.5	70.9
Finland	138.4	26.6	21.4	22.3	3.6	31.9	64.5
France	1591.9	26.6	18.8	19.8	2.7	24.9	72.4
Germany	2059.0	25.0	17.3	*18.0*	1.2	29.7	69.2
Greece	198.2	18.0	30.1	32.9	7.3	23.1	69.6
Hungary	134.1	13.2	22.5	21.9	3.8	31.5	64.7
Iceland	8.3	28.8	20.7	23.6	9.1	27.4	63.5
Ireland	124.4	31.5	106.5	120.2	3.4	42.1	54.5
Italy	1461.2	25.2	17.2	17.6	2.7	28.5	68.7
Luxembourg	22.8	50.4	55.6	65.3	0.7	20.1	79.2
Netherlands	434.4	26.8	24.1	26.2	2.6	25.8	71.6
Norway	168.4	36.9	40.1	43.1	1.9	38.3	59.9
Poland	417.4	10.9	51.6	51.7	3.2	30.5	66.4
Portugal	176.8	16.9	25.2	26.7	3.7	29.3	67.1
Slovak Rep.	64.8	12.0	21.6	21.9	4.6	32.4	63.0
Spain	875.0	20.9	30.3	32.7	3.4	29.7	67.0
Sweden	247.5	27.6	22.2	23.3	1.8	28.2	70.0
Switzerland	218.5	29.8	2.5	2.7	1.2	26.7	72.1
Turkey	479.6	6.8	19.2	24.2	12.4	30.7	56.9
UK	1579.7	26.1	28.7	30.1	1.0	26.5	72.5
OECD	28355.5	24.6	23.2	25.7	2.6	28.8	68.6

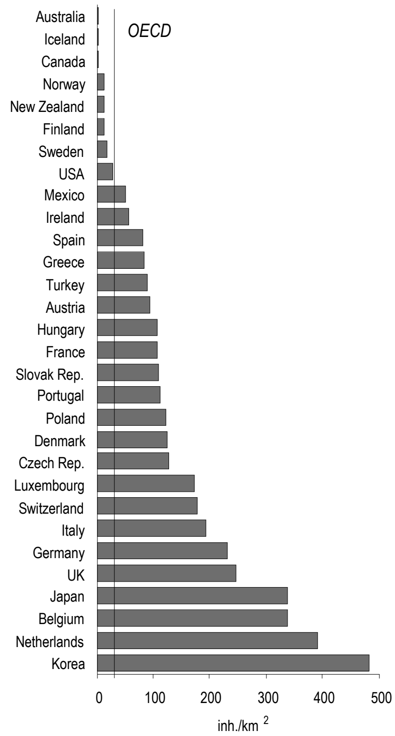
♦ *See Technical Annex for data sources, notes and comments.*

21 POPULATION GROWTH AND DENSITY

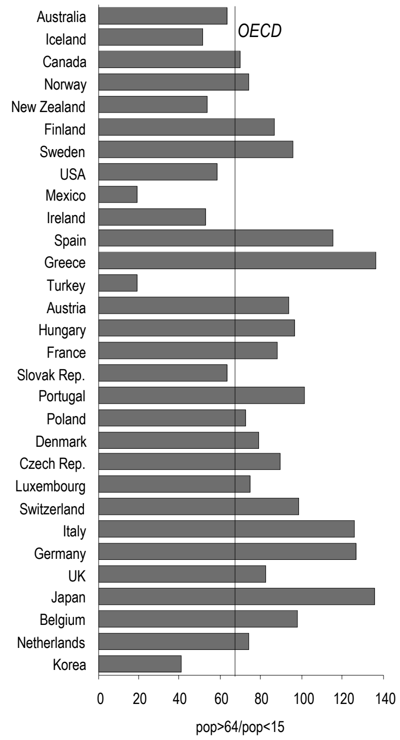
Change since 1990 (%)

Australia	16.5
Iceland	13.5
Canada	14.2
Norway	7.6
New Zealand	19.2
Finland	4.6
Sweden	4.7
USA	16.4
Mexico	26.4
Ireland	12.8
Spain	7.8
Greece	9.4
Turkey	25.9
Austria	4.5
Hungary	-2.4
France	5.4
Slovak Rep.	1.5
Portugal	5.8
Poland	0.2
Denmark	4.8
Czech Rep.	-1.5
Luxembourg	17.5
Switzerland	9.4
Italy	2.4
Germany	4.0
UK	5.1
Japan	3.4
Belgium	4.1
Netherlands	8.5
Korea	11.8

Density, 2003



Ageing index, 2003



	Population					Unemployment rate
	Total 1 000 inh.	Change (%) since	Density inh./km^2	Ageing index pop>64/pop<15		% of total labour force
	2003	1990	2003	2003	1990	2003
Canada	31630	14.2	3.2	70.2	54.4	7.6
Mexico	102708	26.4	52.5	18.8	10.8	3.3
USA	291049	16.4	30.2	59.1	57.7	6.0
Japan	127619	3.4	337.8	135.8	66.2	5.3
Korea	47925	11.8	482.8	40.8	20.0	3.4
Australia	19881	16.5	2.6	64.0	50.4	5.9
New Zealand	4009	19.2	14.8	54.0	47.9	4.7
Austria	8067	4.5	96.2	93.7	86.9	5.7
Belgium	10372	4.1	339.8	98.1	82.3	8.1
Czech Rep.	10202	-1.5	129.4	90.4	58.3	7.8
Denmark	5387	4.8	125.0	79.1	91.3	5.6
Finland	5213	4.6	15.4	87.2	69.3	9.1
France	59768	5.4	108.8	88.0	70.4	9.7
Germany	82520	4.0	231.1	126.6	103.9	8.7
Greece	11036	9.4	83.6	136.6	74.1	9.5
Hungary	10124	-2.4	108.8	97.0	66.0	5.9
Iceland	289	13.5	2.8	51.5	42.6	3.3
Ireland	3953	12.8	56.2	53.0	41.7	4.7
Italy	58095	2.4	192.8	126.2	88.9	8.8
Luxembourg	452	17.5	174.6	74.6	77.0	3.8
Netherlands	16224	8.5	390.7	74.2	70.4	3.5
Norway	4564	7.6	14.1	74.1	86.2	4.5
Poland	38204	0.2	122.2	73.4	40.0	19.6
Portugal	10449	5.8	113.6	102.0	68.1	6.4
Slovak Rep.	5380	1.5	109.7	64.2	40.8	17.4
Spain	41874	7.8	82.8	116.3	68.5	11.3
Sweden	8958	4.7	19.9	95.8	99.2	4.9
Switzerland	7343	9.4	177.9	98.9	90.9	4.0
Turkey	70712	25.9	90.7	19.0	13.0	10.5
UK	60483	5.1	247.0	83.3	82.7	5.0
OECD	1154490	10.8	32.9	68.5	52.3	7.1

◆ *See Technical Annex for data sources, notes and comments.*

CONSUMPTION

Consumption by households and government is a determinant of sustainable development and its economic, environmental and social dimensions. It has important implications for the level and pattern of production and for related demands for natural resources. Growth of private consumption has both positive and negative environmental effects, entailing increased use of private transport, more leisure and tourism, higher energy consumption, increased use of packaged goods and higher waste production, but also demand for environmentally friendly goods.

Agenda 21, adopted at UNCED (Rio de Janeiro, 1992), stresses that changes in consumption and production patterns are necessary to ensure more sustainable development. These can be promoted by increasing consumer awareness and expanding use of approaches such as life cycle analysis of products and extended producer responsibility. Governments can show the way by "greening" their own consumption and operations.

Indicators presented here relate to:

- *private consumption, i.e. by households and private non-profit institutions serving households. They present private final consumption expenditure expressed as percentage of GDP and per capita, as well as the structure of private consumption.*
- *government consumption, presenting government final consumption expenditure expressed as percentage of GDP and per capita.*

They should be read in conjunction with other indicators in this publication, notably those dealing with energy, transport, waste and water, and should be complemented with information on production patterns and trends.

CONSUMPTION: ONGOING WORK AND REFERENCES

♦ **OECD SECTORAL INDICATORS**

Sectoral trends of environmental significance	Interactions with the environment	Economic & policy aspects
☑ Private consumption❶ ☑ Government consumption❶ ☐ Socio-demographic trends❷ *p.100* ☐ Transport trends ❷ *p.111* ☐ Consumer goods and food ❸ ☐ Recreation ❸	Resource use and pollutant discharges ☐ Energy use ❷ *p.107* ☐ Air emissions❷ *p.53* ☐ Water use❷ *p.75* ☐ Sewage discharges ❸ & treatment❷ *p.71* ☐ Waste generation ❷ *p.63* ☐ Nature & wildlife ❸	☐ Regulatory instruments ❸ ☐ Economic instruments (prices, taxes, subsidies, expenditure)❷*p.77,109,117* ❸ ☐ Information & social instruments❸

❶ *indicator presented here* ❷ *indicator presented elsewhere in this publication* ❸ *indicator not presented*

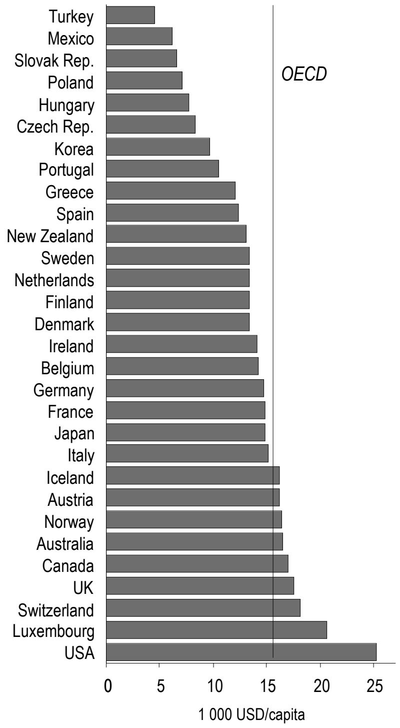
♦ **REFERENCES**

- 🕮 OECD (1997), OECD Proceedings, Sustainable Consumption and Production: Clarifying the Concepts
- 🕮 OECD (1997), Sustainable Consumption and Production
- 🕮 OECD (1999), OECD Series on Environmental Indicators: Towards More Sustainable Household Consumption Patterns – Indicators to Measure Progress
- 🕮 OECD (annual publication), National Accounts of OECD Countries
- 🕮 OECD (2001), OECD Environmental Outlook, Chapter 5, Consumption Patterns
- 🕮 OECD (2004), OECD Environmental Data — Compendium 2004

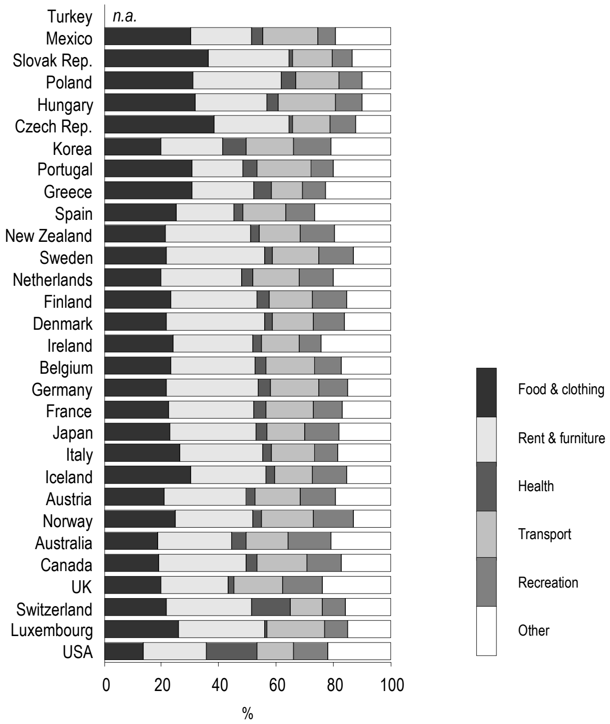
PRIVATE CONSUMPTION 22

Private final consumption expenditure

per capita, 2003



structure by type, 2003

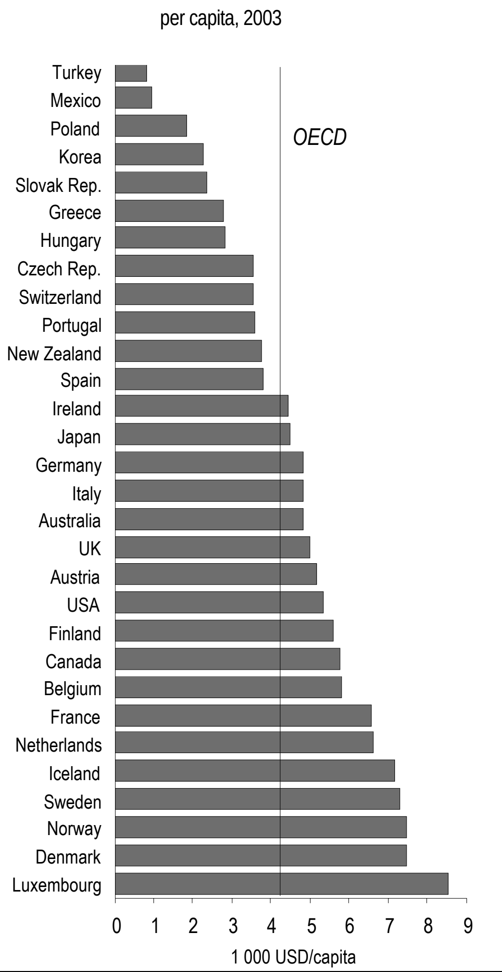


	Private final consumption expenditure			Consumption patterns, by type, %					
	Total	per capita							
	% of GDP 2003	1000 USD/cap. 2003	% change since 1990	Food & clothing	Rent & furniture	Health	Transport	Recreation	Other
Canada	56	17.0	22.1	19.2	30.1	4.4	17.2	12.0	17.2
Mexico	70	6.2	15.2	30.4	21.1	4.4	19.1	6.3	18.7
USA	71	25.3	32.4	14.1	22.0	17.6	12.8	11.5	22.0
Japan	56	14.9	17.1	23.3	30.3	3.8	13.2	11.9	17.6
Korea	53	9.8	64.4	20.3	21.5	7.7	16.5	13.3	20.6
Australia	61	16.5	32.1	18.6	26.1	4.6	14.7	14.5	21.5
New Zealand	61	13.2	22.4	21.0	29.4	3.2	14.3	12.0	18.8
Austria	56	16.2	20.0	21.4	27.7	3.3	16.3	12.4	18.9
Belgium	54	14.3	20.5	23.0	29.3	4.4	16.8	9.5	17.1
Czech Republic	54	8.4	24.6	38.3	26.2	1.1	13.1	9.3	12.0
Denmark	47	13.5	16.8	21.8	34.3	2.6	14.3	11.2	15.9
Finland	51	13.5	16.8	23.3	30.4	4.0	15.5	11.6	15.2
France	56	14.9	17.1	22.6	29.5	3.6	17.3	9.7	17.3
Germany	59	14.7	18.0	22.3	31.6	4.2	17.2	10.1	14.7
Greece	67	12.1	25.6	30.9	22.0	5.6	10.9	7.5	23.0
Hungary	59	7.8	..	32.3	25.1	3.6	19.8	8.9	10.3
Iceland	56	16.2	21.7	30.2	25.7	3.1	13.1	12.4	15.4
Ireland	45	14.2	66.0	23.5	28.2	2.7	13.1	8.5	23.9
Italy	61	15.2	18.8	26.4	28.8	3.0	14.9	8.4	18.4
Luxembourg	41	20.7	31.4	26.0	29.5	1.3	20.0	8.4	14.8
Netherlands	50	13.4	23.3	20.4	27.9	4.3	16.0	11.6	19.8
Norway	45	16.4	41.1	25.3	27.1	2.9	17.5	13.8	13.5
Poland	65	7.1	76.9	31.1	30.7	5.2	14.7	7.9	10.3
Portugal	62	10.6	30.3	30.5	17.8	4.5	19.4	8.2	19.6
Slovak Republic	55	6.6	..	36.3	27.6	1.3	13.9	7.4	13.5
Spain	59	12.4	28.2	25.3	20.2	3.4	14.8	9.9	26.4
Sweden	49	13.4	14.9	22.4	33.8	2.5	16.2	12.3	12.6
Switzerland	61	18.2	6.5	21.1	28.6	13.3	11.1	8.2	15.4
Turkey	67	4.5	9.7	..	..	..	..	..	..
UK	67	17.6	34.6	19.6	24.1	1.7	16.7	13.9	24.0
OECD ♦	63	15.5	26.6	..	..	..	..	..	..

♦ *See Technical Annex for data sources, notes and comments.*

23 GOVERNMENT CONSUMPTION

Government final consumption expenditure



		Total % of GDP 2003	per capita 1 000 USD/cap. 2003	per capita % change since 1990
Canada		19	5.8	5.1
Mexico		11	1.0	-0.5
USA		15	5.4	5.2
Japan		17	4.5	41.9
Korea		12	2.3	49.1
Australia		18	4.9	21.2
New Zealand		17	3.8	11.0
Austria		18	5.2	21.7
Belgium		22	5.8	23.3
Czech Rep.		23	3.5	0.5
Denmark		26	7.5	24.2
Finland		21	5.6	10.6
France		25	6.6	27.0
Germany		19	4.8	17.1
Greece		16	2.8	15.4
Hungary		21	2.8	..
Iceland		25	7.2	27.1
Ireland		14	4.5	65.5
Italy		19	4.9	9.3
Luxembourg		17	8.5	45.5
Netherlands		25	6.6	25.6
Norway		20	7.5	38.0
Poland		17	1.9	41.8
Portugal		21	3.6	37.1
Slovak Rep.		20	2.4	..
Spain		18	3.8	43.2
Sweden		27	7.3	7.8
Switzerland		12	3.6	11.0
Turkey		13	0.9	22.3
UK		19	5.0	19.7
OECD	♦	17	4.2	15.7

♦ *See Technical Annex for data sources, notes and comments.*

ENERGY

Energy is a major component of OECD economies, both as a sector in itself and as a factor input to all other economic activities. Energy production and use have environmental effects that differ greatly by energy source. Fuel combustion is the main source of local and regional air pollution and greenhouse gas emissions; other effects involve water quality, land use, risks related to the nuclear fuel cycle and risks related to the extraction, transport and use of fossil fuels.

The structure of a country's energy supply and the intensity of its energy use, along with changes over time, are key determinants of environmental performance and sustainability of economic development. The supply structure varies considerably among countries. It is influenced by demand from industry, transport and households, by national energy policies and by national and international energy prices. Environmental performance can be assessed against domestic objectives such as energy efficiency targets, and targets concerning the share of renewable energy sources; and against international environmental commitments that have direct implications for domestic energy policies and strategies (e.g. the United Nations Framework Convention on Climate Change (1992), Convention on Long-Range Transboundary Air Pollution (1979)). The main challenge is to further de-couple energy use and related air emissions from economic growth, through improvements in energy efficiency and through the development and use of cleaner fuels. This requires the use of a mix of instruments including extended reliance on economic instruments.

Indicators presented here relate to:

- *trends in energy intensities. Energy intensities, expressed as total primary energy supply per unit of GDP and per capita, reflect, at least partly, changes in energy efficiency and efforts to reduce atmospheric emissions. They also reflect structural and climatic factors.*
- *energy mix, i.e. the structure of and changes in energy supply, in terms of primary energy source as a percentage of total energy supply. This is closely related to consumption and production patterns and to environmental effects.*
- *energy prices for industry and households, with changes in real energy end-use prices.*

ENERGY AND THE ENVIRONMENT: ONGOING WORK AND REFERENCES

♦ **OECD SECTORAL INDICATORS**

Sectoral trends of environmental significance	Interactions with the environment	Economic & policy aspects
☑ Energy intensities ❶ ☑ Energy mix ❶ ☐ Energy consumption ❸	☐ Air emissions ❷ *p.53* ☐ Water resource use ❷ *p.75* ☐ Waste generation ❷ *p.65* ☐ Risks ❸	☑ Energy prices & taxes ❶ ☐ Energy subsidies ❸ ☐ Environmental expenditure ❸

❶ *indicator presented here* ❷ *indicator presented elsewhere in this publication* ❸ *indicator not presented*

♦ **REFERENCES**

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- 🕮 OECD (1997), Reforming Energy and Transport Subsidies: Environmental and Economic Implications
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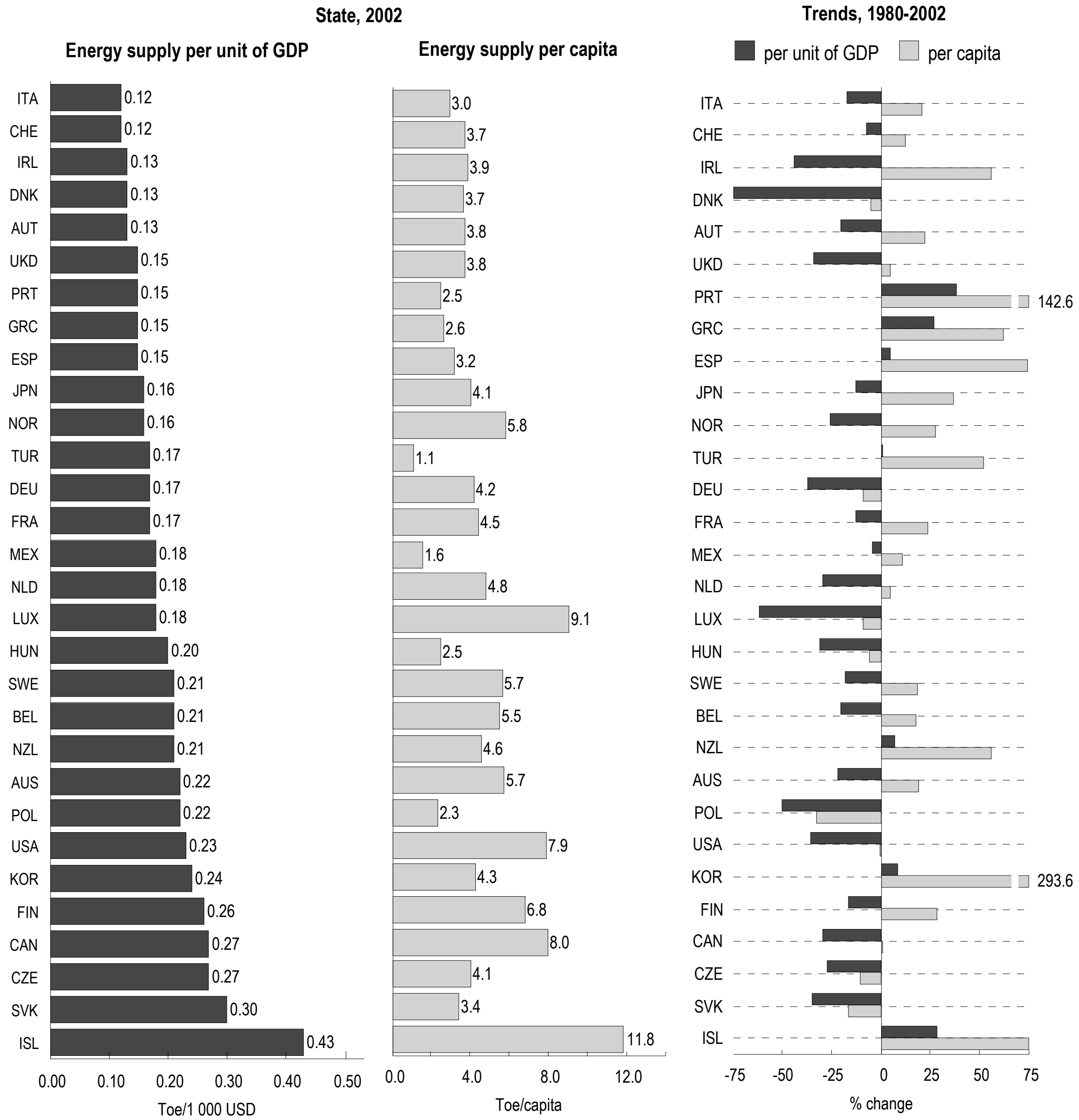
ENERGY INTENSITIES 24



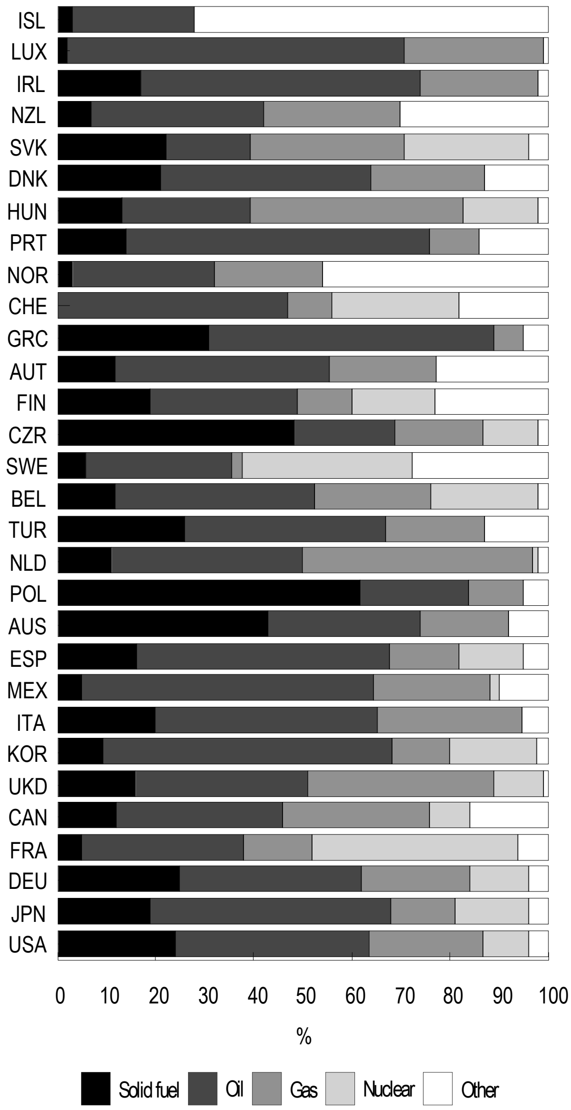
STATE AND TRENDS SUMMARY

During the 1980s, energy intensity per unit of GDP generally decreased for OECD countries overall as a consequence of economic structural changes and energy conservation measures. While in the first half of the 1990s, energy intensity did not further improve in most countries, due to decreasing prices for energy resources (oil, gas, etc.), it improved slightly in the second half of the 1990s. Progress in per capita terms has been slower, reflecting an overall increase in energy supply and energy demands for transport activities.

Variations in energy intensity among OECD countries are wide (from 1 to 4 per unit of GDP, from 1 to 11 per capita) and depend on national economic structure, geography (e.g. climate), energy policies and prices, and countries' endowment in different types of energy resources.

25 ENERGY MIX

Primary energy supply by source, 2002



Primary energy supply

	Total (Mtoe	% change	Structure by source, share of total (%)				
	2002	since 1980	Solid fuel	Oil	Gas	Nuclear	Other
Iceland	3	122	3	25	-	-	72
Luxembourg	4	11	2	68	28	-	1
Ireland	15	80	17	57	24	-	2
New Zealand	18	96	7	35	28	-	30
Slovak Republic	19	-10	22	17	31	25	4
Denmark	20	0	21	43	23	-	13
Hungary	25	-11	14	26	43	15	2
Portugal	26	156	13	62	10	-	14
Norway	27	42	3	29	22	-	46
Switzerland	27	30	-	47	9	26	18
Greece	29	85	31	58	6	-	5
Austria	30	31	12	44	22	-	23
Finland	36	40	19	30	11	17	23
Czech Republic	42	-12	48	20	18	11	2
Sweden	51	28	6	30	2	35	28
Belgium	57	23	12	41	24	22	2
Turkey	75	139	26	41	20	-	13
Netherlands	78	20	11	39	47	1	2
Poland	89	-28	61	22	11	-	5
Australia	113	60	43	31	18	-	8
Spain	132	92	16	51	14	13	5
Mexico	157	62	5	60	24	2	10
Italy	173	24	8	52	34	-	6
Korea	203	392	23	50	10	15	2
UK	227	13	16	35	38	10	1
Canada	250	30	12	34	30	8	16
France	266	37	5	33	14	42	6
Germany	346	-4	25	37	22	12	4
Japan	517	49	19	49	13	15	4
USA	2290	26	24	39	23	9	4
OECD	5346	31	21	41	22	11	6

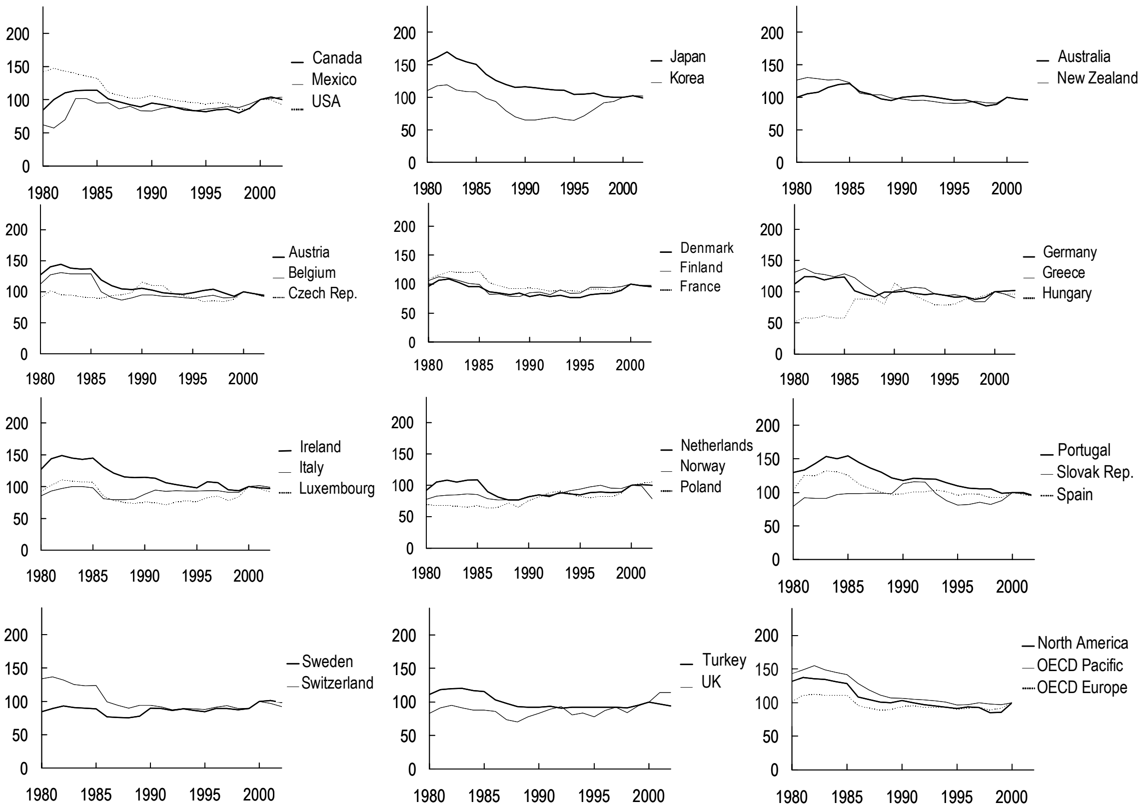
STATE AND TRENDS SUMMARY

The energy supply mix has a major effect on environmental performance because the environmental impact of each energy source differs greatly.

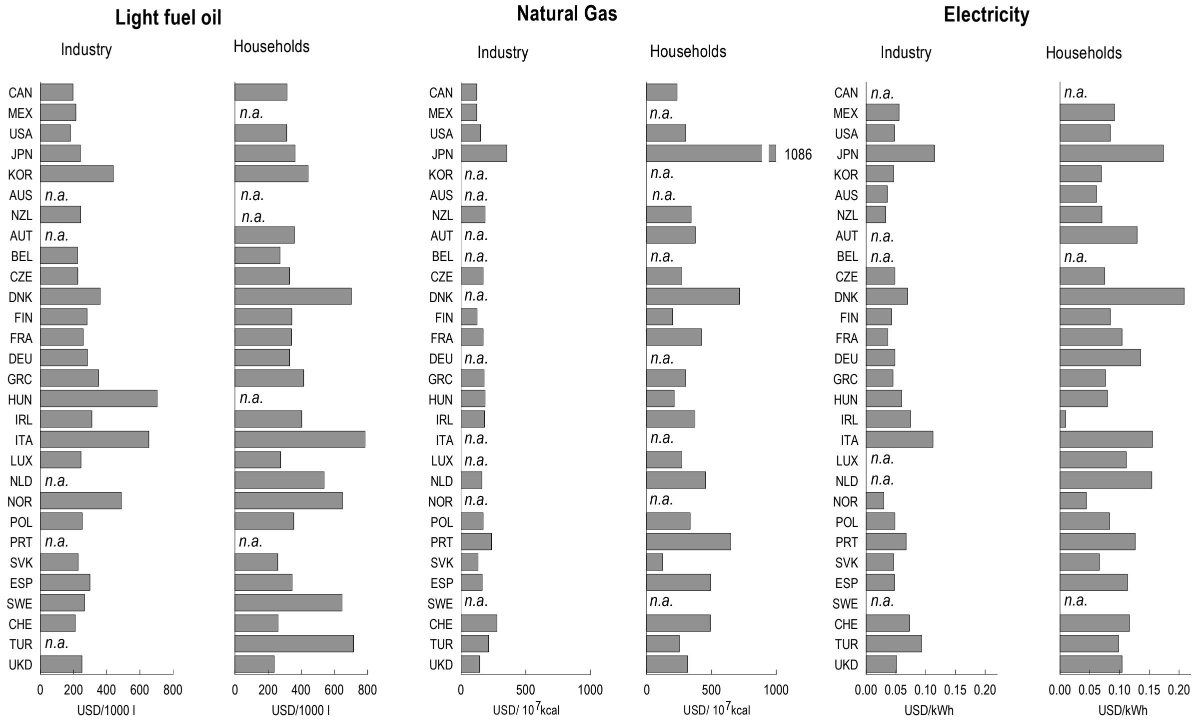
During the 1980s and early 1990s, growth in total primary energy supply was accompanied by changes in the fuel mix: the shares of solid fuels and oil fell, while those of gas and other sources, including renewable energy sources, rose. This trend has however been less marked in the 1990s than in the 1980s and is particularly visible in OECD Europe. The rates of change, however, vary widely by country.

ENERGY PRICES 26

Trends in real energy end-use prices (Index 2000 = 100)



Selected energy prices for industry and households, 2002



26 ENERGY PRICES

	Industry						Households						Real energy end-use prices
	Oil		Natural gas		Electricity		Oil		Natural gas		Electricity		
	Price USD/1000 l 2002	Tax (%) 2002	Price USD/10^7 kcal 2002	Tax (%) 2002	Price USD/kWh 2002	Tax (%) 2002	Price USD/1000 l 2002	Tax (%) 2002	Price USD/10^7 kcal 2002	Tax (%) 2002	Price USD/kWh 2002	Tax (%) 2002	Change (%) since 1980
Canada	199	..	125	..	..	..	316	10	236	..	..	..	18.7
Mexico	216	-	123	-	0.056	-	..	..	..	..	0.092	11	66.9
USA ♦	183	5	154	..	0.048	..	314	6	304	..	0.085	..	-35.0
Japan	243	5	357	5	0.115	9	364	5	1086	5	0.174	6	-35.8
Korea	442	33	..	..	0.047	..	443	33	..	..	0.070	..	-7.6
Australia	..	..	..	..	0.036	..	..	..	..	..	0.062	16	-4.1
New Zealand	244	-	189	5	0.033	-	..	..	344	14	0.071	14	-23.4
Austria	..	..	..	..	..	..	361	37	379	27	0.130	31	-25.8
Belgium	226	6	..	..	..	..	273	22	..	..	..	..	-18.3
Czech Republic	227	-	174	-	0.049	-	332	32	275	18	0.076	13	2.3
Denmark	363	8	..	..	0.070	14	703	57	720	59	0.209	62	-0.7
Finland	283	23	127	14	0.043	-	345	36	202	27	0.085	24	-8.0
France	261	18	172	-	0.037	-	343	30	426	15	0.105	19	-13.8
Germany	285	20	..	..	0.049	-	331	31	..	..	0.136	15	-9.4
Greece	353	30	181	-	0.046	-	417	41	303	7	0.077	13	-31.2
Hungary	706	45	189	-	0.060	-	x	..	215	11	0.080	13	87.8
Ireland	312	14	184	-	0.075	-	405	22	376	11	0.011	93	-23.8
Italy	655	58	..	..	0.113	27	786	65	c	..	0.156	32	16.0
Luxembourg	247	2	..	..	..	..	277	12	273	6	0.112	9	-0.2
Netherlands	..	..	164	6	c	..	539	51	457	37	0.155	45	9.1
Norway	489	24	x	..	0.030	33	649	38	x	..	0.045	44	0.8
Poland	254	15	173	-	0.049	-	356	29	337	18	0.084	24	53.3
Portugal	x	x	238	-	0.068	-	x	x	651	5	0.127	8	-26.6
Slovak Republic	230	-	133	-	0.047	-	259	11	126	9	0.067	15	18.8
Spain	300	27	165	-	0.048	-	348	37	497	14	0.114	18	-8.0
Sweden	269	21	..	..	..	..	648	61	..	..	..	..	17.3
Switzerland	213	3	279	1	0.073	-	262	9	495	8	0.117	9	-31.2
Turkey	..	..	215	16	0.094	21	717	63	255	16	0.099	20	37.2
UK □	252	19	146	7	0.052	-	239	24	317	5	0.105	-	-15.5

♦ *See Technical Annex for data sources, notes and comments.* *.. not available - nil or negligible x not applicable c: confidential*

STATE AND TRENDS SUMMARY

Energy end-use prices influence overall energy demand and the fuel mix, which in turn largely determine environmental pressures caused by energy activities. They can help internalise environmental costs. Though price elasticities vary considerably by end-use sector, historical and cross-country experience suggests that the overall price effect on energy demand is strong and that increases in energy prices have reduced energy use and hence its environmental impact.

The indicators show a general downward trend in real end-use energy prices in most OECD countries up to 2002, though rates of change differ greatly among countries. Since then, real end-use prices have been increasing mainly due to a rise in crude oil prices. Energy prices and related taxes, whether for industry or households, also vary widely among countries for all types of energy.

TRANSPORT

Transport is a major component of economic activity, both as a sector in itself and as a factor input to most other economic activities. It has many effects on the environment: air pollution raises concern mainly in urban areas where road traffic and congestion are concentrated, though road transport also contributes to regional and global pollution problems such as acidification and climate change; transport infrastructure leads to fragmentation of natural habitats; and vehicles entail waste management issues.

Road transport plays an important role in a country's environmental performance and the sustainability of its development. The volume of traffic depends on the demand for transport (largely determined by economic activity and transport prices) and on transport supply (e.g. the development of road infrastructure). Road traffic, both freight and passenger, is expected to increase further in a number of OECD countries. The main challenge is to reduce the environmental and health effects of transport, particularly regarding air pollution and climate change, by ensuring that efficiency gains from technological developments and demand side management achieve lasting environmental quality improvements.

Indicators presented here relate to:

- *road traffic and vehicle intensities, i.e. traffic volumes per unit of GDP and per kilometre of road, and vehicle numbers per capita and per kilometre of road;*
- *road infrastructure densities, i.e. the length of road and motorway networks per square kilometre of land area;*
- *road fuel prices and taxes, notably the relative price and taxation levels of diesel fuel and leaded and unleaded gasoline.*

TRANSPORT AND THE ENVIRONMENT: ONGOING WORK AND REFERENCES

♦ **OECD SECTORAL INDICATORS**

Sectoral trends of environmental significance	Interactions with the environment	Economic & policy aspects
☑ Road traffic ❶ ☑ Vehicle stocks ❶ ☑ Road infrastructure ❶ ☑ Energy consumption ❶	☐ Air emissions ❷*p.53* ☐ Urban air quality ❷ *p.58* ☐ Waste generation ❸ ☐ Habitat fragmentation ❸	☑ Road fuel prices & taxes ❶ ☐ Market share of unleaded gasoline ❸ ☐ Vehicle taxes ❸

❶ *indicator presented here* ❷ *indicator presented elsewhere in this publication* ❸ *indicator not presented*

♦ **REFERENCES**

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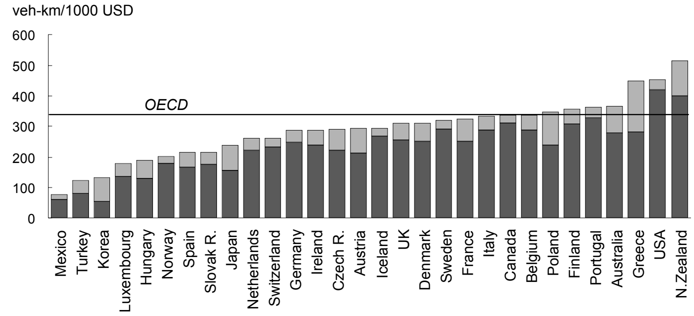
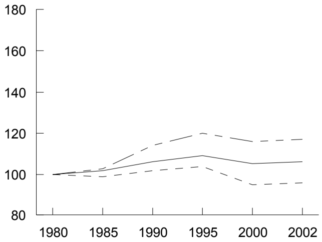
ROAD TRAFFIC AND VEHICLE INTENSITIES 27

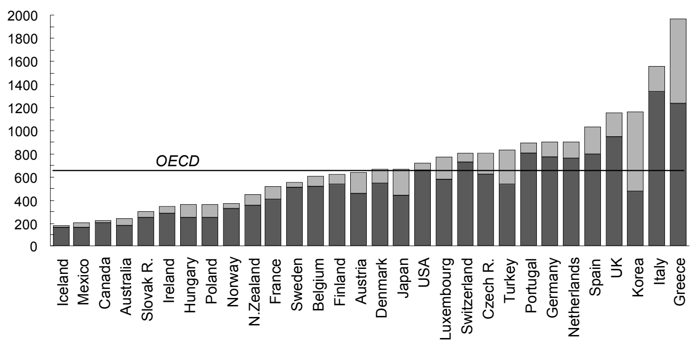
Road traffic intensities
State, 2002
Traffic per unit of GDP



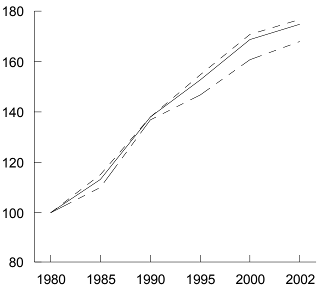
Road traffic intensities
Trends, Index 1980=100
Traffic per unit of GDP



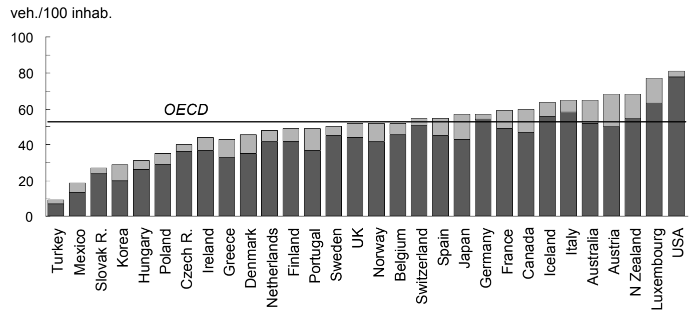
Traffic per network length



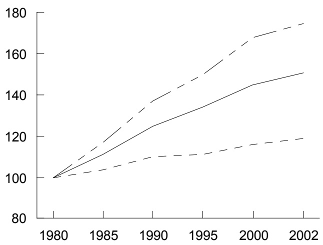
Traffic per network length



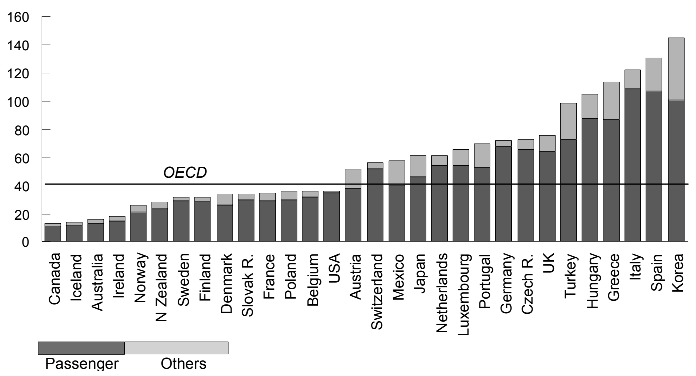
Road vehicle intensities
State, 2002
Motor vehicles per capita



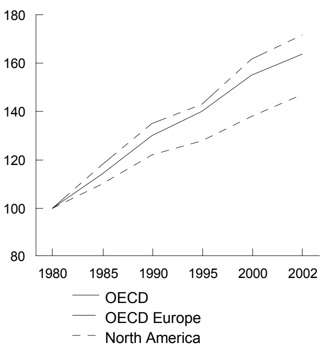
Road vehicle intensities
Trends, Index 1980=100
Motor vehicles per capita



Motor vehicles per network length



Motor vehicles per network length



27 ROAD TRAFFIC AND VEHICLE INTENSITIES

	Road traffic						Motor vehicles in use				GDP
	Total volume		Intensity		Goods vehicles		Total stock		Private car ownership		
	billion veh-km	% change	per unit of GDP veh-km/1000 USD	per network length 1000 veh-km/km	Volume % change	share in total traffic, %	1000 vehicles	% change	veh./ 100 inh.	% change	% change
	2002	since 1980	2002	2002	since 1980	2002	2002	since 1980	2002	since 1980	since 1980
Canada ◆	316	54	338	224	-55	7	18912	43	47	13	84
Mexico ◆	68	60	76	201	3	20	19533	235	13	116	69
USA ◆	4580	87	455	718	98	8	234571	51	78	19	95
Japan ◆	788	103	238	672	83	33	72255	95	43	111	70
Korea	107	1125	132	1166	1606	56	13949	2543	20	3028	352
Australia ◆	192	67	366	237	70	23	12800	76	52	31	105
N. Zealand ◆	41	129	515	450	189	24	2651	69	55	32	83
Austria ◆	68	91	296	639	102	27	5419	93	50	66	65
Belgium ◆	90	88	338	610	112	14	5390	55	46	45	54
Czech R. ◆	45	113	291	808	215	23	4018	108	36	107	21
Denmark	48	83	313	671	60	17	2457	46	35	30	51
Finland ◆	49	82	360	625	64	13	2540	82	42	65	68
France ◆	517	75	326	520	105	22	35144	62	49	38	57
Germany ◆	591	46	287	901	63	13	47276	72	54	64	53
Greece ◆	83	305	451	1965	255	37	4801	280	33	273	46
Hungary ◆	24	24	188	364	30	30	3141	..	26	..	30
Iceland	2	164	297	182	74	6	184	92	56	50	73
Ireland	33	77	289	341	45	15	1706	113	37	71	221
Italy ◆	483	113	333	1558	84	13	37682	97	58	85	50
Luxembourg	4	80	181	769	181	13	341	119	63	79	188
Netherlands ◆	113	68	260	902	102	14	7784	71	42	42	70
Norway	34	79	203	370	154	15	2365	69	42	39	91
Poland	138	210	348	366	86	27	13275	333	29	331	45
Portugal ◆	65	202	364	896	45	9	5138	..	37	291	85
Slovak R. ◆	13	56	218	302	-42	15	1476	143	24	144	37
Spain ◆	181	157	217	1035	135	21	22881	155	45	126	83
Sweden ◆	77	73	322	558	145	7	4466	45	45	31	56
Switzerland ◆	57	59	262	805	65	11	4007	65	51	43	40
Turkey ◆	53	256	125	834	163	30	6236	433	7	296	136
UK ◆	481	82	312	1156	82	17	31351	81	44	61	72
OECD ◆	9407	90	339	673	89	14	623751	79	48	49	79

◆ *See Technical Annex for data sources, notes and comments.*

STATE AND TRENDS SUMMARY

ROAD TRAFFIC AND VEHICLE DENSITIES

From 1980, countries' efforts in introducing cleaner vehicles have largely been offset by growth in vehicle stocks and the rapid increase of their use. This results in additional fuel consumption and road-building and in related damage to health and nature. In most OECD countries road traffic growth rates exceeded economic growth.

Traffic intensities per unit of GDP and per length of network show wide variations among OECD countries. The same holds for vehicle availability per capita and vehicle density.

ROAD INFRASTRUCTURE DENSITIES

Length of road network is an indicator of transport infrastructure development, which in turn is an important component of transport supply. Transport infrastructure exerts pressures on the environment through use of space and physical transformation of the natural environment (e.g. fragmentation of habitats).

Density of road infrastructure varies greatly among OECD countries (from 1 to 60). The length of motorways often grows faster than GDP.

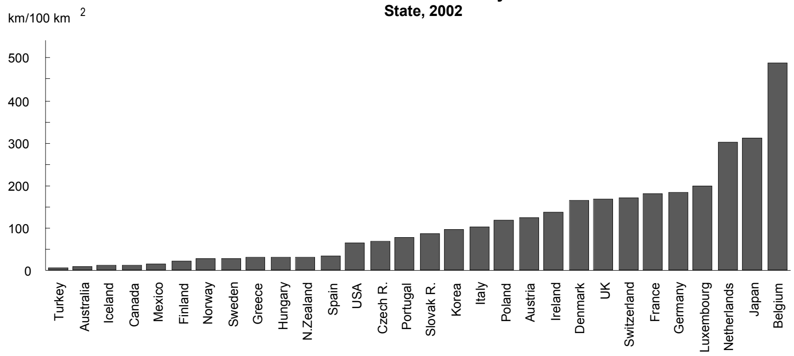
ROAD FUEL PRICES AND TAXES

Prices are a key form of information for consumers. When fuel prices rise relative to other goods, this tends to reduce demand for fuels and stimulate energy saving, and may influence the fuel structure of energy consumption.

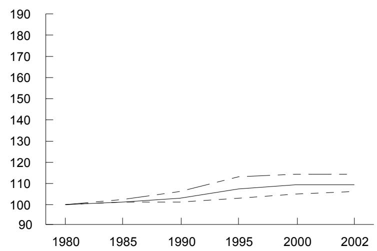
The use of taxation to influence energy consumer behaviour and to internalise environmental costs is increasing. Taxation of unleaded fuel ranges from 13 to 76 per cent of the price. Many OECD countries have introduced tax differentials in favour of unleaded gasoline and some have imposed environmental taxes (e.g. relating to sulphur content) on energy products.

ROAD INFRASTRUCTURE DENSITIES 28

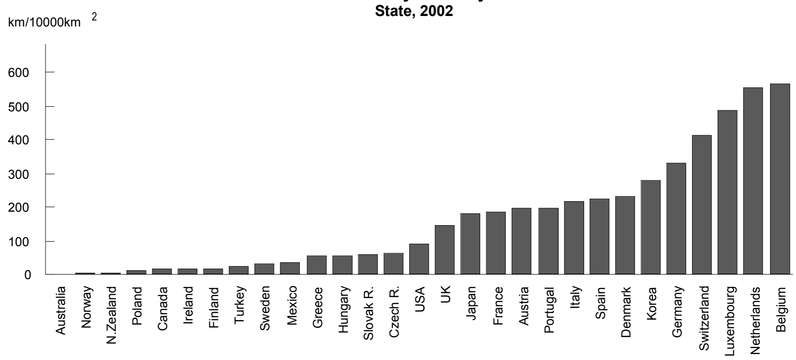
Road Network Density
State, 2002



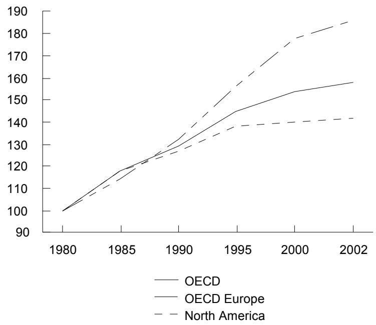
Trends in road network density
Trends, Index 1980=100



Motorways Density
State, 2002



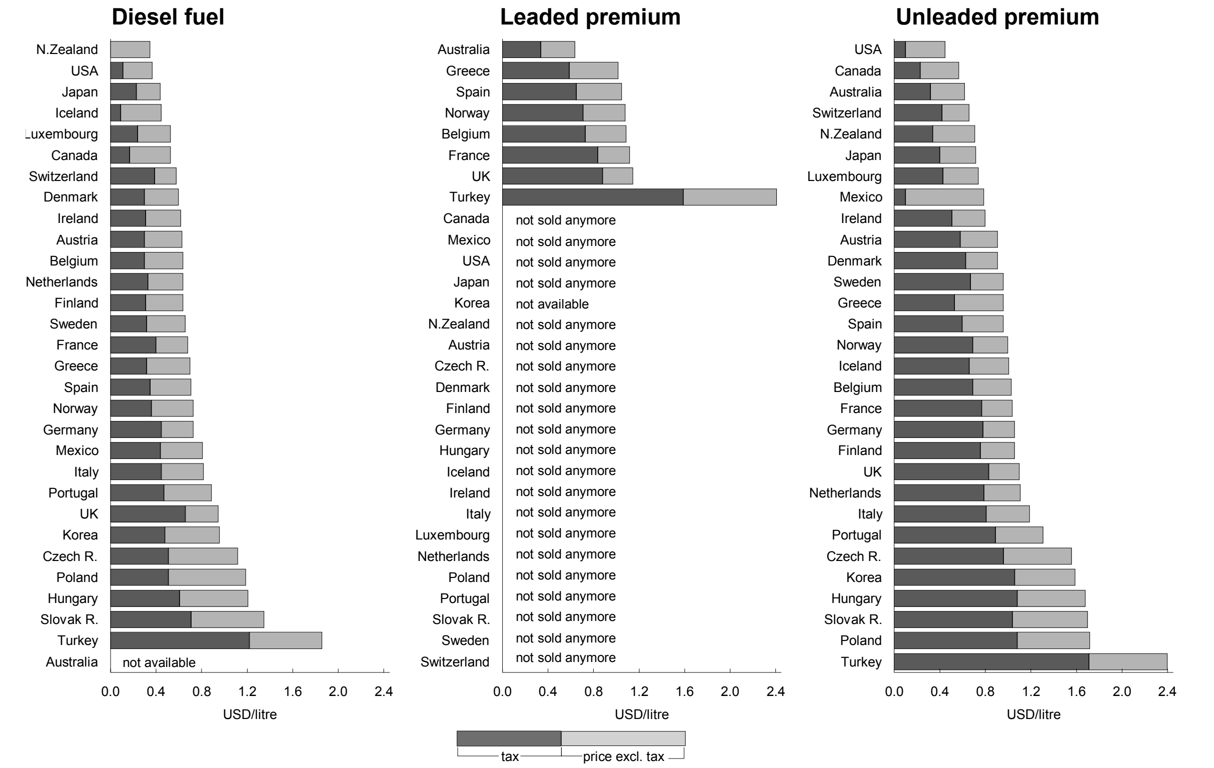
Trends in motorways density
Trends, Index 1980= 100



		Road network				Motorways				GDP
		Total length			Density	Total length			Density	
		1 000 km	% change		km/100 km²	km	% change		km/10 000 km²	% change
		2002	since 1980	since 1990	2002	2002	since 1980	since 1990	2002	since 1980
Canada	♦	1409	..	..	14	16900	106	12	17	84
Mexico	♦	337	..	..	17	6987	..	..	36	69
USA	♦	6382	4	4	66	89807	26	6	93	95
Japan	♦	1177	6	6	312	6915	168	48	183	70
Korea		96	104	69	97	2778	127	79	280	352
Australia	♦	810	19	6	11	1509	39	26	2	105
New Zealand	♦	92	-1	-1	34	190	60	35	7	83
Austria	♦	106	0	0	126	1645	89	14	196	65
Belgium	♦	149	19	6	488	1729	38	4	566	54
Czech Republic	♦	55	-1	-1	70	518	..	..	66	21
Denmark		72	4	2	167	1009	100	55	234	51
Finland	♦	78	3	1	23	603	196	168	18	68
France	♦	994	24	23	181	10223	94	44	186	57
Germany	♦	656	9	5	184	11800	28	9	331	53
Greece	♦	42	13	3	32	742	715	291	56	46
Hungary	♦	30	..	..	32	533	..	..	57	30
Iceland		13	4	4	13	-	..	..	..	73
Ireland		97	5	5	138	125	..	1463	18	221
Italy		310	4	2	103	6487	10	5	215	50
Luxembourg		5	2	2	201	126	..	..	487	188
Netherlands	♦	126	16	8	303	2291	29	10	552	70
Norway		92	13	3	28	178	212	144	5	91
Poland		372	25	2	119	405	191	84	13	45
Portugal	♦	73	41	11	79	1833	1343	391	199	85
Slovak Republic	♦	43	..	..	88	302	82	57	62	37
Spain	♦	176	17	13	35	11406	490	123	225	83
Sweden	♦	138	7	3	31	1507	77	62	33	56
Switzerland		71	7	0	172	1706	46	14	413	40
Turkey	♦	63	5	7	8	1851	7613	655	24	136
UK	♦	416	..	9	170	3586	..	13	146	72
OECD		14481	14	10	41	185909	59	22	53	79

♦ *See Technical Annex for data sources, notes and comments.*

29 ROAD FUEL PRICES AND TAXES



		Diesel				Leaded premium				Unleaded gasoline		Energy consumption by road transport		
		Price USD/litre		Taxation % of price		Price USD/litre		Taxation % of price		Price USD/litre	Taxation % of price	share of total cons.	Total Mtoe	% change since
		1980	2003	1980	2003	1980	2003	1980	2003	2003	2003	2002	2002	1980
Canada	♦	0.65	0.54	..	32	..	..	..	..	0.58	41	75	40	14
Mexico	♦	0.10	0.80	..	54	..	..	..	..	0.80	13	91	35	136
USA		..	0.38	..	30	..	..	..	..	0.44	22	82	511	47
Japan	♦	0.82	0.44	24	52	..	..	..	..	0.72	55	82	78	78
Korea	♦	0.85	0.96	..	50	3.45	..	..	..	1.60	67	76	25	2376
Australia	♦	0.54	..	..	..	0.57	0.64	19	53	0.62	52	82	23	64
N.Zealand		0.79	0.36	2	1	1.01	..	28	..	0.71	48	47	3	55
Austria		1.05	0.63	33	48	1.15	..	42	..	0.91	64	85	6	61
Belgium	♦	0.63	0.63	33	47	1.14	1.08	53	67	1.03	67	83	8	62
Czech R.		..	1.12	..	45	..	..	..	..	1.56	62	90	5	135
Denmark		0.49	0.60	..	51	1.20	..	59	..	0.91	70	79	4	60
Finland		0.81	0.64	32	48	1.19	..	36	..	1.06	72	83	4	52
France		0.82	0.68	47	59	1.18	1.12	58	75	1.04	74	83	44	57
Germany		0.83	0.74	41	62	0.97	..	49	..	1.06	74	86	56	39
Greece		0.92	0.70	12	45	2.17	1.02	42	58	0.96	55	75	6	146
Hungary		..	1.22	..	50	..	..	..	..	1.68	64	90	3	41
Iceland	♦	..	0.45	..	20	..	..	..	..	1.01	65	63	0	70
Ireland		0.84	0.61	28	50	1.18	..	48	..	0.80	64	81	4	142
Italy		0.70	0.82	8	55	1.77	..	61	..	1.19	68	90	39	72
Luxembourg		0.58	0.53	17	46	0.90	..	44	..	0.74	59	81	2	316
Netherlands		0.60	0.64	23	52	1.05	..	52	..	1.11	71	73	11	57
Norway		0.45	0.73	1	49	1.04	1.07	52	66	1.01	69	67	3	66
Poland		..	1.19	..	43	..	..	..	..	1.72	63	88	8	30
Portugal		1.07	0.89	7	53	2.82	..	61	..	1.31	68	86	6	207
Slovak R.		..	1.35	..	53	..	..	..	..	1.70	61	75	2	39
Spain		0.79	0.70	25	49	1.59	1.04	34	62	0.96	62	81	29	171
Sweden		0.42	0.66	8	49	0.84	..	49	..	0.95	70	85	7	34
Switzerland		..	0.58	..	67	0.99	..	51	..	0.66	63	74	5	44
Turkey		1.03	1.86	..	66	1.76	2.41	..	66	2.40	71	83	11	119
UK		0.97	0.95	40	70	1.10	1.15	46	76	1.09	76	76	40	49

♦ *See Technical Annex for data sources, notes and comments.*

AGRICULTURE

The economic and social significance of the agricultural sector has been declining in most OECD countries for decades. Agriculture's environmental effects can be negative or positive. They depend on the scale, type and intensity of farming as well as on agro-ecological and physical factors and on climate and weather. Farming can lead to deterioration in soil, water and air quality, and to loss of natural habitats and biodiversity. These environmental changes can have important implications for the level of agricultural production and food supply, and can limit the sustainable development of agriculture. But farming can also provide sinks for greenhouse gases, conserve biodiversity and landscapes and help prevent floods and landslides.

The main environmental concerns related to agriculture include nitrogen and phosphorus run-off from excessive commercial fertiliser use, intensive livestock farming and pesticides. Nitrogen and phosphorus, while major plant nutrients, are responsible for water eutrophication and related effects on aquatic life and water quality. Pesticide use adds persistent organic chemicals to ecosystems; these tend to accumulate in the soil and in biota, and residues may leach into surface and groundwaters. The general population can be exposed to pesticides through food. The main challenge is to progressively decrease the negative and increase the positive environmental effects of agricultural production so that ecosystem functions can be maintained and food security ensured for the world's population.

Indicators presented here relate to:

- *intensity of use of nitrogen and phosphate fertilisers in agriculture, reflected through apparent consumption in tonnes of active ingredients (N and P per km^2 of agricultural land). This represents potential pressure on the environment in the absence of effective pollution abatement. These indicators should be complemented with nitrogen balances, which provide information on the potential loss of nitrogen to the soil, air and to surface or groundwater.*
- *livestock densities, reflected through the number of head of cattle, pigs, chickens, sheep and goats per km^2 of agricultural land; the amount of N and P generated by livestock manure per km^2 of agricultural land is provided to complete the picture.*
- *intensity of use of pesticides in agriculture, reflected through apparent consumption or sales expressed in tonnes of active ingredients per km^2 of agricultural land. This indicator does not recognise differences among pesticides in levels of toxicity, persistence and mobility. It can be considered a first step towards a more comprehensive indicator based on an internationally agreed list of substances with appropriate weighting factors. Using km^2 of land where pesticides are actually applied as the denominator would provide important complementary information about intensity of pesticide use.*

It should be noted that these indicators describe potential environmental pressures, and may hide important sub-national variations. More information is needed to describe the actual pressure.

AGRICULTURE: ONGOING WORK AND REFERENCES

♦ **OECD SECTORAL INDICATORS**

Sectoral trends of environmental significance	Interactions with the environment	Economic & policy aspects
☑ Consumption of fertilisers ❶ ☑ Consumption of pesticides❶ ☑ Livestock densities ❶ ☐ Irrigated areas ❷ *p76* ☑ Agricultural production ❶	☐ Water use❷ *p.75* ☐ Land use and conservation ❸ ☐ Greenhouse gas emissions ❷*p.37* ❸ ☐ Water quality,❷*p.69,* nitrogen surplus❸ ☐ Soil quality ❸ ☐ Biodiversity, wildlife habitats, landscape ❸	☐ Farm management ❸ ☐ Farm financial resources ❸ ☐ Socio-cultural issues ❸

❶ *indicator presented here* ❷ *indicator presented elsewhere in this publication* ❸ *indicator not presented*

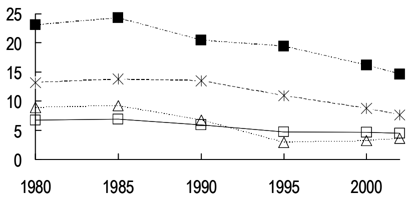
♦ **REFERENCES**

🕮 OECD (1997), Environmental Indicators for Agriculture
🕮 OECD (1997), Agriculture, Pesticides and the Environment: Policy Options
🕮 OECD (1998), Sustainable Management of Water in Agriculture: The Athens Workshop
🕮 OECD (1998), Agriculture and the Environment: Issues and Policies
🕮 OECD (2001), Environmental Indicators for Agriculture, Volume 3: Methods and Results
🕮 OECD (2001), OECD Environmental Outlook, Chapter 7, Agriculture
🕮 OECD (2004), OECD Environmental Data — Compendium 2004

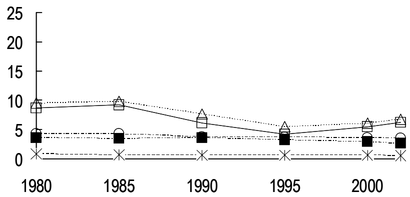
INTENSITY OF USE OF NITROGEN AND PHOSPHATE FERTILISERS 30

Nitrogen from fertilisers per km² of agricultural land

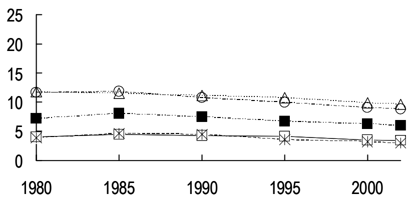
Trends (tonnes/km²) — %change 1980-2002



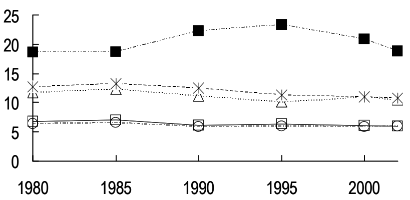
△ Slovak Rep.	-61.8
⚹ Denmark	-40.8
■ Netherlands	-38.4
□ Poland	-34.7
OECD	5.4



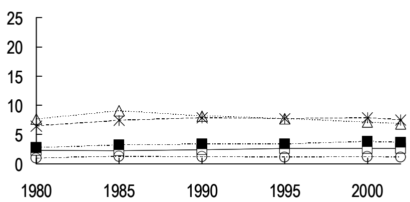
△ Czech Rep.	-32.9
⚹ Iceland	-31.6
■ Portugal	-23.8
□ Hungary	-23.2
○ Austria	-19.9
OECD	5.4



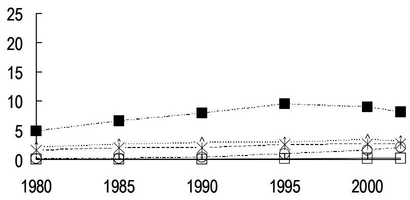
△ Norway	-18.0
⚹ Greece	-17.9
■ Finland	-17.0
□ Switzerland	-16.9
○ Japan	-15.7
OECD	5.4



△ Germany	-15.6
⚹ Belgium	-14.1
□ Sweden	-8.6
○ Italy	-6.1
■ Korea	-5.2
OECD	5.4



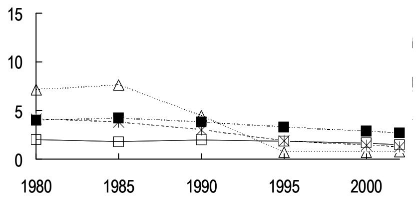
△ UK	-2.2
□ USA	4.7
⚹ France	15.8
○ Mexico	20.1
■ Spain	26.1
OECD	5.4



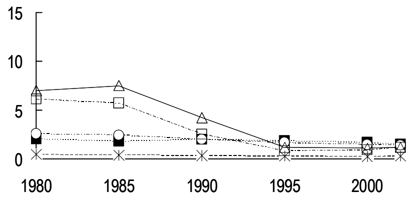
△ Turkey	47.7
⚹ Canada	68.7
■ Ireland	68.9
□ Australia	343.9
○ N.Zealand	1427.6
OECD	5.4

Phosphate from fertilisers per km² of agricultural land

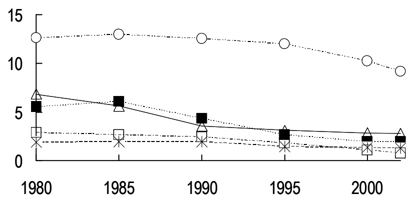
Trends (tonnes/km²) — %change 1980-2002



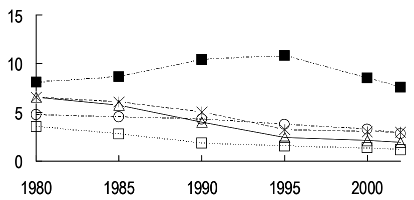
△ Slovak Rep.	-89.7
⚹ Denmark	-67.4
■ Netherlands	-34.3
□ Poland	-64.7
OECD	-29.4



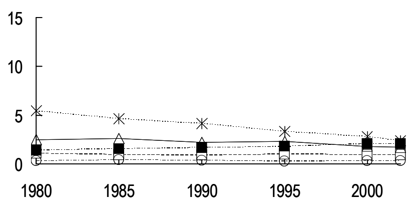
△ Czech Rep.	-83.9
⚹ Iceland	-41.7
■ Portugal	-26.5
□ Hungary	-80.3
○ Austria	-48.7
OECD	-29.4



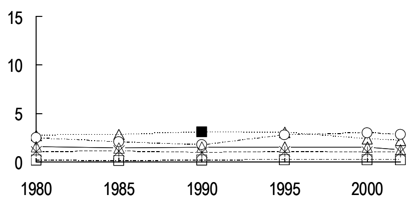
△ Norway	-58.5
⚹ Greece	-26.5
■ Finland	-65.0
□ Switzerland	-73.9
○ Japan	-21.9
OECD	-29.4



△ Germany	-71.0
⚹ Belgium	-55.3
□ Sweden	-66.2
○ Italy	-40.2
■ Korea	-1.1
OECD	-29.4



△ UK	-25.6
□ USA	-18.2
⚹ France	-55.2
○ Mexico	26.5
■ Spain	34.2
OECD	-29.4



△ Turkey	-23.5
⚹ Canada	-2.5
■ Ireland	-13.5
□ Australia	47.2
○ N.Zealand	22.3
OECD	-29.4

30 INTENSITY OF USE OF NITROGEN AND PHOSPHATE FERTILISERS

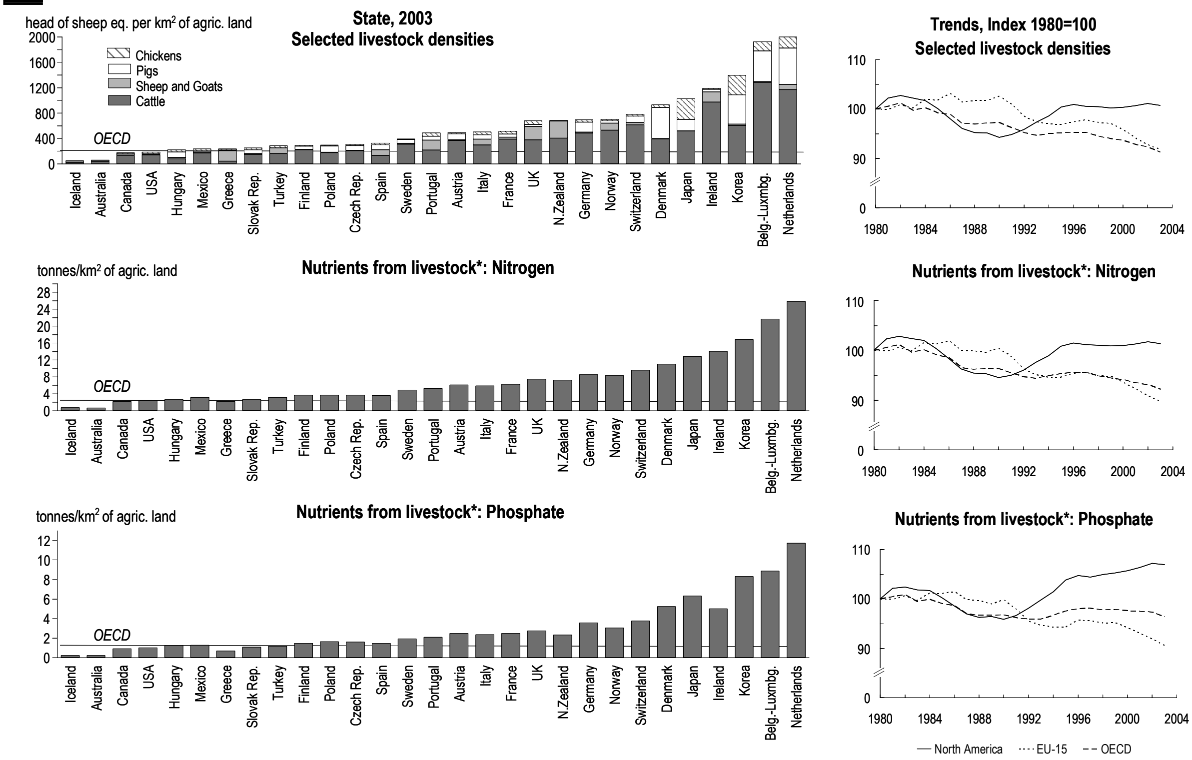
		Intensity of use of commercial nitrogen and phosphate fertilisers apparent consumption per km^2 of agricultural land				Agricultural production		Agricultural value added
		Nitrogen		Phosphate		Crops	Total	
		tonnes/km^2 2002	% change since 1980	tonnes/km^2 2002	% change since 1980	% change 1980 - 2003	% change 1980 - 2003	% GDP 2002
Canada		2.7	69	1.0	-2	53.2	50.0	2.5
Mexico	♦	1.1	20	0.3	26	50.3	59.5	4.1
USA	♦	2.6	5	0.9	-18	31.4	35.9	1.6
Japan		8.8	-16	9.2	-22	-20.8	-6.7	1.4
Korea	♦	18.9	-5	7.6	-1	29.9	56.3	4.1
Australia		0.2	344	0.2	47	129.1	65.5	3.8
N.Zealand		2.1	1428	2.8	22	85.1	52.1	7.0
Austria		3.5	-20	1.4	-49	-8.9	3.6	2.4
Belgium	♦	10.8	-14	3.0	-55	71.9	32.3	1.3
Czech Republic		6.8	-33	1.1	-84	..	..	3.8
Denmark	♦	7.6	-41	1.2	-67	50.2	25.6	2.6
Finland		6.0	-17	1.9	-65	10.2	-3.9	3.6
France	♦	7.5	16	2.4	-55	3.0	2.2	2.7
Germany		10.5	-16	1.9	-71	14.9	3.2	1.2
Greece	♦	3.0	-18	1.3	-27	17.4	12.5	7.3
Hungary	♦	6.2	-23	1.2	-80	-34.3	-23.0	3.8
Iceland	♦	0.5	-32	0.2	-42	3.7	-3.7	9.1
Ireland		8.1	69	2.2	-13	17.2	16.5	3.4
Italy		6.0	-6	2.8	-40	-18.3	-10.5	2.7
Netherlands		14.6	-38	2.7	-34	33.6	9.4	2.6
Norway		9.6	-18	2.8	-59	-23.7	-7.6	1.9
Poland		4.5	-35	1.6	-65	5.1	-1.0	3.2
Portugal		2.6	-24	1.5	-26	3.5	33.8	3.7
Slovak Republic		3.6	-62	0.8	-90	..	..	4.6
Spain	♦	3.6	26	2.0	34	37.3	41.9	3.4
Sweden	♦	6.0	-9	1.2	-66	-1.9	-3.1	1.8
Switzerland		3.5	-17	0.8	-74	-8.5	0.6	1.2
Turkey	♦	3.1	48	1.2	-24	52.8	45.0	12.4
UK	♦	6.8	-2	1.7	-26	14.2	-0.4	1.0
OECD	♦	2.2	5	0.8	-29	..	..	2.2

♦ *See Technical Annex for data sources, notes and comments.*

STATE AND TRENDS SUMMARY

Overall apparent consumption of commercial nitrogen fertiliser per unit of agricultural land since 1980 has grown in a number of OECD countries, and in the world, while consumption of phosphate fertiliser has decreased. These trends reflect developments aimed at maximising yield per hectare through specialisation and intensification. However major variations among countries exist. More recently the use of commercial nitrogen fertiliser has levelled off, and has declined in a number of countries.

31 LIVESTOCK DENSITIES



** Data refer to nutrients from cattle, sheep, goats, pigs, chickens and horses*

	Selected livestock densities head of sheep equivalent per km² of agricultural land								Nutrients from livestock per km2 of agricultural land		Agricultural production	
	Cattle		Sheep and Goats		Pigs		Chickens		Nitrogen	Phosphate	Livestock prod.	Total
	2003	% change since 1980	2003	% change since 1980	2003	% change since 1980	2003	% change since 1980	tonnes/km² 2003	tonnes/km² 2003	% change since 1980	% change since 1980
Canada	131.7	8	1.6	93	23.9	41	15.7	66	2.2	0.9	42.8	50.0
Mexico	172.2	2	15.0	-8	16.9	-1	30.2	180	3.2	1.3	82.4	59.5
USA	140.2	-10	1.8	-45	14.5	-8	28.4	93	2.4	1.0	40.6	35.9
Japan	516.2	19	0.9	-36	185.0	9	324.0	12	12.8	6.3	10.3	-6.7
Korea	602.6	38	22.6	146	462.6	483	305.2	185	16.9	8.3	211.3	56.3
Australia	35.8	13	21.7	-21	0.6	28	1.2	119	0.6	0.2	40.9	65.5
N.Zealand	402.4	21	273.7	-42	2.6	-11	7.5	185	7.2	2.3	50.3	52.1
Austria	365.8	-12	10.7	70	97.5	-11	19.5	-18	6.1	2.5	8.0	3.6
Belgium ♦	1281.6	6	11.1	50	483.7	48	150.1	37	21.6	8.9	26.8	32.3
Czech Rep. ♦	206.7	-55	2.7	-62	78.6	-32	17.5	-59	3.7	1.6	..	..
Denmark ♦	391.0	-36	5.4	182	489.4	43	44.7	42	11.0	5.2	22.2	25.6
Finland	222.2	-42	2.7	-32	50.9	-4	13.3	-35	3.6	1.5	-13.6	-3.9
France	385.1	-11	34.3	-13	49.5	43	43.4	36	6.2	2.5	6.4	2.2
Germany	483.7	-28	16.6	-4	154.1	-17	38.7	-12	8.5	3.6	-10.6	3.2
Greece	41.3	-32	165.8	21	10.6	3	19.8	3	2.2	0.7	-6.1	12.5
Hungary	78.8	-55	21.2	-52	86.6	-31	32.9	-41	2.6	1.2	-20.0	-23.0
Iceland	21.2	17	24.8	-41	2.3	287	0.7	-44	0.7	0.2	-3.3	-3.7
Ireland ♦	968.8	33	162.2	181	40.9	126	15.4	71	14.1	5.0	17.4	16.5
Italy	295.4	-11	94.0	46	69.8	24	45.9	-14	5.9	2.3	12.4	-10.5
Netherlands	1167.4	-24	80.6	84	574.1	15	302.7	26	25.9	11.7	3.1	9.4
Norway	528.7	-16	109.4	-51	43.9	-38	19.1	-17	8.3	3.0	-2.5	-7.6
Poland ♦	177.8	-55	1.8	-92	100.4	-10	15.7	-37	3.7	1.6	-16.9	-1.0
Portugal	216.7	9	156.6	18	60.7	-31	54.4	90	5.3	2.1	70.6	33.8
Slovak Rep. ♦	145.8	-62	14.9	-41	59.1	-42	33.4	-10	2.6	1.1	..	..
Spain	132.2	47	91.4	71	80.0	133	26.1	27	3.6	1.5	58.8	41.9
Sweden ♦	307.6	-2	14.3	36	60.5	-17	11.0	-49	4.9	1.9	-3.9	-3.1
Switzerland	616.2	-20	33.9	23	100.3	-28	29.3	25	9.6	3.8	-4.0	0.6
Turkey	162.7	-33	88.6	-48	0.0	-79	33.9	303	3.2	1.2	20.6	45.0
UK ♦	375.5	-17	213.8	76	30.2	-31	60.0	53	7.5	2.7	-4.6	-0.4
OECD	134.3	-9	25.2	-16	21.0	7	21.1	64	2.4	1.0	..	..

♦ See Technical Annex for data sources, notes and comments.

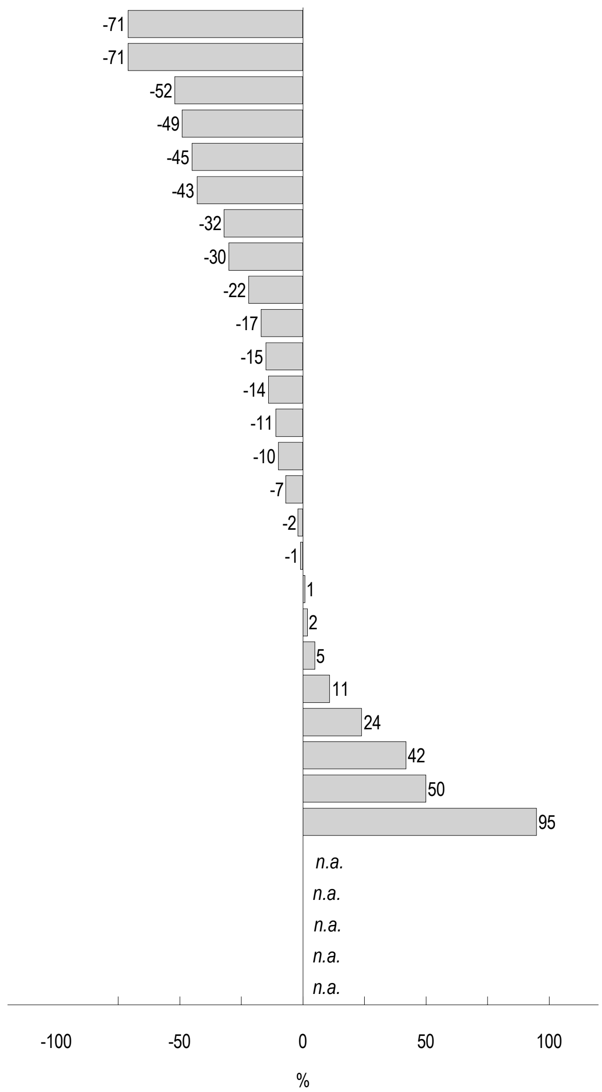
INTENSITY OF USE OF PESTICIDES 32

Apparent consumption of pesticides per km^2 of agricultural land

State, early 2000s
kg of active ingredients/km^2

Hungary	115
Australia	8
Netherlands	438
Czech Rep.	104
Norway	55
Denmark	111
Finland	52
Switzerland	102
Austria	100
Sweden	54
Poland	51
Japan	1397
France	281
Italy	579
Belgium	675
Slovak Rep.	147
Spain	135
UK	197
USA	77
Ireland	48
Korea	1340
Canada	69
Luxembourg	310
Greece	134
Portugal	400
Mexico	35
N.Zealand	24
Germany	172
Iceland	0
Turkey	45

% change since 1990



STATE AND TRENDS SUMMARY

The intensity of use of pesticides i.e. the apparent consumption of pesticides per km^2 of agricultural land has declined in a number of OECD countries since 1990, though major variations exist among and within countries. The reductions can be explained partly by changing crop prices, greater efficiency in pesticide use as a result of improvements in pest management practices and technologies, and by the use of economic and fiscal instruments. In a majority of countries, changes in pesticide use are closely correlated with fluctuations in annual crop production trends. This indicator describes potential pressure on the environment; it does not recognise differences among pesticides in levels of toxicity, persistence and mobility.

EXPENDITURE

Efforts to reduce environmental pressures imply public and private expenditure, to: i) finance pollution abatement and control at national level, and ii) provide financial and technical support for environmental protection measures in developing countries.

Indicators presented here relate to:

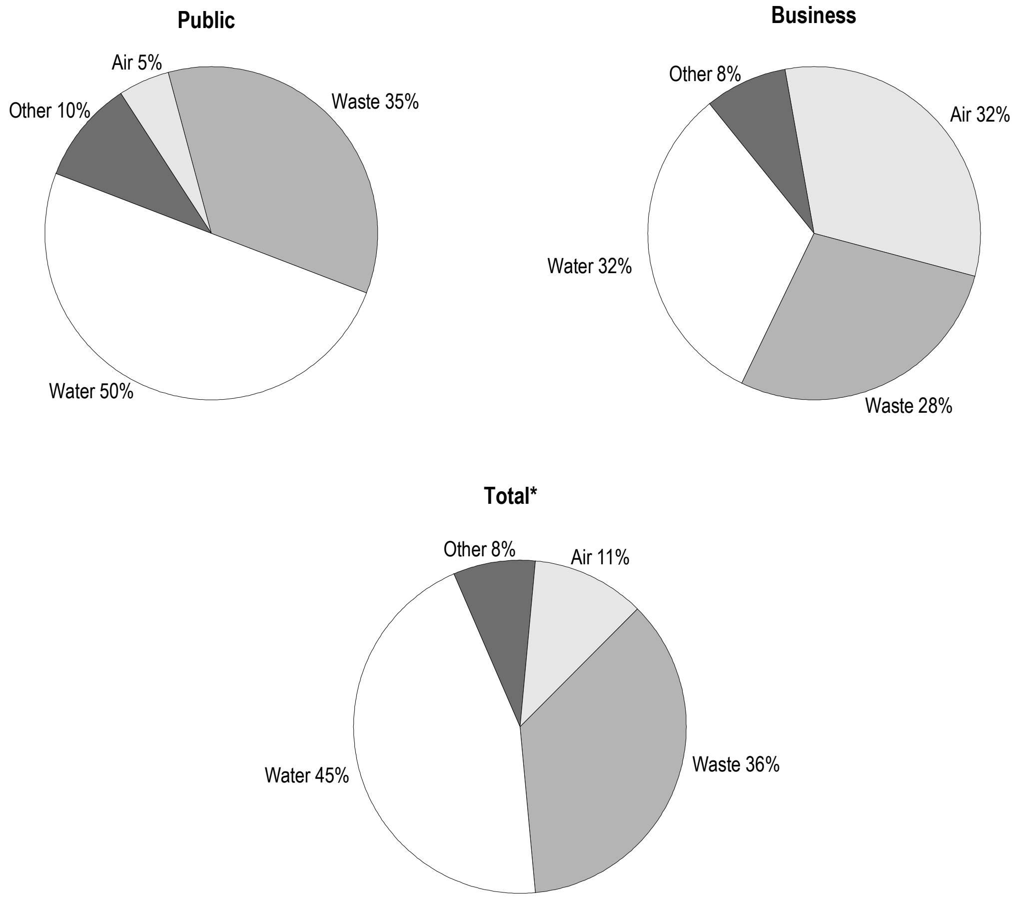
- *levels of pollution abatement and control (PAC) expenditure as a general indication of how much a country spends on controlling and reducing pressures from pollution. This expenditure is disaggregated by medium (air, water, waste) and by the sector undertaking the measures (public sector, businesses). Activities such as nature protection, natural resource preservation and water supply are excluded, as is expenditure on workplace protection, energy saving or improvement of production processes for commercial or technical reasons, though these may have environmental benefits.*
- *levels of official development assistance (ODA), as part of ODA supports sustainable development and, in particular, environmental protection.*

EXPENDITURE: REFERENCES

- 🕮 OECD (2003), Pollution abatement and control expenditure in OECD countries
- 🕮 OECD (2004), OECD Environmental Data — Compendium 2004

POLLUTION ABATEMENT AND CONTROL EXPENDITURE 33

OECD PAC expenditure, early 2000s



** excluding households; based on data for 13 countries representing two third of the GDP of the OECD.*

33 POLLUTION ABATEMENT AND CONTROL EXPENDITURE

		PAC expenditure, early 2000s or latest available year							
		as % of GDP				in USD per capita			
		Public	Business	Private specialised producers	Total*	Public	Business	Private specialised producers	Total*
Canada	♦	0.6	0.5	..	1.1	173	144	..	316
Mexico	♦	0.2	..	..	..	19	..	..	..
Japan	♦	0.6	0.8	..	1.4	144	202	..	346
Korea	♦	0.8	0.7	..	1.5	133	111	..	244
Australia	♦	0.5	0.3	..	0.8	118	63	..	181
Austria	♦	1.3	0.5	0.6	2.4	358	131	157	646
Belgium	♦	0.7	0.3	0.4	1.5	192	89	109	390
Czech Republic	♦	0.3	0.3	0.6	1.2	50	50	91	192
Denmark	♦	1.4	..	0.9	..	386	..	264	..
Finland	♦	0.5	0.3	..	0.8	122	68	..	183
France	♦	1.0	0.3	0.4	1.7	282	94	109	484
Germany	♦	1.3	0.3	..	1.6	321	70	..	393
Greece	♦	0.5	..	..	..	76	..	..	..
Hungary	♦	0.5	0.3	0.6	1.4	55	32	63	150
Iceland	♦	0.3	..	..	..	93	..	..	..
Ireland	♦	0.4	0.2	..	0.6	102	52	..	153
Italy	♦	0.7	0.1	..	0.8	182	24	..	175
Luxembourg	♦	0.6	..	..	..	219	..	..	..
Netherlands	♦	1.1	0.5	0.4	2.0	268	127	89	484
Norway	♦	0.3	..	..	..	101	..	..	..
Poland	♦	0.8	1.2	-	2.0	78	120	1	199
Portugal	♦	0.5	0.3	..	0.8	90	48	..	138
Slovak Republic	♦	0.1	0.7	-	0.8	15	70	5	89
Spain	♦	0.6	0.2	..	0.8	118	37	..	155
Sweden	♦	0.7	0.4	..	1.1	192	107	..	300
Switzerland	♦	0.8	..	..	..	234	..	..	..
Turkey	♦	0.9	0.2	..	1.1	55	13	..	68
United Kingdom	♦	0.4	0.3	..	0.7	110	65	..	175

**excluding households.*

♦ *See Technical Annex for data sources, notes and comments.*

STATE AND TRENDS SUMMARY

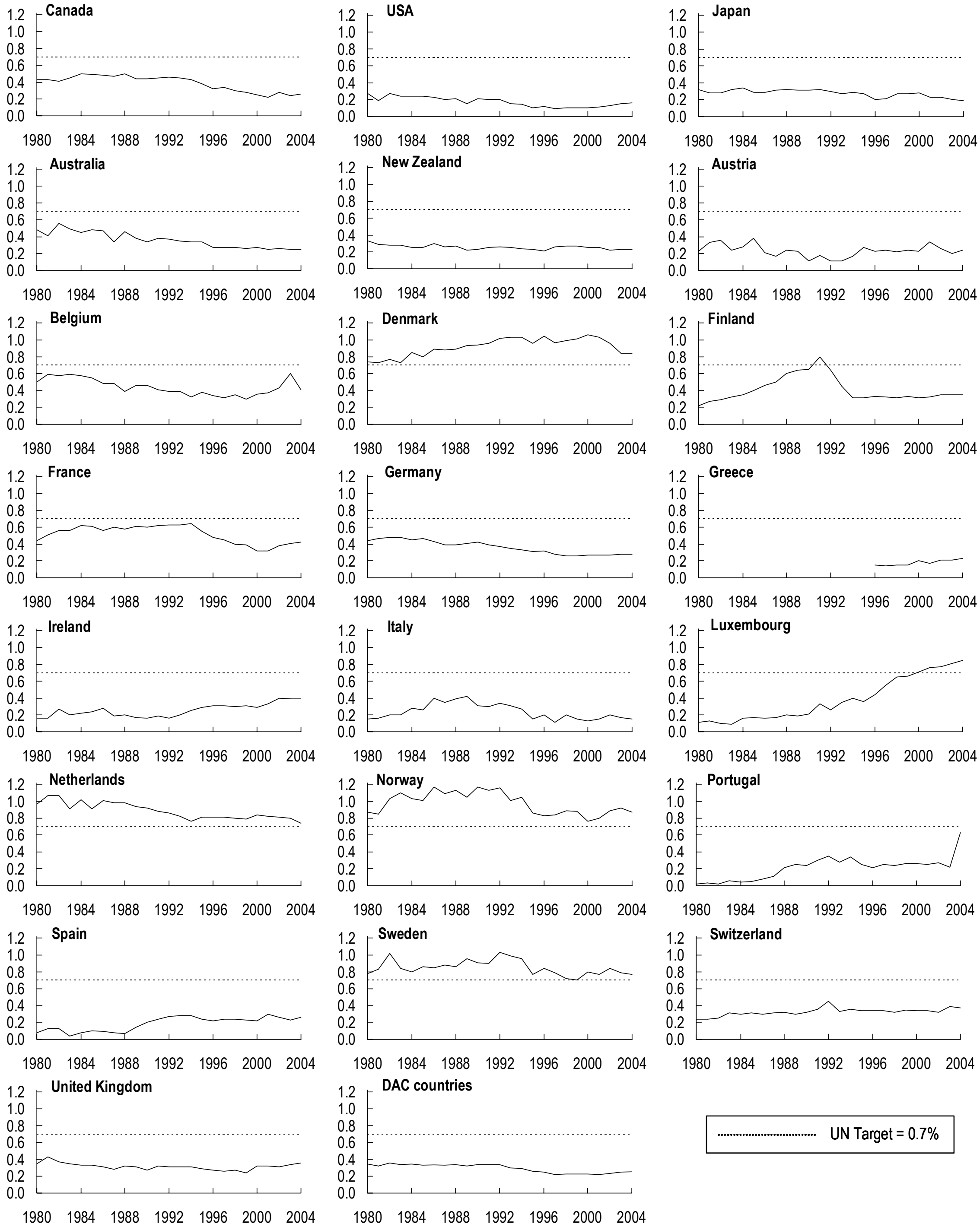
PAC expenditure is part of environmental protection expenditure, covering curative and preventive measures directly aimed at pollution abatement and control. PAC expenditure as a percentage of GDP is slowly growing as stronger pollution prevention and control polices are implemented. It now generally amounts to 1 to 2 per cent of GDP in most OECD countries. In general, the investment-related share of PAC decreases as investment programmes progress, while operating expenses' share grows. In countries with small GDP, a low level of expenditure in GDP terms means PAC is very limited.

Public sector PAC measures mainly concern sewerage, waste water treatment and the collection and disposal of municipal waste. Such measures, either done directly or by the purchase of services from public specialised producers, generally represent 0.3 to 1.4 per cent of GDP. Public expenditure on water is usually large, and growing in line with efforts to ensure that most of the population is connected to sewerage and public waste water treatment. Public expenditure is generally financed by pollution taxes or charges paid by households, but most countries still fund PAC partly from the general budget.

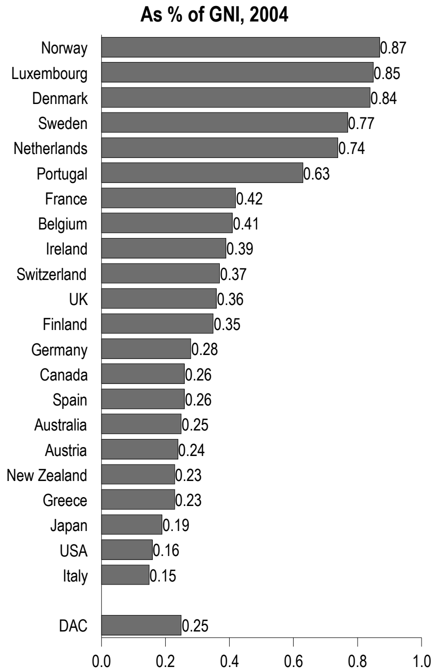
Private sector (business) measures mostly relate to air and water pollution and hazardous waste disposal. They generally amount to 0.2 to 1.2 per cent of GDP. They mainly represent compliance with the polluter pays principle. Business also pays pollution charges to public authorities, either to offset costs of services or in relation to externalities.

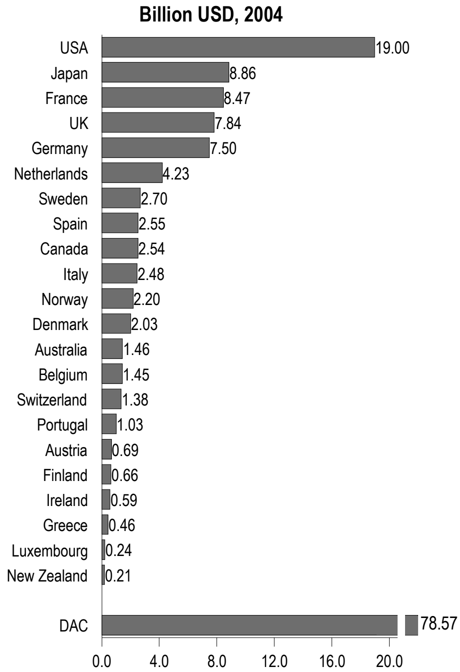
OFFICIAL DEVELOPMENT ASSISTANCE 34

Trends in Official Development Assistance, 1980-2004
as % of GNI



34 OFFICIAL DEVELOPMENT ASSISTANCE





	GNI per capita 1 000 USD/cap.	Official development assistance (ODA)			
		Total, 2004 million USD	as a share of GNI		
			% , 2004	absolute change since 1980	absolute change since 1992
Canada	30.6	2537	0.26	-0.17	-0.2
USA	40.0	18999	0.16	-0.11	-0.04
Japan	37.3	8859	0.19	-0.13	-0.11
Australia	29.6	1465	0.25	-0.23	-0.12
New Zealand	22.7	210	0.23	-0.10	-0.03
Austria	35.5	691	0.24	0.01	0.13
Belgium	34.3	1452	0.41	-0.09	0.02
Denmark	44.6	2025	0.84	0.10	-0.18
Finland	35.4	655	0.35	0.13	-0.29
France	33.6	8475	0.42	-0.02	-0.21
Germany	32.7	7497	0.28	-0.16	-0.09
Greece	18.5	464	0.23	..	..
Ireland	36.9	586	0.39	0.23	0.23
Italy	28.7	2484	0.15	0.00	-0.19
Luxembourg	62.0	241	0.85	0.74	0.59
Netherlands	35.2	4235	0.74	-0.23	-0.12
Norway	54.8	2200	0.87	0.00	-0.29
Portugal	15.7	1028	0.63	0.61	0.28
Spain	23.0	2547	0.26	0.18	-0.01
Sweden	38.9	2704	0.77	-0.01	-0.26
Switzerland	51.0	1379	0.37	0.13	-0.08
UK	35.7	7836	0.36	0.01	0.05
DAC	35.3	78568	0.25	-0.09	-0.08

STATE AND TRENDS SUMMARY

ODA is provided to support socio-economic development of less developed countries. A large fraction of ODA aims at ensuring more sustainable development and, in particular, conserving natural resources and protecting the environment. ODA increased in the latest years but commitments made at UNCED (Rio de Janeiro, 1992) are still a challenge. There is no direct relation between assistance and donor wealth; the level of discrepancy is a factor of six. Most countries' aid to developing countries amounts to 0.2 to 0.4 per cent of GNI. Special funding via the Global Environment Facility is directed at global environmental problems. Total aid for environmental protection is relatively small.

IV. OECD FRAMEWORK FOR ENVIRONMENTAL INDICATORS

INSETS:

OECD FRAMEWORK FOR ENVIRONMENTAL INDICATORS

The OECD work on environmental indicators recognises that there is no universal set of indicators; rather, several sets exist, corresponding to specific purposes. Indicators can be used at international and national levels in state of the environment reporting, measurement of environmental performance and reporting on progress towards sustainable development. They can further be used at national level in planning, clarifying policy objectives and setting priorities.

The OECD work focuses principally on indicators to be used in national, international and global decision making, yet the approach may also be used to develop indicators at sub-national or ecosystem level. Results of this work have in turn influenced similar activities by a number of countries and international organisations with which continued co-operation takes place.

APPROACH AND RESULTS

In developing harmonised international environmental indicators, OECD countries adopted a pragmatic approach, which led in particular to:

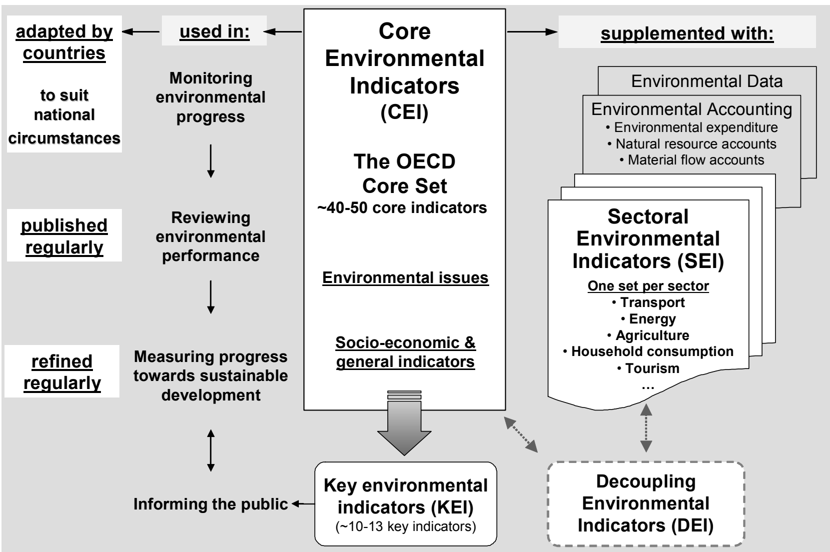
- agreement on a common conceptual framework, based on a common understanding of concepts and definitions and on the pressure-state-response (PSR) model (Inset 1, Inset 3);
- identification of criteria to help in selecting indicators and validating their choice: all indicators are reviewed according to their policy relevance, analytical soundness and measurability (Inset 2);
- identification and definition of indicators (including an assessment of their measurability);
- provision of guidance for the use of indicators (stressing that indicators are only one tool and have to be interpreted in context).

SEVERAL TYPES OF INDICATORS

The OECD work[1] includes several types of indicators, each corresponding to a specific purpose:

- Core Environmental Indicators (CEI) from the OECD Core Set, to keep track of environmental progress and performance.
- Key Environmental Indicators (KEI), a sub-set of core indicators, to inform the public.
- Several sets of Sectoral Environmental Indicators (SEI), to promote integration of environmental concerns into sectoral policy making: transport-environment indicators, energy-environment indicators, agri-environmental indicators[2].
- Decoupling Environmental Indicators (DEI) to monitor progress towards sustainable development.

Indicators are also derived from environmental accounting, to promote both integration of environmental concerns into economic policies and sustainable use and management of natural resources.



These indicator sets are closely related to each other, the OECD Core Set being a synthesis and representing a common minimum set.

Core sectoral indicators are part of the Core Set, as are core indicators derived from resource accounting.

1. *Work led by the OECD Working Group on Environmental Information and Outlooks.*
2. *Work led by the Joint Working Party on Agriculture and the Environment.*

Inset 1 **Definitions and functions of environmental indicators**

The terminology adopted by OECD countries points to two major functions of indicators:

- they reduce the number of measurements and parameters that normally would be required to give an "exact" presentation of a situation;
- they simplify the communication process by which the results of measurement are provided to the user.

TERMINOLOGY

- Indicator**:** A parameter, or a value derived from parameters, which points to, provides information about, describes the state of a phenomenon/environment/area, with a significance extending beyond that directly associated with a parameter value.
- Index**:** A set of aggregated or weighted parameters or indicators.
- Parameter**:** A property that is measured or observed.

Source: OECD 1993

Inset 2 **Criteria for selecting environmental indicators**

As indicators are used for various purposes, it is necessary to define general criteria for selecting indicators. Three basic criteria are used in OECD work: policy relevance and utility for users, analytical soundness, and measurability.*

POLICY RELEVANCE AND UTILITY FOR USERS

An environmental indicator should:

- provide a representative picture of environmental conditions, pressures on the environment or society's responses;
- be simple, easy to interpret and able to show trends over time;
- be responsive to changes in the environment and related human activities;
- provide a basis for international comparisons;
- be either national in scope or applicable to regional environmental issues of national significance;
- have a threshold or reference value against which to compare it, so that users can assess the significance of the values associated with it.

ANALYTICAL SOUNDNESS

An environmental indicator should:

- be theoretically well founded in technical and scientific terms;
- be based on international standards and international consensus about its validity;
- lend itself to being linked to economic models, forecasting and information systems.

MEASURABILITY

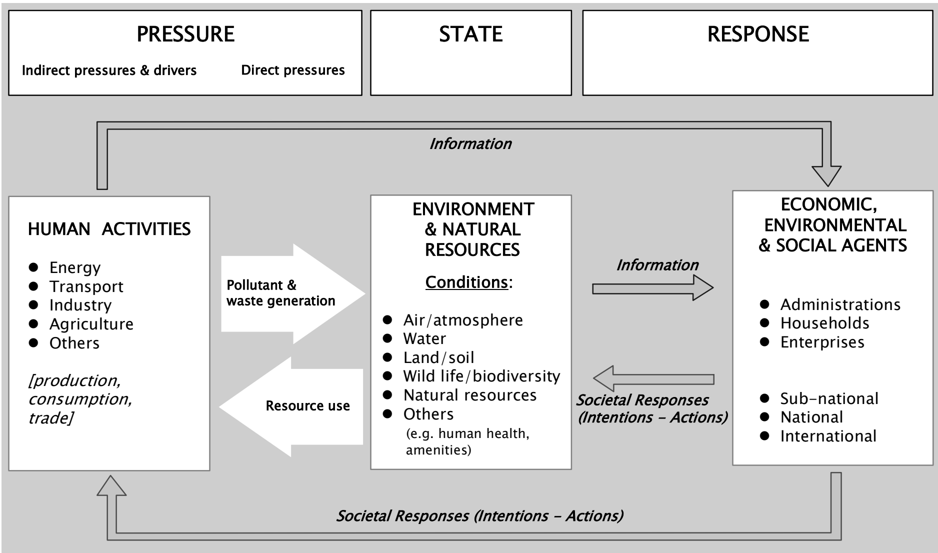
The data required to support the indicator should be:

- readily available or made available at a reasonable cost/benefit ratio;
- adequately documented and of known quality;
- updated at regular intervals in accordance with reliable procedures.

**These criteria describe the "ideal" indicator; not all of them will be met in practice.*
Source: OECD 1993

Inset 3 **The Pressure - State - Response (PSR) Model**

The PSR model, initially developed by the OECD to structure its work on environmental policies and reporting, considers that: human activities exert pressures on the environment and affect its quality and the quantity of natural resources ("state"); society responds to these changes through environmental, general economic and sectoral policies and through changes in awareness and behaviour ("societal response"). The PSR model has the advantage of highlighting these links, and helping decision makers and the public see environmental and other issues as interconnected (although this should not obscure the view of more complex relationships in ecosystems, and in environment-economy and environment-social interactions).



- Indicators of environmental pressures describe pressures from human activities exerted on the environment, including natural resources. "Pressures" here cover underlying or indirect pressures (i.e. the activity itself and trends and patterns of environmental significance) as well as proximate or direct pressures (i.e. the use of resources and the discharge of pollutants and waste materials). Indicators of environmental pressures focus on direct pressures and are closely related to production and consumption patterns; they often reflect emission or resource use intensities, along with related trends and changes over a given period. They can be used to show progress in de-coupling economic activities from related environmental pressures, or in meeting national objectives and international commitments (e.g. emission reduction targets).
- Indicators of environmental conditions relate to the quality of the environment and the quality and quantity of natural resources. As such they reflect the ultimate objective of environmental policies. Indicators of environmental conditions are designed to give an overview of the situation (the state) concerning the environment and its development over time. Examples of indicators of environmental conditions are: concentration of pollutants in environmental media, exceedance of critical loads, population exposure to certain levels of pollution or degraded environmental quality and related effects on health, the status of wildlife and of natural resource stocks. In practice, measuring environmental conditions can be difficult or very costly. Therefore, environmental pressures are often measured instead as a substitute.
- Indicators of societal responses show the extent to which society responds to environmental concerns. They refer to individual and collective actions and reactions, intended to:
  - mitigate, adapt to or prevent human-induced negative effects on the environment;
  - halt or reverse environmental damage already inflicted;
  - preserve and conserve nature and natural resources.

  Examples of indicators of societal responses are environmental expenditure, environment-related taxes and subsidies, price structures, market shares of environmentally friendly goods and services, pollution abatement rates, waste recycling rates, enforcement and compliance activities. In practice, indicators mostly relate to abatement and control measures; those showing preventive and integrative measures and actions are more difficult to obtain.

Depending on the purpose for which the PSR model is to be used, it can easily be adjusted to account for greater details or specific features. Examples of adjusted versions are the Driving force - State - Response (DSR) model formerly used by the UNCSD in its work on sustainable development indicators, the framework used for OECD sectoral indicators and the Driving force-Pressure-State-Impact-Response (DPSIR) model used by the European Environment Agency.

CORE ENVIRONMENTAL INDICATORS (CEI): THE OECD CORE SET

PURPOSE AND CHARACTERISTICS

The OECD Core Set of environmental indicators is a commonly agreed upon minimum set of indicators for OECD countries and for international use, published regularly. It is a first step in tracking environmental progress and the factors involved in it, and it is a major tool for measuring environmental performance. Characteristics of the Core Set are that:

- it is of limited size (around 50 core indicators);
- it covers a broad range of environmental issues;
- it reflects an approach common to a majority of OECD countries and provides a base of comparable information that is useful to respond to common policy goals and to which countries can add to suit their circumstances.

FRAMEWORK

The conceptual framework adopted for the Core set comprises several dimensions.

❶ First, it uses the Pressure-State-Response model which provides a first classification of indicators into indicators of environmental pressures, both direct and indirect, indicators of environmental conditions and indicators of societal responses (Inset 3).

❷ Second, it distinguishes a number of environmental issues which reflect major environmental preoccupations and challenges in OECD countries. For each issue, indicators of environmental pressure, conditions and societal responses were defined (Inset 4).

Inset 4 **Structure of the OECD Core indicators by environmental issue**

Major issues	PRESSURE **Indicators of environmental pressures**	STATE **Indicators of environmental conditions**	RESPONSE **Indicators of societal responses**
1. Climate change **2. Ozone layer depletion** **3. Eutrophication** **4. Acidification** **5. Toxic contamination** **6. Urban environmental quality** **7. Biodiversity** **8. Cultural landscapes** **9. Waste**			
10. Water resources **11. Forest resources** **12. Fish resources** **13. Soil degradation** **14. Material resources** (under development)			
15. Socio-economic, sectoral and general indicators			

The first nine issues relate to the use of the environment's "sink capacity", dealing with issues of environmental quality, whereas the other issues relate to the environment's "resource function", dealing with the quantity aspect of natural resources. For indicators not directly associated with a specific environmental issue, an additional category has been added. It relates to socio-economic background variables and driving forces; selected sectoral trends and patterns of environmental significance, or factors such as economy-wide environmental expenditure and public opinion. This category provides an opportunity to integrate indicators from sectoral sets into the OECD Core Set. These issues depend on changing and sometimes conflicting perceptions; hence the list is not final nor exhaustive.

❸ Third, core indicators can be disaggregated at sectoral level. Data availability permitting, this is one tool for analysing environmental pressures exerted by different economic sectors and distinguishing government responses from those of the business sector or private households. Indicators at the sectoral level are useful in reviewing the integration of environmental and sectoral policies and monitoring resource use and emission intensities in the various economic sectors. They also facilitate the link with economic information.

KEY ENVIRONMENTAL INDICATORS (KEI)

PURPOSE AND CHARACTERISTICS

To respond to the increasing interest by Member countries in a reduced number of indicators selected from existing larger sets to capture key trends and draw public attention to key issues of common concern, a small set of key environmental indicators has been selected from the OECD Core Set. In May 2001, this set has been endorsed by environment ministers of OECD countries for systematic use in the OECD's communication and policy work.

These key indicators have been very useful in charting environmental progress and their selection has benefited from experience gained in using environmental indicators in the OECD's country environmental performance reviews.

Like other indicator lists, the list of key indicators is neither final, nor exhaustive; it has to be seen together with other indicators from the OECD Core Set, and will evolve as knowledge and data availability improve. Ultimately, the set is expected to also include key indicators for issues such as toxic contamination, land and soil resources, and urban environmental quality.

FRAMEWORK AND STRUCTURE

Key environmental indicators are classified according to the PSR model with a focus on pollution and natural resource issues and on environmental pressures and conditions.

Inset 5. **Key environmental indicators**

OECD CORE SET OF ENVIRONMENTAL INDICATORS

Climate change	Pressures	♦ Index of greenhouse gas emissions**
		♦ CO2 emissions
		♦ CH4, N2O, CFC emissions
	Conditions	♦ Atmospheric concentrations of GHG**; Global mean temperature**
	Responses	♦ Energy efficiency**
		♦ Energy intensity
		♦ Economic and fiscal instruments (prices and taxes, expenditures)
Ozone layer depletion	Pressures	♦ Index of apparent consumption of ozone depleting substances (ODP)**
		♦ Apparent consumption of CFCs/ and halons
	Conditions	♦ Atmospheric concentrations of ODP**; Ground level UV-B radiation**
		♦ Stratospheric ozone levels
	Responses	♦ CFC recovery rate**
Eutrophication	Pressures	♦ Emissions of N and P in water and soil → Nutrient balance**
		♦ N and P from fertilizer use and from livestock
	Conditions	♦ BOD/DO, concentration of N & P in inland waters**, in marine waters**
	Responses	♦ Population connected to biological and/or chemical sewage treatment plants**
		♦ Population connected to sewage treatment plants
		♦ User charges for waste water treatment
		♦ Market share of phosphate-free detergents
Acidification	Pressures	♦ Index of acidifying substances**
		♦ Emissions of NOx and SOx
	Conditions	♦ Exceedance of critical loads of pH in water & soil**
		♦ Concentrations in acid precipitation
	Responses	♦ % of car fleet equipped with catalytic converters**
		♦ Capacity of SOx and NOx abatement equipment of stationary sources**
Toxic contamination	Pressures	♦ Emissions of heavy metals**; of organic compounds**
		♦ Consumption of pesticides
	Conditions	♦ Concentr. of heavy metals & org. compounds in environmental media & in living species**
		♦ Concentration of heavy metals in rivers
	Responses	♦ Changes of toxic contents in products and production processes**
		♦ Market share of unleaded petrol
Urban environmental quality	Pressures	♦ Urban air emissions (SOx, NOx, VOC)**
		♦ Urban traffic density (or national); Urban car ownership (or national)
		♦ Degree of urbanisation (urban population growth rates, urban land)
	Conditions	♦ Population exposure to air pollution, to noise**
		♦ Concentrations of air pollutants
		♦ Ambient water conditions in urban areas**
	Responses	♦ Green space** (Areas protected from urban development)
		♦ Economic, fiscal and regulatory instruments**
		♦ Water treatment and noise abatement expenditure
Biodiversity	Pressures	♦ Habitat alteration and land conversion from natural state**
	Conditions	♦ Threatened or extinct species as a share of total species known**
		♦ Area of key ecosystems**
	Responses	♦ Protected areas as % of national territory, and by type of ecosystem**
		♦ Protected species
Cultural landscapes		Indicators to be further developed
Waste	Pressures	♦ Generation of waste** (municipal, industrial, hazardous, nuclear)
		♦ Movements of hazardous waste
	Responses	♦ Waste minimisation** (to be further developed)
		♦ Recycling rates
		♦ Economic and fiscal instruments, expenditures
Water resources	Pressures	♦ Intensity of use of water resources**
	Conditions	♦ Frequency, duration and extent of water shortages**
	Responses	♦ Water prices and user charges for sewage treatment**
Forest resources	Pressures	♦ Intensity of forest resource use**
	Conditions	♦ Area, volume and structure of forests**
	Responses	♦ Forest area management and protection**
Fish resources	Pressures	♦ Fish catches**
	Conditions	♦ Size of spawning stocks**
	Responses	♦ Fishing quotas**
Soil degradation (desertification & erosion)	Pressures	♦ Erosion risks: potential and actual use of land for agriculture**
		♦ Change in land use
	Conditions	♦ Degree of top soil losses**
	Responses	♦ Rehabilitated areas**
Material resources (new issue)	Pressures	♦ Intensity of use of material resources Indicators to be further developed on the basis of MFA

OECD SET OF KEY ENVIRONMENTAL INDICATORS

POLLUTION ISSUES		Available indicators*	Medium term indicators**
Climate change	1.	CO2 emission intensities	Index of greenhouse gas emissions
Ozone layer	2.	Indices of apparent consumption of ozone depleting substances (ODS)	Same, plus aggregation into one index of apparent consumption of ODS
Air quality	3.	SOx and NOx emission intensities	Population exposure to air pollution
Waste generation	4.	Municipal waste generation intensities	Total waste generation intensities, Indicators derived from material flow
Freshwater quality	5.	Waste water treatment connection rates	Pollution loads to water bodies
NATURAL RESOURCES & ASSETS			
Freshwater resources	6.	Intensity of use of water resources	Same plus sub-national breakdown
Forest resources	7.	Intensity of use of forest resources	Same
Fish resources	8.	Intensity of use of fish resources	Same plus closer link to available resources
Energy resources	9.	Intensity of energy use	Energy efficiency index
Biodiversity	10.	Threatened species	Species and habitat or ecosystem diversity Area of key ecosystems

** indicators for which data are available for a majority of OECD countries and that are presented in this report*

*** indicators that require further specification and development (availability of basic data sets, underlying concepts and definitions).*

SECTORAL ENVIRONMENTAL INDICATORS (SEI)

PURPOSE AND CHARACTERISTICS

The OECD has been developing sets of sectoral indicators to better integrate environmental concerns into sectoral policies. The objective is to develop a “tool kit” for sectoral decision makers, which should facilitate the integration of environmental concerns in sectoral policy formulation and implementation. While limited to a specific sector and its interactions with the environment, these indicators are typically developed in larger numbers than the Core Set.

Sectoral indicator sets are not restricted to "environmental indicators" *per se* but also concern linkages between the environment and the economy, placed in a context of sustainable development. They may include environmental indicators (e.g. pollutant emissions), economic indicators (e.g. sectoral output, prices and taxes, subsidies) and selected social indicators.

FRAMEWORK

The conceptual framework adopted for sectoral indicators is derived from the PSR model, but was adjusted to account for the specificities of the respective sectors. As defined by OECD countries, sectoral indicators have been organised along a framework that distinguishes:

- ♦ indicators to reflect sectoral trends and patterns of environmental significance (i.e. indirect pressures and/or related driving forces);
- ♦ indicators to reflect interactions between the sector and the environment, including positive and negative effects of sectoral activity on the environment (i.e. direct pressures, such as pollutant releases and resource use, and related effects and resulting environmental conditions, such as ambient concentrations of pollutants and population exposure), as well as effects of environmental changes on sectoral activity;
- ♦ indicators to reflect economic linkages between the sector and the environment, as well as policy considerations. This category includes environmental damage and environmental expenditure, economic and fiscal instruments, and trade issues.

Inset 6 **Framework of OECD sets of sectoral indicators**

Sectoral trends and patterns of environmental significance	**Interactions with the environment**	**Economic and policy aspects**
Indirect pressures and driving forces	Sector related: • Resource use • Pollutant & waste generation • Risk and safety issues • Related effects and resulting environmental conditions • Selected direct responses	Sector related: • Environmental damage • Environmental expenditure • Taxation and subsidies • Price structures • Trade aspects • Regulatory and social instruments

This framework, derived from the PSR model, is applied by the OECD to the transport and energy sectors, and to structure work on sustainable consumption indicators. A set of sectoral indicators is also being developed for the agricultural sector and for the tourism sector[3].

3. *OECD (various years), OECD Series on Environmental Indicators: Indicators for the Integration of Environmental Concerns into Transport Policies*
OECD (1993), OECD Series on Environmental Indicators: Indicators for the Integration of Environmental Concerns into Energy Policies
OECD (1997, 2001, 2006 forthcoming), Environmental Indicators for Agriculture
OECD (1999), OECD Series on Environmental Indicators: Towards more sustainable Household Consumption Patterns – Indicators to measure progress

INDICATORS DERIVED FROM ENVIRONMENTAL ACCOUNTING

Environmental indicators are also derived from the broader area of environmental accounting, in both physical and monetary terms[4]. The OECD work focuses on physical natural resource accounts as a tool for sustainable management of natural resources, on material flow accounts as a tool for monitoring the efficiency and productivity of material resource use, as well as on expenditure for pollution abatement and control and other environmental measures. Work is also done on the use of accounting frameworks as a tool for sustainable development statistics. In addition, the OECD participates in international work on environmental accounting and acts as a forum for exchanges of experiences in this field.

Inset 7 **Environmental accounting: definitions and concepts**

Environmental accounting[5] can be defined as the systematic description of interactions between the environment and the economy by means of an accounting framework. There is no unique model for environmental accounting; approaches vary according to purpose.

Approach	**Environmental categories taken into account**	**Characteristics**
Adjustment of national economic accounts	Valuation of: ♦ Environmental damages ♦ Environmental services ♦ Stock of natural capital	Modifies SNA framework and boundaries
Satellite accounts	Valuation of: ♦ Environmental damages ♦ Environmental services ♦ Stock of natural capital ♦ Environmental expenditure + Corresponding physical flows and stocks	Complements SNA without modifying it General coherence with SNA
Natural resource and environment accounts	♦ Physical flows and stocks of natural resources ♦ Physical and monetary flows associated with anthropogenic exploitation of natural resources	Independent from and complementary to SNA

INDICATORS DERIVED FROM NATURAL RESOURCE ACCOUNTS

To progress towards a common methodology, the OECD reviewed different approaches of OECD Member countries in the field of natural resource accounting (NRA). This work resulted in the establishment of OECD pilot accounts on forests and water. The basic methodology used in the pilot accounts is simple and provides a guide to countries that are developing natural resource accounts. The format was set up to provide a tool for decision makers.

The pilot accounts propose physical input-output tables tracing the production, transformation and use of each resource throughout the economy. This provides an analytical tool with which to assess the impact of sectoral economic activity on the resource. Basic flow relations from these accounts form the input for calculating indicators of sustainable use of natural resource quantities. Examples of such indicators are: intensity of use of forest resources and intensity of use of water resources. Current work focuses on indicators derived from material flow accounts.

INDICATORS DERIVED FROM ENVIRONMENTAL EXPENDITURE ACCOUNTS

The OECD has pursued work on pollution abatement and control (PAC) and other environmental protection expenditure for a number of years. Recent work is done jointly with Eurostat. The data thus developed are published regularly and supplement economic information from national accounts. Indicators derived from this work reflect the level of PAC expenditure compared with GDP, as well as the structure of such expenditure per environmental domain and per source sector.

4 🕮 *OECD (2003),Special Session on Material Flow Accounting –Papers and Presentations*
🕮 *OECD (1996), Environmental Accounting for Decision Making - Summary Report of an OECD Seminar*
🕮 *OECD (1996), Natural Resource Accounts - Taking Stock in OECD Countries*
🕮 *OECD (various years), Pollution Abatement and Control Expenditure in OECD Countries*

5 🕮 *United Nations, European Commission, International Monetary Fund, OECD, World Bank (2003),.Handbook of National Accounting - Integrated Environmental and Economic Accounting 2003*

DECOUPLING ENVIRONMENTAL INDICATORS (DEI)

PURPOSE AND CHARACTERISTICS

Decoupling indicators measure the decoupling of environmental pressure from economic growth over a given period. In conjunction with other indicators used in OECD policy analysis and country reviews, they are valuable tools for determining whether countries are on track towards sustainable development. They further support the evaluation of environmental performance and monitor the implementation of the OECD Environmental Strategy for the first decade of the 21st century. [Inset 8]

Many of the variables that feature in decoupling indicators also appear in the concepts of resource efficiency, resource intensity, and resource productivity. For example, resource efficiency and resource intensity are calculated as ratios of resource use to economic value-added, while resource productivity is the inverse ratio. Decoupling is usually conceived as an elasticity focusing on changes in volumes, whereas efficiency and intensity are more concerned with the actual values of these ratios. Which usage is chosen depends on the context and, often, on the audience being addressed.

Most DEIs are derived from other indicator sets, mainly sectoral and core environmental indicators, and from environmental accounts, and further broken down to reflect underlying drivers and structural changes. Work so far has sought to establish an analytical basis to facilitate consensus by Member countries on a list of indicators to be used in OECD peer reviews. It has also identified gaps in the statistical and scientific data needing to be filled[6].

FRAMEWORK AND STRUCTURE

The approach used to develop decoupling indicators is seen as a complement to other analytical frameworks. It builds on selected components of the PSR model, with focus on pressures, both direct and indirect, and on pollution and resource issues. Decoupling indicators describe the relationship between the two components of the pressure part of the PSR model, i.e. a change in direct or proximate environmental pressure (emissions, discharges, resource use) as compared to the change in driving force (indirect or underlying pressure) over the same period.

Two major groups of decoupling indicators covering various environmental issues have been explored:

- macro-level decoupling indicators that relate to the decoupling of environmental pressures from total economic activity with a focus on climate change, air pollution, water quality, waste disposal, material and natural resource use;
- sector specific decoupling indicators that focus on production and use in specific sectors: such as energy, transport, agriculture and manufacturing.

Inset 8. **The concept of decoupling**

The term decoupling refers to breaking the link between "*environmental bads*" and "*economic goods*." It refers to the relative growth rates of a direct pressure on the environment and of an economically relevant variable to which it is causally linked. Decoupling occurs when the growth rate of the environmental pressure (EP) is less than that of its economic driving force (DF) over a given period. One distinguishes between *absolute and relative decoupling*. Decoupling is said to be absolute when the environmental variable is stable or decreasing while the economic variable is growing. Decoupling is said to be relative when environmental variable is increasing, but at a lower rate than the economic variable.

The decoupling concept has however *no automatic link* to the environment's capacity to sustain, absorb or resist pressures of various kinds (deposition, discharges, harvests). A meaningful *interpretation* of the relationship of EP to economic DF will require additional information. Also, the relationship between economic DF and EP, more often than not, is *complex*. Most DF have multiple environmental effects, and most EP are generated by multiple DF, which, in turn, are affected by societal responses. Changes in decoupling may thus be *decomposed* in a number of intermediate steps. These may include changes in the scale of the economy, in consumption patterns, and in economic structure — including the extent to which demand is satisfied by domestic production or by imports. Other mechanisms in the causal chain include the adoption of cleaner technology, the use of higher-quality inputs, and the post-facto clean-up of pollution and treatment of waste.

6 📖 *OECD (2002, 2005) Indicators to measure decoupling of environmental pressure from economic growth.*

USING ENVIRONMENTAL INDICATORS

GUIDING PRINCIPLES

When using environmental indicators in analytical and evaluation work, the OECD applies the following principles:

ONLY ONE TOOL

Indicators are not designed to provide a full picture of environmental issues, but rather to help reveal trends and draw attention to phenomena or changes that require further analyses and possible action. Indicators are thus only one tool for evaluation; scientific and policy-oriented interpretation is required for them to acquire their full meaning. They need to be supplemented by other qualitative and scientific information, particularly in explaining driving forces behind indicator changes which form the basis for an assessment.

THE APPROPRIATE CONTEXT

Indicators' relevance varies by country and by context. They must be reported and interpreted in the appropriate context, taking into account countries' different ecological, geographical, social, economic and institutional features.

INTERCOUNTRY COMPARISON AND STANDARDISATION

OECD focuses on indicators for use in international work. This implies not only nationally aggregated indicators, but also an appropriate level of comparability or coherence among countries. Despite a number of achievements in this area, further work is needed on internationally harmonised definitions and concepts.

There is no single method of standardisation for the comparison of environmental indicators across countries. The outcome of the assessment may depend on the chosen denominator (e.g. GDP, population, land area) as well as on national definitions and measurement methods. It is therefore appropriate for different denominators to be used in parallel to balance the message conveyed. In some cases absolute values may be the appropriate measure, for example when international commitments are linked to absolute values.

MEASURABILITY

Measurability issues such as the quality of underlying data are important in the use of environmental indicators, and must be taken into account to avoid misinterpretation. Measurability still varies greatly among individual indicators. Some indicators are immediately measurable, others need additional efforts before they can be published. For example, most indicators of societal responses have a shorter history than indicators of environmental pressures and many indicators of environmental conditions, and are still in development both conceptually and in terms of data availability.

TIMELINESS

An important criterion affecting the usefulness and relevance of an indicator is the timeliness of the underlying data. The interval between the period to which data refer and the date when data are released should be as short as is practicable. Current timeliness of environmental data remains insufficient and needs improvement as a matter of priority.

LEVEL OF AGGREGATION

Most OECD indicators focus on the national level and are designed to be used in an international context. Within a country a greater level of detail or breakdown may be needed, particularly when indicators are to support sub-national or sectoral decision making or when national indicators hide major regional differences. This is particularly important when dealing, for example, with river basin or ecosystem management. The actual measurement of indicators at these levels is encouraged and lies within the responsibility of individual countries. At these levels, however, measurability and comparability problems may be further exacerbated.

COHERENCE BETWEEN ENVIRONMENTAL AND ECONOMIC INFORMATION SYSTEMS

Coherence between environmental and economic information systems is essential to establish links between environmental and economic variables, to analyse environmental pressures exerted by different economic sectors and distinguish government responses from those of the business sector or private households. To date, breaking environmental indicators down at sectoral level remains difficult because of different definitions and classifications used. Further harmonisation work and closer links between accounting work and the development of indicators could help to overcome some of these difficulties.

INDICATORS AND PERFORMANCE ANALYSIS

Environmental indicators support and illustrate the analysis made in the OECD Country Environmental Performance Reviews (conducted since 1992) and provide all reviews with a common denominator. This creates a synergy in which regular feedback is provided on the indicators' policy relevance and analytical soundness. To date, the environmental performances of all OECD countries and some non members have been reviewed, and environmental information and indicators have been assembled for all OECD Member countries.

It is important to recognise, however, that indicators are not a mechanical measure of environmental performance. They need to be complemented with background information, data, analysis and interpretation. One should also note that some issues or topics do not lend themselves to evaluation by quantitative measures or indicators.

In the OECD environmental performance reviews, international indicators from the OECD sets (CEI, KEI, SEI) are used in combination with specific national indicators and data. These national indicators provide a more detailed picture of the country's situation through further sectoral and/or spatial breakdown (e.g. sub-national data) and often point at particular issues of concern. They are further complemented as appropriate by additional information (e.g. lists of laws and regulations, economic instruments, and conventions; organigrammes; maps). Whenever possible, both state and trend data are presented for the indicators.

Using environmental indicators in environmental performance reviews implies linking these indicators to the measurement and analysis of achievements, as well as to underlying driving forces and to the country's specific conditions. Three broad categories of indicators are distinguished:

Performance indicators linked to quantitative objectives (targets, commitments)

Examples of such indicators include e.g. air emission trends relating to national or international targets, urban air quality relating to national standards;

Performance indicators linked to qualitative objectives (aims, goals)

These indicators generally address the concept of performance in two ways:

- with respect to the eco-efficiency of human activities, linked to the notions of de-coupling, elasticities: e.g. emissions per unit of GDP, relative trends of waste generation and GDP growth; and
- with respect to the sustainability of natural resource use: e.g. intensity of the use of forest resources, intensity of the use of water resources.

Descriptive indicators

These indicators are not linked to explicit national objectives; they describe major conditions and trends and are close to the concept of "state of the environment" reporting: e.g. population connected to waste water treatment plants, river quality, share of threatened species.

V. TECHNICAL ANNEX

GENERAL INFORMATION

Country region codes used are as follows:

CAN:	Canada	FIN:	Finland	NOR:	Norway
MEX:	Mexico	FRA:	France	POL:	Poland
USA:	United States	DEU:	Germany	PRT:	Portugal
JPN:	Japan	GRC:	Greece	SVK:	Slovak Republic
KOR:	Korea	HUN:	Hungary	ESP:	Spain
AUS:	Australia	ISL:	Iceland	SWE:	Sweden
NZL:	New Zealand	IRL:	Ireland	CHE:	Switzerland
AUT:	Austria	ITA:	Italy	TUR:	Turkey
BEL:	Belgium	LUX:	Luxembourg	UKD:	United Kingdom
CZE:	Czech Republic	NLD:	Netherlands	DAC:	OECD Development Assistance Committee Member countries
DNK:	Denmark				

➢ Country aggregates

OECD: All OECD member countries, which include the OECD Europe — i.e. Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Poland, Portugal, Slovak Republic, Spain, Sweden, Switzerland, Turkey and United Kingdom — plus Canada, Mexico, the United States, Japan, Korea, Australia and New Zealand.

OECD* Partial OECD total.

➢ Signs

.. n.a.	not available	.	decimal point	%	percentage
-	nil or negligible	n. app.	not applicable	USD	US dollar

➢ Abbreviations

BOD	- biochemical oxygen demand	HCFC	- hydrochlorofluorocarbon	ODS	- ozone depleting substances
Cap	- capita	HM	- heavy metal	PAC	- pollution abatement & control
CFC	- chlorofluorocarbon	Inh	- inhabitant	PCB	- polychlorinated biphenyls
CO	- carbon monoxide	kcal	- kilocalorie	PFC	- private final consumption
CO_2	- carbon dioxide	l	- litre	Pop	- population
CH_4	- methane	Mtoe	- million tonnes of oil equivalent	ppb	- parts per billion
DAC	- Development Assistance Committee	N	- nitrogen	PPP	- purchasing power parities
GCV	- gross calorific value	N_2O	- nitrous oxide	ppt	- parts per trillion
GDP	- gross domestic product	NO_x	- nitrogen oxides	SO_x	- sulphur oxides
GNI	- gross national income	NMVOC	- non-methane volatile organic compounds	t	- tonne
GHG	- greenhouse gas	ODA	- official development assistance	veh-km	- vehicle-kilometre

➢ Units

cal	- calorie (1 cal = 4.1868 joules)	kWh	- kilowatt hour (1 kWh = 103 Wh = 0.8598 kcal)	m^3	- cubic metre (1 m^3 = 1.3079 cubic yards)
Dobson	- see Ozone Layer Depletion notes	litre	- (1 l = 1 dm^3 = 0.001 m^3)	Toe	- tonne of oil equivalent (1 Toe = 10^7 kcal = 41.868*10^9 joules)
g	- gram (1 g = 0.0353 ounces)	km	- kilometre (1 km = 1 000 m. = 0.6214 miles)	tonne	- metric ton (1 t. = 1 000 kg = 0.9842 long ton = 1.1023 short ton)
µg	- microgram (1 µg = 10^{-6} g)	km^2	- square kilometre (1 km^2 = 0.3861 square miles)		
mg	- milligram (1 mg = 10^{-3} g)				
ha	- hectare (1 ha = 0.01 km^2)				
kg	- kilogram (1 kg = 1 000 g = 2.2046 pounds)				

➢ Per capita values

All <u>per capita</u> information uses OECD and Food and Agriculture Organization (FAO) population data.

➢ Per unit of GDP values

All <u>per unit of GDP</u> information uses OECD GDP data at 2000 prices and purchasing power parties (PPPs). The use of PPPs appears preferable to the use of exchange rates in conjunction with environmental questions, as the objective of comparing measures of economic activity such as GDP is to reflect underlying volumes and physical processes as closely as possible.

PPPs are defined as the ratio between the amount of national currency and the amount of a reference currency needed to buy the same bundle of consumption goods in the two countries. In this publication, the reference currency is USD. Typically, PPPs differ from exchange rates as the latter reflect not only relative prices of consumer goods but also a host of other factors, including international capital movements, interest rate differentials and government intervention. As a consequence, exchange rates exhibit much greater variations over time than PPPs.

CLIMATE CHANGE

- A number of gases have direct effects on climate change and are considered responsible for a major part of global warming: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N2O), chlorofluorocarbons (CFCs), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexa fluoride (SF_6). Other air pollutants, such as NMVOC, NO_x and CO, have indirect effects on climate change as their reactions in the atmosphere result in the production of tropospheric ozone which effectively a GHG. Sulphur-containing trace gases also play a role. A major part of these emissions stems from combustion of fossil fuels and biomass. Other sources are industrial processes, agriculture and changes in land use.

CO_2 EMISSION INTENSITIES

Data sources: IEA-OECD

- Data refer to gross direct emissions; CO_2 removal by sinks, indirect emissions from land use changes and indirect effects through interactions in the atmosphere are not taken into account.
- Data refer to CO_2 emissions from fossil fuel combustion. Man-made emissions by other sources (industrial processes, biomass burning) are not included.
- Data are estimates based on the default methods and emission factors from the *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories* and on the IEA-OECD data for total primary energy supply.
- Oil and gas for non-energy purposes such as feedstocks in the chemical and petrochemical industries are excluded.
- Oil held in international marine and aviation bunkers is excluded at national level; world emissions include marine and aviation bunkers, amounting to 463 million tonnes and 354 million tonnes in 2002.
- Further details on calculation methods and conversion factors can be found in *IEA-OECD (2004), CO_2 Emissions from Fuel Combustion ,1971-2002*.
- For details on fuel supply and energy prices see Energy notes.
- Energy prices: % change refer to 1980-2002 period.

GREENHOUSE GAS EMISSIONS

Data sources: UNFCCC

- Status of the UNFCCC and the Kyoto Protocol: as of 27 May 2005.
- Data refer to the sum of all six "Kyoto gases" expressed in CO2 equivalents: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N2O), perfluorocarbons (PFCs); hydrofluorocarbons (HFCs), and sulphur hexa fluoride (SF6).
- Data do not directly relate to Kyoto targets; they refer to domestic emissions, i.e. emitted within the national territory, and exclude CO2 emissions and removals from land-use change and forestry. They do not account for international transactions of emission reduction units or certified emission reductions.
- Depending on the country commitment, the reference year may differ from 1990, e.g. base year is 1985-1987 for Hungary and 1988 for Poland.
- The individual country targets for developed countries (Annex I Parties) are listed in the Kyoto Protocol's Annex B. These add up to a total cut in greenhouse-gas emissions of at least 5% from 1990 levels in the commitment period 2008-2012.

OECD • OECD total is for Annex I countries, and therefore does not include Korea, Mexico and Turkey.

GREENHOUSE GAS CONCENTRATIONS

Data sources: Carbon Dioxide Information Analysis Center (CDIAC, http://cdiac.ornl.gov/)

- Although gas concentrations at any given time vary among monitoring sites, the data reported reflect global trends. CO_2 data refer to Mauna Loa, Hawaii (19°32′ N, 155°35′ W). Data for other gases are from values monitored at Cape Grim, Tasmania (45°41′ S, 144°41′ E) under the Atmospheric Lifetime Experiment (ALE) and Global Atmospheric Gases Experiment (GAGE).
- Total gaseous chlorine concentrations: calculated by multiplying the number of chlorine atoms in each of the chlorine-containing gases (carbon tetrachloride (CCl4), methyl chloroform (CH3CCl3), CFC-11 (CCl3F), CFC-12 (CCl2F2), CFC-22 (CHClF2), and CFC-113 (C2Cl3F3)) by the concentration of that gas.

OZONE LAYER DEPLETION

- Status of the Montreal Protocol: as of 24 May 2005.
- Ninety six (96) chemicals are presently controlled by the Montreal Protocol, including: halo carbons, notably chlorofluorocarbons (CFCs) and halons, carbon tetrachloride, methyl chloroform (1,1,1 trichloroethane), hydrobromofluorocarbons (HBFCs), hydrochlorofluorocarbons (HCFCs), methyl bromide (CH3Br) and bromochloromethane (BCM).
- The phase out schedules for developed countries are as follows: phase out Halons by 1994; phase out CFCs, carbon tetrachloride, methyl chloroform, and HBFCs by 1996; reduce methyl bromide by 25% by 1999, 50% by 2001, 70% by 2003, and phase out by 2005; reduce HCFCs by 35% by 2004, 65% by 2010, 90% by 2015, and 99.5% by 2020, with 0.5% permitted for maintenance purposes only until 2030; and phase out BCM immediately.

Atmospheric lifetimes, emissions and ODP of halogen source gases*

Halogen source gases	Lifetime (years)	2000 global emissions (1000 t/year)	Ozone Depletion Potential (ODP)
Chlorine			
CFC-12	100	130-160	1
CFC-113	85	10-25	1
CFC-11	45	70-110	1
Carbon tetrachloride	26	70-90	0.73
HCFCs	1-26	340-370	0.02-0.12
Methyl Chloroform	5	~20	0.12
Methyl chloride	1.3	3000-4000	0.02
Bromine			
Halon-1301	65	~3	12
Halon-1211	16	~10	6
Methyl bromide	0.7	160-200	0.38

**includes both human activities and natural sources.*

OZONE DEPLETING SUBSTANCES

Data sources: UNEP Ozone Secretariat, Montreal Protocol on Substances that Deplete the Ozone Layer (http://www.unep.org/ozone)

- Consumption: production plus imports minus exports of controlled substances.
- Production: production minus the amount destroyed minus the amount entirely used as feedstock in the manufacture of other chemicals.
- Negative values for calculated production imply that quantities destroyed or export for feedstock uses exceeded production for that year. Similarly, negative values for calculated consumption indicate

that exports for the year exceeded production and imports, implying that the exports come from stockpiles.

- Data are weighted with the ozone depleting potentials of the substances.
- CFCs: Annex A Group I substances (chlorofluorocarbons).
- Halons: Annex A Group II substances (halons).
- Other CFCs: Annex B Group I, II and III substances (other fully halogenated CFCs, carbon tetrachloride and methyl chloroform).
- HCFCs: Annex C Group I substances (hydrochlorofluorocarbons).
- Methyl bromide: Annex E.
- Total consumption and total production refer to CFCs, halons, other fully halogenated CFCs, carbon tetrachloride, methyl chloroform, HCFCs, HBFCs, bromochloromethane and methyl bromide.
- Regional totals include OECD Secretariat estimates; may not add up to the sum of individual countries due to internal OECD trade.
- Dotted lines (graphics) refer to data not available.

KOR • Data refer to 2002.
CHE • Data refer to 2002.
OECD • Excludes Mexico, Korea and Turkey (Article 5 countries).

STRATOSPHERIC OZONE

Data sources: Column ozone: WOUDC (World Ozone and Ultraviolet Radiation Data Center). Global ozone levels: Ozone Processing Team of NASA/Goddard Space Flight Center.

- Data refer to total column ozone (i.e. tropospheric plus stratospheric ozone) in Dobson units. Stratospheric ozone represents the majority of total column ozone, e.g. comprises on average about 90% of total column ozone in Canada. Dobson unit: measure used to estimate the thickness of the ozone layer. 100 Dobson units represent a quantity equivalent to a 1-mm-thick layer of ozone at 0 degrees Celsius and at a pressure of 1013 hectopascal (sea level).
- Ozone levels over selected cities: data presented are annual averages of daily values taken from the WOUDC database calculated by the OECD Secretariat.
- Global ozone levels: data are annual averages generated from daily ozone measurements. Ozone was measured by the Total Ozone Mapping Spectrometer (TOMS) on the Nimbus-7 (1979-1992), the Meteor-3 (1993-94) and the Earth Probe (1996-2002) satellites, referring to latitudes between 70° N and 70° S. At latitudes above 70°, ozone data are not collected during the winter months and there is increasing seasonal and interannual variability.

AIR QUALITY

SO_X AND NO_X EMISSIONS

Data sources: OECD Environmental Data Compendium 2004, UN-ECE EMEP, UNFCCC

- Man-made emissions only. SOx and NOx: given as quantities of SO_2 and NO_2 respectively.
- Excludes emissions from international transport (aviation, marine).
- Data may include provisional figures and Secretariat estimates.
- % change: change with respect to latest available year from 1990 on.

MEX • SO_x and NO_x: no data available.
USA • SO_x and NO_x: excludes emissions from fires (SO_x: 82280 tonnes in 2002, NO_x: 309510 tonnes in 2002).
AUS • NOx: excludes emissions from prescribed burning of savannas (1410330 tonnes in 2002).
NZL • NOx: excludes emissions from prescribed burning of savannas (10 tonnes in 2002).
CZE • SO_x and NOx: 2002 expert estimates from EMEP.
HUN • SO_x and NOx: 1990, 2002: expert estimates from EMEP.
LUX • SO_x and NOx: 2002: expert estimates from EMEP.
POL • SO_x and NOx: 1990, 2002: expert estimates from EMEP.
SVK • SO_x and NOx: 1990, 2002: expert estimates from EMEP.
TUR • SO_x : expert estimates from EMEP.
OECD • Secretariat estimates.

Emission ceilings relating to the provision of article 3, paragraphs 1 and 10 of the Gothenburg protocol (a)

	Sulphur emissions (1 000 tonnes of SO_2 per year)					Nitrogen oxide emissions (1 000 tonnes of NO_2 per year)			
Party	Levels 1980	Levels 1990	Ceilings for 2010	% reductions for 2010 (base year 1990)	Protocol Status (b)	Levels 1990	Ceilings for 2010	% reductions for 2010 (base year 1990)	Party
Canada national *	4643	3236	..	..	S	2104	..	..	Canada *
PEMA (SOMA)	3135	1873	..	..		..	..	..	
USA *	..	..	..	..	R	..	..	..	USA *
Austria	400	91	39	-57%	S	194	107	-45%	Austria
Belgium	828	372	106	-72%	S	339	181	-47%	Belgium
Czech Republic	2257	1876	283	-85%	R	742	286	-61%	Czech Republic
Denmark	450	182	55	-70%	R	282	127	-55%	Denmark
Finland	584	260	116	-55%	R	300	170	-43%	Finland
France	3208	1269	400	-68%	S	1882	860	-54%	France
Germany	7514	5313	550	-90%	R	2693	1081	-60%	Germany
Greece	400	509	546	7%	S	343	344	0%	Greece
Hungary	1633	1010	550	-46%	S	238	198	-17%	Hungary
Ireland	222	178	42	-76%	S	115	65	-43%	Ireland
Italy	3757	1651	500	-70%	S	1938	1000	-48%	Italy
Luxembourg	24	15	4	-73%	R	23	11	-52%	Luxembourg
Netherlands	490	202	50	-75%	R	580	266	-54%	Netherlands
Norway	137	53	22	-58%	R	218	156	-28%	Norway
Poland	4100	3210	1397	-56%	S	1280	879	-31%	Poland
Portugal	266	362	170	-53%	R	348	260	-25%	Portugal
Slovakia	780	543	110	-80%	R	225	130	-42%	Slovakia
Spain *	2959	2182	774	-65%	R	1113	847	-24%	Spain *
Sweden	491	119	67	-44%	R	338	148	-56%	Sweden
Switzerland	116	43	26	-40%	S	166	79	-52%	Switzerland
United Kingdom	4863	3731	625	-83%	S	2673	1181	-56%	United Kingdom
European Community	26456	16436	4059	-75%	R	13161	6671	-49%	European Community

(a) The 1980 and 1990 emission levels and the % emission reductions listed are given for information purposes only in the Annex II of the Gothenburg protocol. See the protocol text for details and country notes (http://www.unece.org/env/lrtap/).

(b) As of 17 May 2005, date of entry in force of the Protocol. S: signed, R: ratified.

URBAN AIR QUALITY (SO_2 AND NO_2)

Data sources: OECD Environmental Data Compendium 2002, EEA (AirBase), national statistical websites

- Data: average annual concentrations of sulphur and nitrogen dioxides. The number of monitoring stations considered for the average may change over the years.
- Trends: reference year is 1990 unless otherwise specified.

CAN • Measurement temperature -15.6°C. Toronto: SO_2 index 100 refers to 1992; NO_2 index 100 refers to 1995.
JPN • Fiscal year. Measurement temperature 20°C.
CZE • NO_2 Brno: index 100 refers to 1995.
FIN • Measurement temperature 20°C. NO_2: traffic sites near city centre.
FRA • Paris (SO_2): Paris agglomeration.
ISL • Data represent the average concentration for a part of the year, months may differ from year to year. NO_2: station near busy street corner and unusually close to traffic in 1995.
IRL • NO_2: index 100 refers to 1996.
LUX • NO_2: data refer to city centre.
NLD • Fiscal year.
NOR • Average concentrations for winter season. NO_2: after 1994/95 data refer to a different station.
PRT • SO_2: in 1992 six UV Fluor. stations were incorporated. NO_2: data after 1991 refer to more than one station.
ESP • Madrid: city centre.
SWE • Monitoring period from October to March.
TUR • NO_2: index 100 refers to 1994.
UKD • Fiscal year. Measurement method follows British Standard 1747 Part. 3. NO_2 Newcastle: index 100 refers to 1993.

SO_2				
	Cat. (a)	City or area	Measurement method	No. Stn. (b)
Canada	A	Toronto	UV Fluor.	..
	B	Hamilton	UV Fluor.	3-4
Mexico	A	Mexico City	Pulsed fluor.	26
USA	A	New York	UV Fluor.	1
	A	Los Angeles	UV Fluor.	4
Japan	A	Tokyo	Conduct. c.	1
	B	Kawasaki	Conduct. c.	1
Korea	A	Seoul	UV Fluor.	20
	A	Pusan	UV Fluor.	9
Austria	A	Wien	UV Fluor.	12
	B	Linz	UV Fluor.	7
Belgium	A	Brussels	UV Fluor.	4
	B	Antwerpen	UV Fluor.	4
Czech. R.	A	Praha	UV Fluor./manual	16-25
	A	Brno	UV Fluor./manual	7-18
Denmark	A	Köbenhavn	KOM Imp. F.	1-6
	C	Aalborg	KOM Imp. F.	1
Finland	A	Helsinki	UV Fluor.	1-2
France	A	Paris	UV Fluor.	4-46
	B	Rouen	UV Fluor.	3-9
Germany	A	Berlin	UV Fluor.	9-31
	A	München	UV Fluor.	5
Greece	A	Athens	UV Fluor.	4-5
Hungary	A	Budapest	UV Fluor.	35
	B	Miskolc	UV Fluor.	8
Iceland	A	Reykjavik	UV Fluor.	1
Ireland	A	Dublin	Total acid titration	24
Italy	A	Milano	UV p. fluor c.	3-5
Luxemb.	A	Luxembourg	UV Fluor.	2
Netherl.	A/B	Rotterdam	UV Fluor.	1
Norway	A	Oslo	DOAS	1
Poland	A	Lódz	Colorimetry	3-12
	C	Warszawa	Colorimetry	4-6
Portugal	A	Lisboa	UV Fluor.	5-7
Spain	A	Madrid	UV Fluor.	13-24
	A	Barcelona	Thorin	1-4
Sweden	A	Gothenburg	UV Fluor./Ion.c.	1-5
	B	Stockholm	UV Fluor.	1-2
Switzerl.	A	Zurich	UV Fluor. c.	1
	B	Basel	UV Fluor. c.	1
Turkey	A	Ankara	Conduct.	7-8
UK	A	London	UV Fluor.	15
	B	Newcastle	UV Fluor.	1

NO_2				
	Cat. (a)	City or area	Measurement method	No. Stn. (b)
Canada	A	Toronto	Chem.	..
	B	Hamilton	Chem.	2-4
Mexico	A	Mexico City	Chem.	19
USA	A	New York	Chem.	1
	A	Los Angeles	Chem.	13
Japan	A	Tokyo	Chem.	1
	B	Kawasaki	Saltzman	1
Korea	A	Seoul	Chem.	20
	A	Pusan	Chem.	9
Austria	A	Wien	Chem.	16
	B	Linz	Chem.	7
Belgium	A	Brussels	Chem.	3
	B	Antwerpen	Chem.	1
Czech. R.	A	Praha	Chem./manual	3-13
	A	Brno	Chem./manual	2
Denmark	A	Köbenhavn	Chem.	1-3
	C	Aalborg	Chem.	1-2
Finland	A	Helsinki	Chem.	2
France	A	Paris	Chem.	5-19
	B	Rouen	Chem.	3-6
Germany	A	Berlin	Chem.	9-13
	A	München	Chem.	5
Greece	A	Athens	Chem.	4-5
Hungary	A	Budapest	Chem./Saltz.	35
	B	Miskolc	Chem.	8
Iceland	A	Reykjavik	Chem.	1
Ireland	A	Dublin	Chem.	3
Italy	A	Milano	Chem. c.	3-9
Luxemb.	A	Luxembourg	Chem.	1
Netherl.	A/B	Rotterdam	Chem.	1
Norway	A	Oslo	Chem.	1
Poland	A	Lódz	Saltzman	1-4
	C	Warszawa	Saltzman	2-4
Portugal	A	Lisboa	Sod.Ars./Chem.	1-11
Spain	A	Madrid	Chem.	9-24
	A	Barcelona	Chem.	2-6
Sweden	A	Gothenburg	Chem. c.	1-3
	B	Stockholm	Chem. c.	2
Switzerl.	A	Zurich	Chem. c.	1
	B	Basel	Chem. c.	1
Turkey	A	Ankara	Chem.	1-2
UK	A	London	Chem.	1
	B	Newcastle	Chem.	1

(a) Categories: A - city in which a notable portion (5-10%) of national population is concentrated; B - industrial city in which a significant number of inhabitants is considered to be exposed to the worst level of pollution in 1980; C - city with residential and service functions and with intermediate pollution level.
(b) Number of monitoring stations may change over the years.

WASTE

MUNICIPAL WASTE

Data sources: OECD

- Municipal waste is waste collected by or on the order of municipalities. It includes waste originating from households, commercial activities, office buildings, institutions such as schools and government buildings, and small businesses that dispose of waste at the same facilities used for municipally collected waste. Household waste is waste generated by the domestic activity of households. It includes garbage, bulky waste and separately collected waste. National definitions may differ.
- Values per capita are rounded.
- Management of municipal waste: categories may overlap because residues from some types of treatment (incineration, composting) are landfilled; categories do not necessarily add up to 100% since other types of treatment may not be covered.

CAN • 2002 data. 860 kg/cap. of non hazardous w. were generated from households, institutions, commercial establishments and industries (excluding construction and demolition w.). Management: % based on household waste and composted waste.
MEX • 2004 data; landfill: controlled, non-controlled and open landfills.
USA • Incineration: after recovery; landfill: after recovery and incineration.
JPN • 2001 data. Municipal waste: data cover municipal w. collection, w. directly delivered and in-house treatment. It excludes separate collection for recycling by the private sector (22 kg/cap.). Management: % based on w. treated by municipalities and separate collection for recycling by the private sector. Recycling: amounts directly recycled (incl. private collection) and recovered from intermediate processing. Landfill: direct disposal (excluding residues from other treatments).
KOR • Hous. w. : 2002 data.
AUS • Estimated data referring to the late 1990s; municipal w. may include significant amounts of commercial and industrial waste. Management: 2001 percentages.
NZL • 1999 data referring to household waste landfilled (excluding construction and demolition w.) and packaging waste recycled; 1990 data refer to 1986-91.
AUT • Municipal w.: exclude construction site w. , on-site composting of green waste from municipal services, municipal kitchen and canteen waste which are included in national definition; household w.: includes small part of w. from commerce and trade. Management data: 1999. Landfill: direct delivery without any pretreatment.
BEL • Data are NSI (2003) and Secretariat (1990) estimates. Household w. : 2001 data including w. from small enterprises. Management data: 2001; landfill: includes residues from incineration.
CZE • Management: % based on total excluding amounts undergoing mechanical sorting before treatment/disposal.
DNK • Municipal waste change: Secretariat estimate. Household w.: domestic w., bulky w., garden w. and other in Danish classification.
FIN • Municipal and household waste: 2003 preliminary data.
FRA • Municipal and household waste 2003: Secretariat estimates. 1990 data refer to 1989; data include DOM; municipal w.: includes similar hous. w. from commerce and trade, bulky w. and w. from municipal services; household w.: excludes similar w. from commerce and trade and bulky w.. Management: 2002 data.
DEU • Municipal waste 2003: estimate; waste according to the European Waste Catalogue; household w. (2002): hous. and similar w. collected publicly with hous. w., bulky, compostable w. from biocontainers, separate collection.
HUN • 2003: estimates. Municipal w.: includes estimates for population not served by municipal waste services. Management: percentages based on collected amounts; 2002 data.
ISL • Municipal waste: 2002 data; % change: 2002/1992; household waste and management: 2003 preliminary data.
IRL • Municipal waste change: Secretariat estimate; household w.: include estimated arisings from household not served by waste collection. Management: percentages based on collected amounts.
LUX • 2003: estimates. Mun. w. : includes separate collection. Management: 2001 data.
NLD • Municipal w.: include separate collection for recycling purposes. Household w.: include w. paper collected by schools, churches, sportclubs. Management: % based on total excluding amounts undergoing mechanical sorting before treatment/disposal .
NOR • Municipal w.: include about 20 kg/cap. of construction and demolition waste. Per capita amounts adjusted to population served by municipal waste services. Management: household waste only; incineration: excluding residues landfilled.
POL • Data refer to waste collected.
PRT • Includes Azores and Madeira Islands. Incineration and landfill: excluding residues from other operations.
ESP • 2002 data. Municipal w. include household and similar w. from small businesses, bulky w., w. from municipal services and separate collection. Mun. w. % change: refer to household w. Includes Baleares and Canary Islands.
CHE • Municipal w.: includes separately collected waste for recycling.
TUR • 2003: estimate: 1990 data refer to 1991; amounts collected in municipalities served by w. service (76.3% of the population in 2002) as a share of total population. Management: 2002 data.
UKD • Estimates; household w.: includes hazardous and clinical w. from households and w. from street cleansing and litter bins. Management: 2002 data.
OECD • Estimates which can differ from the sum of national data presented. Do not include Czech and Slovak Rep., Hungary, Poland and Korea.

INDUSTRIAL / NUCLEAR / HAZARDOUS WASTE

Data sources: OECD; Nuclear Energy Data, NEA 2005

- Industrial waste refers to waste generated by the manufacturing industry. National definitions often differ. Rounded data.
- Nuclear waste refers to spent fuel arisings in nuclear power plants. The data are expressed in tonnes of heavy metal. It should be noted that these data do not represent all radioactive waste generated.
- Hazardous waste refers to waste streams controlled according to the Basel Convention on Transboundary Movements of Hazardous Wastes and their Disposal (see Annex IV of the convention for complete definition and methods of treatment, movement and disposal). National definitions often differ, and caution should be exercised when using these figures. Imports, exports: should refer to actual amounts moved, but may in some cases refer to total authorisations (notifications).

CAN • 1.1 million tonnes of hazardous waste were treated and disposed of in Canada in the year 2000.
MEX • Haz. w.: data based on surveys covering 27 280 enterprises; includes biological infectious waste. Movements: 2003 data. Amounts to be managed : capacity building granted.
USA • Nuc. w.: provisional data. Haz. w.: includes some waste water. Amounts to be managed: quantity managed by storage only is excluded.
JPN • Ind. w.: 2001 data. Haz. w.: production: data refer to national law; movements (2004 data): data refer to Basel definition.

KOR • Ind. w.: 2003 data. Includes hazardous w. and cover ISIC 01-02 ,10-14, 40 and 41. Nuc. w.: including LWR fuel and HWR fuel.
NZL • Ind. w.: 1999 data; landfilled waste.
AUT • Haz. w.: primary waste.
BEL • Ind. w.: NSI estimates for 2000.
CZE • Ind. w.: 2002 data including hazardous waste. Haz. w.: data include municipal hazardous waste.
DNK • Ind. w.: 2000 data. Haz. w.: according to the European Waste Catalogue. Production: primary waste. Movements: subject to mandatory notification. Amounts to be managed: primary and secondary waste.
FIN • Ind. w.: 2000 data. Haz. w.: amounts to be managed: amounts generated and treated excluding preparatory activities (239 kt); movements: waste regulated according to the regulation 259/93/EC.
FRA • Ind. w.: 1999 data including hazardous w. and w. from construction and services. Haz. w.: amount generated: estimates for all waste defined as special industrial waste in French legislation.
DEU • Ind. w.: 2003 preliminary data referring to primary waste; includes hazardous waste. Haz. W.: from off-site management (with consignment note); movements data (2002) based on Basel Convention.
HUN • Ind. w.: 2000 data excluding hazardous waste; firms with more than 10 employees.
ISL • Ind. w.: 2002 data. Waste from slaughterhouses.
IRL • Ind. w.: 1998 data. Haz. w.: total figure includes 275 kt of reported and 48 kt of unreported waste; it also includes contaminated soil (169 kt).
ITA • Ind. w.: 2002 data. Haz. w.: National definition refers to haz. w. according to the European Waste Catalogue. Amount to be managed include stored waste from earlier years and is therefore higher then the amount generated.
NLD • Ind. w.: 2001 data. Haz. w.: all waste defined as special waste in Dutch legislation; production: excluding contaminated soil.
NOR • Ind. w.: 2002 data including hazardous waste.
POL • Ind. w.: 2001 data according European waste catalogue. Haz. w.: data refer to a classification based on the European Waste Catalogue.
PRT • Ind. w.: 2002 data on Portugal mainland and Azores.
SVK • Ind. w.: 1999 data.
ESP • Ind. w.: 2000 data. Haz. W.: production data according to the European Waste Catalogue.
SWE • Ind. w.: 1998 data excluding ISIC 37.
CHE • Ind. w.: 2000 data; recovered/landfilled industrial waste including some special waste. Haz. w.: amount generated: all waste defined as special waste in Swiss legislation; includes imports.
TUR • Ind. w.: 1997 data.
UKD • Ind. w.: 1998/99 estimates referring to England and Wales. Nuc. w.: Secretariat estimate. Haz. W.: special wastes as defined by the Hazardous Waste List (94/904/EC) and implemented by the Special Waste Regulations, 1996. Movements: under the Transfrontier Shipments of Waste Regulations 1994.

WASTE RECYCLING

Data sources: OECD, Fédération Européenne du Verre d'Emballage (Brussels), Confederation of European Paper Industries (Brussels), FAOSTAT data, 2005

- Recycling is defined as reuse of material in a production process that diverts it from the waste stream, except for recycling within industrial plants and the reuse of material as fuel. The recycling rate is the ratio of the quantity collected for recycling to the apparent consumption (domestic production + imports - exports).
- Table: data may refer to the years immediately preceding or following the columns' header; 2003: or latest available year; data prior to 1999 were not taken into account.

CAN • Paper: recovered paper/paper and board consumption; glass: packaging glass only.
MEX • Recycling rates are based on amounts of waste generated and refer to municipal waste only.
USA • Data refer to the material diverted from the municipal waste stream; recycling rates are based on amounts of waste generated.
JPN • Glass: returnable bottles are excluded; data refer to reuse of glass as cullet compared to national production of glass bottles.
AUS • Data for 2003 refer to 2000. Paper: data refer to newsprint, cardboard, and paper packaging; definitions of recycling vary according to the material collected (e.g. may include amounts incinerated to divert them from landfill).
NZL • Data refer to packaging only.
AUT • Glass: data for 1980 and 1995 refer to 1981 and 1994.
BEL • Glass: data for 1980 and 1990 refer to 1981 and 1991.
CZE • Paper: figure for 1995 refers to 1996.
DNK • Glass: data for 1980 and 1990 refer to 1981 and 1991.
FRA • Paper: ratio of the quantity recycled in the country to the apparent consumption. Glass: amounts collected as a percentage of apparent consumption (FEVE); data for 1980 and 1990 refer to 1981 and 1991.
DEU • 1980, 85, (and 90 for glass): western Germany; latest years: total Germany; glass: recycling rate is based on total sales.
HUN • Paper: figure for 1990 refers to 1991. Glass: figure for 2003 refers to 1999.
ISL • Data for 2003 refer to 2002.
ITA • Paper: figure for 1980 refers to 1981. Glass: figure for 1990 refers to 1991.
NLD • Glass: glass collected in bottle banks as % of sale of products in disposable glass on domestic market.
NOR • Glass: excludes considerable amounts of glass recovered before entering the waste stream (deposit/reuse of bottles); figure for 1990 refers to 1991.
SWE • Paper: figure for 2003 refers to 2002. Glass: figure for 1990 refers to 1991.
CHE • Glass: figure for 1980 refers to 1981.
UKD • Glass: Great Britain only; glass collected in bottle banks and from industrial sources (bottlers and packers) and flat glass. Figure for 2003 refers to 2001.

WATER QUALITY

RIVER QUALITY

Data sources: OECD Environmental Data Compendium 2004

- Measurement locations are at the mouth or downstream frontier of rivers.
- Data: refer to three year averages around 1980, 1985, 1990, 1995 and 2001.
- Nitrates: total concentrations unless otherwise specified.

CAN • Nitrates: NO2 + NO3.
MEX • Lerma: since 2000, data refer to another station.
DNK • Nitrates: NO2 + NO3.
FRA • Seine: station under marine influence. Rhône: since 1987, data refer to another station. Nitrates Loire and Seine: dissolved concentrations.
DEU • Nitrates: dissolved concentrations.
ITA • Po: until 1988: Ponte Polesella (76 km from the mouth); since 1989: Pontelagoscuro (91 km from the mouth).
LUX • Moselle 1980 and 1985: one year average (1980, 1985).

NLD • Nitrates Rijn-Lobith and Maas-Keizersveer: dissolved concentrations.
NOR • Skienselva: until 1990 data refer to a station which may have marine influence; from 1990 onwards data refer to a new station further away from the outlet.
POL • Data 1980 and 1985: one year average (1980, 1985).
PRT • Guadiana: since 1997, data refer to another station.
ESP • Guadalquivir: from 1990 onwards data refer to another station closer to the mouth and farther away from Sevilla influence. Nitrates: dissolved concentrations.
UKD • Nitrates: when the parameter is unmeasurable (quantity too small) the limit of detection values are used when calculating annual averages. Actual averages may therefore be lower. Mersey 1980: one year average (1980).

WASTE WATER TREATMENT

Data sources: OECD Environmental Data Compendium 2004

- Total served: national population connected to public sewage treatment plants. Includes: primary treatment - physical and mechanical processes which result in decanted effluents and separate sludge (sedimentation, flotation, etc.); secondary treatment - biological treatment technologies, i.e. processes which employ anaerobic or aerobic micro-organisms; tertiary treatment - advanced treatment technologies, i.e. chemical processes.
- Sewerage connection rates: refers to population connected to public sewage network with or without treatment.
- Early 2000s: data refer to 2002 unless otherwise specified.

CAN • Data refer to 1983 and 1999, secretariat estimates based on MUD Municipal Waste Water Database. Secondary treatment includes waste stabilisation ponds. The population not connected to public sewerage are connected to private or independent treatment.
MEX • Early 2000s: 2000 data. Among the 38.6% of population not connected to public sewerage, 15.1% are connected to private or independent treatment.
USA • Data refer to 1982 and 1996. Primary: may include ocean outfalls and some biological treatment. Tertiary: includes 2-3% of non-discharge treatment, e.g. lagoons, evaporation ponds. Excludes rural areas served by on-site disposal systems.
JPN • Early 2000s: 2001 data. Secondary: may include primary treatment and some tertiary treatment. Among the 36% of population not connected to public sewerage, 7 % are connected to private or independent treatment (1999 data).
KOR • Early 2000s: 2003 data. Connection rates may include population not connected by pipe.
AUS • Early 2000s: 2001 data. Sewerage network connection rates refer to reticulated sewerage.
NZL • Early 2000s: 1999 data.
AUT • Early 2000s: 2001 data. The population not connected to public sewerage are connected to private or independent treatment.
BEL • Early 2000s: 1998 data.
DNK • Data refer to 1983 and 1998. The population not connected to public sewerage are connected to private or independent treatment.
FIN • Early 2000s: 2001 data. Secondary: 50-80% removal of BOD; tertiary: 70-90% removal of BOD.
FRA • Early 2000s: 2001 data. Among the 18.5% of population not connected to public sewerage, 16.2% are connected to private or independent treatment.
DEU • 1980 data refer to 1979 and to w. Germany only. Early 2000s: 2001 data, total public sewage treatment connection rates are based on classification by residence, treatments are based on classification by plant. Among the 5.5% of population not connected to public sewerage, 4% are connected to private or independent treatment.
GRC • Early 2000s: 1997 data. In 1993 a new waste water plant in Athens city started working; data include connections still under construction.
HUN • Early 2000s: 2000 data. Among the 48.8% of population not connected to public sewerage, 17.1% are connected to private or independent treatment.
ISL • Early 2000s: 2002 data. Among the 10% of population not connected to public sewerage, 6% are connected to private or independent treatment.
IRL • Early 2000s: 2000 data (sewerage network connection rates include 1998 data on population connected to public sewerage without treatment).
ITA • Early 2000s: 1999 data.
LUX • Early 2000s: 1999 data. The population not connected to public sewerage are connected to private or independent treatment.
NLD • Early 2000s: 2000 data. Tertiary: incl. dephosphatation and/or disinfection.
NOR • Early 2000s: 2000 data. The population not connected to public sewerage are connected to private or independent treatment.
POL • Early 2000s: 2001 data (sewerage network connection rates include 1999 data on population connected to public sewerage without treatment).
PRT • Data refer to 1981 and 1998. Among the 35.7% of population not connected to public sewerage, 4.7% are connected to private or independent treatment.
ESP • Early 2000s: Secretariat estimates.
SWE • Early 2000s: 2000 data, change in methodology. Primary: may include removal of sediments. Secondary: chemical or biological treatment. Tertiary: chemical and biological plus complementary treatment. Among the 14% of population not connected to public sewerage, 13% are connected to private or independent treatment.
CHE • Early 2000s: 2000 data.
TUR • Early 2000s: 1998 data. Data result from an inventory covering municipalities with an urban population over 3000 inhabitants, assuming that the sewerage system and treatment facilities serve the whole population of the municipalities.
UKD • Early 2000s: 2000 data. Data refer to England and Wales and to financial year (April to March). Primary: removal of gross solids. Secondary: removal of organic material or bacteria under aerobic conditions. Tertiary: removal of suspended solids following secondary treatment.

PUBLIC EXPENDITURE ON WATER

Data sources: OECD (2003), Pollution abatement and control expenditure in OECD countries.

- Data refer to public pollution abatement and control (PAC) expenditure (see Expenditure item) at current prices and purchasing power parities for the latest available year. PAC activities for soil and water comprise collection and purification of waste water, combating of pollution in the marine environment, prevention, control and monitoring of surface water pollution, combating of pollution of inland surface waters, prevention and combating of thermal pollution of water, abatement of groundwater and soil pollution, and regulation and monitoring. Excludes the supply of drinking water.
- Data includes expenditure by public specialised producers of environmental protection services.

MEX • Public sector: Federal government, capital city government, and two public enterprises are included.
CZE • Investment only.
DEU • End-of-pipe investments only, except for public specialised producers.
HUN • Investment only.
NOR • Only covers municipal departments. Investments: end-of-pipe only.
ESP • Secretariat estimate for 2000.
CHE • Provisional data.

WATER RESOURCES

INTENSITY OF USE OF WATER RESOURCES

Data sources: OECD Environmental Data Compendium 2004;
FAOSTAT data, 2004

- Abstractions: accounts for total water withdrawal without deducting water that is reintroduced into the natural environment after use.
- Abstractions as % of available resources: data refer to total abstraction divided by total renewable resources, except for total, where the internal resource estimates were used to avoid double counting.
- Renewable water resources: net result of precipitation minus evapotranspiration (internal) plus inflow (total). This definition ignores differences in storage capacity, and represents the maximum quantity of fresh water available on average.
- Inflow: water flows from neighbouring countries. Includes underground flows.
- Water stress (source: CSD, "Comprehensive Assessment of the Freshwater Resources of the World") is based on the ratio of water withdrawal to annual water availability.
  - Low (less than 10 per cent): generally there is no major stress on the available resources.
  - Moderate (10 to 20 per cent): indicates that water availability is becoming a constraint on development and significant investments are needed to provide adequate supplies.
  - Medium-high (20 to 40 per cent): implies the management of both supply and demand, and conflicts among competing uses need to be resolved.
  - High (more than 40 per cent): indicates serious scarcity, and usually shows unsustainable water use, which can become a limiting factor in social and economic development.

  National water stress levels may hide important variations at subnational (e.g. river basin) level; in particular in countries with extensive arid and semi-arid regions.
- Freshwater abstractions by major sector
  - "Public water supply" refers to water supply by waterworks, and may include other uses besides the domestic sector.
  - "Irrigation" refers to self supply (abstraction for own final use).
  - "Others": include industry and electrical cooling (self supply).
  - Freshwater abstractions data: refers to 2002 or latest available year (data prior to 1994 have not been considered).
- Cultivated land: refers to arable and permanent crop land.

CAN • 1980 and early 2000s: 1981 and 1996 data. 1996 data include Secretariat estimates for electrical cooling.
MEX • 1980: includes Secretariat estimates for electrical cooling based on electricity generation in power stations. Early 2000s: 2001 data.
USA • Early 2000s: 2000 data.
JPN • Early 2000s: 2000 data.
KOR • Partial totals excluding electrical cooling. Abst. for public supply: data refer to domestic sector only. Early 2000s: 1998 data.
AUS • In Australia the intensity of use of water resources varies widely among regions; one third of the country is arid, one third semi-arid and the high rainfall areas in the north are far from the densily populated areas in the south. 1980: 1977 data adjusted for an average climatic year. Early 2000s: 1996/97 data, abst. for public supply includes Secretariat estimates.
NZL • Early 2000s: 1999 estimates based on the publication "Information on water allocation in New Zealand" (Ministry for the Environment, 2000).
AUT • Partial totals. Early 2000s: 1997 data.
BEL • Data include Secretariat estimates. Early 2000s: 1998 data.
CZE • Early 2000s: 2002 data.
DNK • 1980 and early 2000s: 1977 and 2001 data.
FIN • Partial totals. Early 2000s: 1999 data.
FRA • 1980 and early 2000s: 1981 and 2002 data.
DEU • Excluding agricultural uses other than irrigation. Early 2000s: 2001 data. Change since 1980: ratios for total Germany compared to ratios for western Germany (1979).
GRC • Partial totals excluding agricultural uses besides irrigation. Includes data for public water supply which refer only to data from 42 out of 75 great water distribution enterprises. Early 2000s: 1997 data.
HUN • Early 2000s: 2000 data.
ISL • Fish farming is a major user of abstracted water after 1985. Abst. for public supply: includes the domestic use of geothermal water. Early 2000s: 2002 data.
IRL • Early 2000s: 1994 data; totals include 1980 data for electrical cooling.
ITA • Early 2000s: 1998 data.
LUX • Early 2000s: 1999 data.
NLD • 1980: 1981 data, partial totals excluding all agricultural uses. Early 2000s: 2001 data.
NOR • Early 2000s: 1996 data, including Secretariat estimates for industry.
POL • Totals include mining and construction water discharged without use and abstractions for agriculture which refer to aquaculture (areas over 10 ha) and irrigation (arable land and forest areas greater than 20 ha); animal production and domestic needs of rural inhabitants are not covered. Early 2000s: 2002 data.
PRT • Excluding agricultural uses other than irrigation. Early 2000s: 1998 data.
ESP • 1980: excluding agricultural uses other than irrigation. Early 2000s: 2001 data.
SWE • 1980: include data from different years. Early 2000s: 2002 data.
CHE • Partial totals excluding agricultural uses. Early 2000s: 2001 data.
TUR • 1980: partial totals; excluding agricultural uses other than irrigation and electrical cooling. Early 2000s: 2001 data.
UKD • Partial totals. England and Wales only. Data include miscellaneous uses for power generation, but exclude hydroelectric power water use. Early 2000s: 2000 data.
OECD • Rounded figures, including Secretariat estimates and considering England and Wales only.

IRRIGATION

CAN • Abst. for irrigation: 1996 data.
MEX • Abst. for irrigation: 2001 data.
USA • Abst. for irrigation: 2000 data.
JPN • Abst. for irrigation: Secretariat estimates for 2000. Irrigated land: rice irrigation only.
KOR • Abst. for irrigation: 1998 data, includes other agricultural abstractions. Irrigated land: rice irrigation only.
AUS • Abst. for irrigation: 1996/97 data.
NZL • Abst. for irrigation: 1999 estimates.
AUT • Abst. for irrigation: refers to groundwater, 1997 data.
BEL • Data for Belgium and Luxembourg. Abst. for irrigation: 1998 (Belgium) and 1999 (Luxembourg) data.
DNK • Abst. for irrigation: 2001 data, includes fish farming.
FIN • Abst. for irrigation: 1999 data.
FRA • Abst. for irrigation: includes other agricultural uses but irrigation is the main use.
DEU • Abst. for irrigation: 1998 data.
GRC • Abst. for irrigation: 2001 data.
HUN • Abst. for irrigation: 2000 data.
IRL • Abst. for irrigation: irrigated area is negligible.
LUX • Data for Belgium and Luxembourg. Abst. for irrigation: 1998 (Belgium) and 1999 (Luxembourg) data.
NLD • Abst. for irrigation: 2001 data.
NOR • Abst. for irrigation: 1996 data.

PRT • Abst. for irrigation: 1998 data.
ESP • Abst. for irrigation: 2001 data.
CHE • Abst. for irrigation: 2001 data.
TUR • Abst. for irrigation: 2001 data.
UKD • England and Wales only. Abst. for irrigation: 2000 data.
OECD • Secretariat estimates considering England and Wales only.

WATER PRICES

Data sources: IWSA (International Water Supply Association), 2004, International Statistics for Water Services

- Prices calculated on the basis of a family of four (two adults and two children) living in a house with garden rather than an apartment. Where there are water meters, the price is based on annual consumption of 200 m^3. Where supply is normally unmeasured the average price has been used. Prices at current exchange rates. VAT is not included.

FOREST RESOURCES

INTENSITY OF USE OF FOREST RESOURCES

Data sources: OECD Environmental Data Compendium 2002, UNECE/FAO (TBFRA 2000), national statistical yearbooks

- Intensity of use: data refer to annual growth (gross increment) divided by annual harvest (fellings).
- 2000s: 2000 or latest available year.
- Data exclude Iceland as there is no traditional forestry in this country.

CAN • 1990s and 2000s: 1991 and 1994 data.
MEX • 2000s: 1995 data.
USA • 1980s: estimates. 1990s: annual harvest 1992 data, annual growth 1987-1992 data.
JPN • Annual harvest 2000s: 1995 data. Annual growth: national forest; 1990s and 2000s: 1990-1995 data.
KOR • 2000: 1997 data.
AUS • 1980s and 2000s: 1985 and 1994 data.
NZL • 2000s: 1996 data. Annual growth 1990s: current annual increment for plantation estate only. Growth of natural forests is considered to be near zero with a growth rate equal to mortality. Harvest from natural forests is less than 3 % of harvest.
AUT • 2000s: 1992-96 data. Annual growth: 1980s and 1990s: 1971-1980 and 1986-1990.
BEL • Intensity of use based on annual harvest for 1986-1995 and annual growth for 1982-1997.
CZE • 2000s: 1995 data.
DNK • 1980s: Secretariat estimates. 2000s (1996 data): expected mean annual volume increment for 1990-2000.
FIN • 2000s annual harvest 1991-1996 data, annual growth 1986-1996 data.
FRA • 2000s: annual harvest 1996 data, annual growth 1997 data.
DEU • 2000s: 1996 data.
GRC • 1990s and 2000s: 1992 and 1995 data.
HUN • 2000s: 1996 data.
IRL • 2000s: annual harvest 1996 data, annual growth 1998 data.
LUX • 1980s and 1990s: 1985 and 1989 data. 2000s: annual harvest 1995 data, annual growth 1992 data.
NLD • Before 1995 data refer to total exploitable forest. 1980s and 2000s: 1985 and 1995 data (break in time series, TBFRA 2000 data).
NOR • 2000s: 1994-1996 data.
POL • Harvest: decrease in 1990 was a result of decreased demand for wood in the economic transition period. Until 1990: data refers to the whole forest area. 2000s: 1992-1996 data.
PRT • 2000s: 1995 data, break in time series due to a change in definitions (TBFRA 2000), data refer to continental Portugal, Azores and Madeira Islands.
SVK • 2000s: 1996 data.
ESP • Growth and intensity of use 1980s: Secretariat estimates. Annual growth 1990s: 1989 data. 2000s: 1994 data.
SWE • 1980s and 1990s data refer to 1971-80 and 1986-90. Data refer to total forest including other wooded land and trees outside the forests. 2000s: 1992-96 data, break in time series due to a change in definitions (TBFRA 2000).
CHE • 1990s and 2000s: 1985-1995 data, break in time series due to a change in definitions (TBFRA 2000).
TUR • Annual growth 1980s and 1990s: estimates. 2000s: 1999 data.
UKD • 2000s: 1995 data.
OECD • Secretariat estimates; excludes Germany and Iceland.

FORESTRY PRODUCTS AS % OF NATIONAL EXPORTS OF GOODS

Data sources: FAOSTAT data, OECD Economic Outlook 75 database

- Forestry products refer to wood forest products: roundwood, fuelwood and charcoal, industrial roundwood, sawnwood, wood-based panels, wood residues, pulp for paper, paper and paperboard.

FOREST AND WOODED LAND

Data sources: OECD Environmental Data Compendium 2004

- Data include Secretariat estimates.
- Latest available year: data refer to early 2000s unless otherwise specified.

CAN • Numerical differences between successive national inventories do not necessarily reflect real changes. Accordingly, forest in Canada has been considered as constant, taking into account 1994 data.
MEX • 1970: refers to the Mexican inventory 1961-85. 1980: Secretariat estimates. Data exclude scrubs, perturbed areas and other vegetation types of the Mexican inventory.
USA • Includes low productivity forest land (less than 1.4 m^3/ha/year). Latest available year refers to 1992.
JPN • Data refer to areas under the management of the Minister of Forestry. 1980: 1981 data.
AUS • Forest only. Latest available year: change is primarily due to improvements in mapping.
NZL • Latest available year refers to 1999.
BEL • Change in methodologies after 1970.
DNK • 1970 and 1980: 1976 data. Latest available year refers to 1990.
FIN • Latest year available: 1997 data based on National Forest Inventory 1986-97; includes all the wooded land (forest and scrub land) where the annual potential wood production exceeds 0.1 m^3/ha.
FRA • 1970 and 1980: Secretariat estimates.
DEU • 1970 and 1980: Secretariat estimates based on data for western Germany and eastern Germany (former GDR).
GRC • Data refer to Agriculture and Livestock census. Latest available year refers to 1991.
ISL • Data refer to land outside arable areas.
ITA • Data refer to land with tree crown cover of more than 50% and area of more than 0.5 ha. Since 1986 some agricultural land has been reclassified as forest land; since 1985 Mediterranean maquis has been included in mixed forest.
LUX • Latest available year refers to 1998.
NOR • 1970: Secretariat estimates.
POL • Data refer to the public ground register.

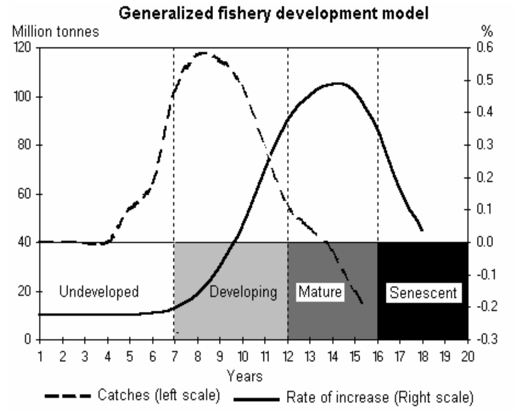
PRT • Data refer to continental Portugal, Azores and Madeira Islands. Latest available year refers to 1998.
SWE • Latest available year refers to 1995, change in definitions.
CHE • Latest available year refers to 1995.
TUR • Latest available year refers to 1999.

FISH RESOURCES

FISH CATCHES AND CONSUMPTION

Data sources: FAO (2005), FAO yearbook, Fishery statistics, Capture production 2003, Vol. 96/1; FAO (2005), Review of the state of world marine fishery resources; FAO Fishstat Plus, 2005; FAOSTAT data, 2004

- Total catches: data refer to capture fisheries in inland and marine waters, including freshwater fish, diadromous fish, marine fish, crustaceans, molluscs and miscellaneous aquatic animals; excludes aquaculture.
- Marine catches: include marine fish, crustaceans, and molluscs.
- Catches data refer to three years moving averages.
- Fish consumption: Total food supply = production - non-food use + imports - exports + stock variations. Data refer to 2002 or latest available year.
- Stage of development of the 200 major marine fishery resources: the figure illustrates the process of intensification of fisheries since 1950 and the increase in the proportion of world resources which are subject to declines in productivity. The resources refer to the top 200 species-area combinations for marine fish, selected for analysis on the basis of average landings over the whole time period. These 200 major resources account for 66% of world marine capture fishery production. The process of development of a fishery is schematically represented in the following figure. The relative rate of increase during the development process, which varies significantly as the maximum long-term yield is approached, reached and “overshot” has been used here to provide a rough assessment of the state of marine resources. For further details, please refer to: “Review of the state of world marine fishery resources”, FAO, Rome 2005.



- Following a recommendation of the 19th Session of the Coordinating Working Party on Fishery Statistics, the names and composition of former groups 33, 34 and 37 of the FAO International Classification of Aquatic Animals and Plants (ISSCAP) were revised. The species formerly included in group 34 “Jacks, mullets, sauries” were moved to group 37 “Mackerels, snoeks, cutlassfishes”, which was renamed “Miscellaneous pelagic fishes”.

NZL • In the 1980's much of the catch in NZ waters was taken by foreign licensed vessels. Therefore much of the increase in catch shown is an artefact of an increase in capacity among NZ fishing companies, as opposed to 286% more fish being removed from the same waters.
BEL • Data include Luxembourg.
DNK • Excludes Greenland and Faroe Islands.

BIODIVERSITY

THREATENED SPECIES

Data sources: OECD

- Threatened species: "Threatened" refers to the sum of species "critically endangered", "endangered" and "vulnerable". Extinct species are excluded unless otherwise specified.
- "Critically endangered": species that are facing an extremely high risk of extinction in the wild in the immediate future.
- "Endangered": species that are not “critically endangered” but are facing a very high risk of extinction in the wild in the near future.
- "Vulnerable": species that are not “critically endangered” or “endangered” but are facing a high risk of extinction in the wild in the medium-term future.
- When interpreting these tables, it should be borne in mind that the number of species known does not always accurately reflect the number of species in existence; and that the definitions are applied with varying degrees of rigour in countries, although international organisations such as the IUCN and the OECD are promoting standardisation.

CAN • Known species: any indigenous species, subspecies, variety, or geographically or genetically distinct population of wild fauna and flora; data include extinct and extirpated species. The national COSEWIC categories “endangered”, “threatened” and “of special concern” have been respectively associated with IUCN categories “critically endangered”, “endangered” and “vulnerable”. All reptile and amphibian species are declining somewhat due to urbanisation and agriculture.
MEX • Threatened: "Endangered/Vulnerable" species and "species facing risk of extinction" of the national classification; birds: resident and migratory species; fish: freshwater species only.
USA • Including Pacific and Caribbean islands; data refer to indigenous species; fish: freshwater species only.
JPN • Known species: estimated data; fish: brackish and fresh water species only.
KOR • Threatened: "endangered" and "critically endangered".
AUS • Mammals: include monotremes and marsupials; birds: estimated data; threatened species of vascular plants refer to threatened species of all plants.
NZL • "Threatened" refers to national standard; indigenous species only; mammals: land-breeding and marine mammals.
AUT • Fish, reptiles, amphibians and plants: indigenous species only; Birds: breeding species on national territory only; fish: freshwater only.
BEL • Indigenous species only; extinct species are excluded; mammals and birds: breeding species only; mammals, birds, reptiles and amphibians: including reintroduced species; fish: freshwater only, including artificially sustained species; plants: % threatened underestimated.

- CZE • Data include extinct species; birds: nesting species only; fish: freshwater only, includes lampreys; reptiles and amphibians: data refer to indigenous species.
- DNK • Data refer to indigenous species; fish: freshwater only; vascular plants: apomictic species in the genus hieracieum, rubus and taraxacum are not included.
- FIN • Known species of mammals, birds, fish, reptiles and amphibians: includes extinct species; mammals: indigenous sp. only out of 65 total known sp.; fish: freshwater only, excludes introduced species; vascular plants: includes indigenous species and established aliens, excludes apomictic species and casual aliens.
- FRA • Metropolitan France; birds: breeding sp. and other regular visitors and passage migrants. Fish: include fish and cyclostomes; threatened marine species are calculated using data available only.
- DEU • Species known: species assessed for German Red List; birds: number of breeding species. Birds, fish, reptiles and amphibians: data refer to indigenous species only.
- GRC • Fish: freshwater only; vascular plants: threatened: includes eight extinct species.
- HUN • Threatened mammals: protected and highly protected species; fish: freshwater species of which 2 indigenous species; "Threatened" fish species include indeterminate species; "Threatened" reptiles and amphibians refer to protected and highly protected species.
- ISL • Mammals: terrestrial species only; birds: breeding species only; about 350 species have been recorded one or more times on national territory; fish: freshwater species only.
- IRL • Mammals: exclude marine mammals; because total of known species includes some sp. for which status is not evaluated, threatened % is underestimated. Birds: resident sp., regular visitors and passage migrants, includes 193 wintering species, endangered birds: 5 or 6, vulnerable: 18 to 28. Fish: freshwater indigenous species only, the smelt is included although it is estuarine. Vascular plants: approx. 2 100 known species, indigenous: between 815 and 1000.
- ITA • Fish: freshwater species only. There are 568 species known of fish.
- LUX • Birds: breeding species only.
- NLD • Birds: breeding sp. only; vascular plants include extinct species.
- NOR • Mammals: includes 53 indigenous terrestrial sp.; birds: number of regular breeding sp. on national territory (total number of breeding sp.: 247); fish: 45 freshwater sp. (of which 9 introduced), 150 marine sp.
- POL • Fish: include anadromous and lampreys.
- PRT • Fish: indigenous freshwater species only; reptiles and amphibians: indigenous species only.
- SVK • Mammals: total species known refer to taxons; fish: freshwater only.
- ESP • Threatened: endangered and vulnerable listed in the red book; mammals: threatened species from the CNEA (national catalogue); fish: freshwater species only.
- SWE • Fish: freshwater species only.
- CHE • Includes indigenous species only, birds: all breeding sp. on national territory; fish: indigenous species of pisces and cyclostomata.
- TUR • Fish: freshwater sp. only; marine sp.: 400-450 (estimated number); vascular plants: indigenous species.
- UKD • Great Britain only; "threatened" refers to national standard; mammals: excludes vagrants species and cetaceans: of the 64 species, 58 are wild, free ranging species and 6 are feral; birds: breeding indigenous species only; fish: freshwater species only, including those that leave the sea to breed in fresh water (e.g. salmon); vascular plants: approximate figure of indigenous species.

PROTECTED AREAS

Data sources: WDPA Consortium. "World Database on Protected Areas" 2005 – Copyright World Conservation Union (IUCN) and UNEP-World Conservation Monitoring Centre (UNEP-WCMC), 2005 (http://www.unep-wcmc.org/index.html)

- Protected area is defined as an area of land and/or sea especially dedicated to the protection and maintenance of biological diversity, and of natural and associated cultural resources, and managed through legal or other effective means. IUCN management categories I-VI and protected areas without IUCN category assignment. National classifications may differ.
- Major protected areas: IUCN management categories I-VI:
  - Ia: strict nature reserves, managed mainly for science;
  - Ib: wilderness areas, managed mainly for wilderness protection;
  - II: national parks, managed mainly for ecosystem protection and recreation;
  - III: natural monuments, managed mainly for conservation of specific natural features;
  - IV: habitat/species management areas, managed mainly for habitat and species conservation through management intervention;
  - V: protected landscapes/seascapes, managed mainly for landscape/seascape conservation and recreation;
  - VI: managed resource protected areas, managed mainly for the sustainable use of natural ecosystems.
- For further details on management categories please refer to “Guidelines for Protected Area Management Categories”, IUCN, 1994.
- See also the Recommendations established at the IVth World Congress on National Parks and Protected Areas.

- USA • Includes Alaska. Excludes American Samoa, Guam, Minor Outlying Islands, Northern Mariana Islands, Puerto Rico and Virgin Islands.
- AUS • Includes the Great Barrier Reef Marine Park totalling 344 360 km^2 (cat. VI).
- DNK • Excludes Greenland: one national park of 972 000 km^2, one national reserve of 10 500 km^2.
- FRA • Excludes non-metropolitan France.
- ISL • Official figures show 91 protected sites in Iceland of which 4 national parks.
- NLD • Excludes the Netherlands Antilles.
- NOR • Excludes Svalbard, Jan Mayen and Bouvet islands.
- PRT • Includes Azores and Madeira.
- ESP • Includes Baleares and Canaries.
- UKD • Excludes Bermuda, British Virgin Islands, Cayman Islands, Falkland Islands, St. Helena and Dependencies, South Georgia and the South Sandwich Islands, Turks and Caicos Islands.

GDP AND POPULATION

GROSS DOMESTIC PRODUCT

Data sources: OECD Economic Outlook 76 database; National Accounts of OECD Countries, OECD, Paris, 2004.

- Gross Domestic Product: expressed at 2000 price levels and purchasing power parities.
- Value added: early 2000s: 2002 or latest available year; agriculture: also includes hunting, forestry and fishing; industry: includes mining and quarrying, manufacturing, gas, electricity and water, and construction; value added excludes financial intermediation services indirectly measured.

POPULATION GROWTH AND DENSITY

Data sources: System of National Accounts, OECD database; Main Economic Indicators, OECD database; OECD Economic Outlook 75 database.

- Population: all nationals present in or temporarily absent from a country, and aliens permanently settled in the country.
- Unemployment rate: commonly used definitions.

CONSUMPTION

PRIVATE FINAL CONSUMPTION EXPENDITURE

Data sources: OECD Economic Outlook 76 database; System of National Accounts, OECD database

- Private final consumption expenditure: the sum of (i) the outlays of resident households on new durable and non-durable goods and services less their net sales of second-hand goods, scraps and wastes; (ii) the value of goods and services produced by private non-profit institutions for own use on current account; expressed at 2000 price levels and purchasing power parities. Consumption patterns: data refer to 2002 or latest data available.

OECD • Change since 1990: excludes Hungary and Slovak Republic.

GOVERNMENT FINAL CONSUMPTION EXPENDITURE

Data sources: OECD Economic Outlook 76 database; System of National Accounts, OECD database

- Government final consumption expenditure: the value of goods and services produced by governments for their own use on current account; expressed at 2000 price levels and purchasing power parities.

OECD • Change since 1990: excludes Hungary and Slovak Republic.

ENERGY

ENERGY SUPPLY

Data sources: Energy Balances of OECD Countries Database, 2004, IEA-OECD

- see IEA (2001-2002) *Energy Balances of OECD Countries* for conversion factors from original units to Toe for the various energy sources.
- Total primary energy supply: indigenous production + imports - exports - international marine bunkers and ± stock changes. Primary energy comprises hard coal, lignite and other solid fuels, crude oil and natural gas liquids, natural gas, and nuclear, hydro, geothermal and solar electricity. Electricity trade is also included.

ENERGY PRICES AND TAXES

Data sources: Energy prices and taxes Database, third quarter 2004, IEA-OECD

- Oil: light fuel oil only.
- Oil and electricity: USD using current exchange rates.
- Natural gas: USD per 10^7 kcal (GCV basis) using current exchange rates.
- Real energy end-use prices: refers to real energy end-use prices for industry and households. % change refer to 1980-2002 period.

USA • Electricity prices: exclude taxes.

TRANSPORT

ROAD TRAFFIC

Data sources: OECD, ECMT, EUROSTAT, International Road Federation (IRF), national statistics

- Traffic volumes are expressed in billions of kilometres travelled by road vehicle; they are usually estimates and represent the average annual distance covered by vehicles, in kilometres, multiplied by the number of vehicles in operation. In principle, the data refer to the whole distance travelled on the whole network inside the national boundaries by national vehicles, with exception of two- and three-wheeled vehicles, caravans, and trailers.
- Data include Secretariat estimates and provisional data.
- Data for 2002 or 2001.

JPN • Traffic by light vehicles, vans, pick-ups and road tractors is excluded. Fiscal year ending 31 March.
BEL • Including motor vehicles with 2 or 3 wheels (about 1%) and ambulances.
CZE • Excludes buses.

DEU • Except for military vehicles, traffic by special vehicles is included.
GRC • Data refer to inter-city traffic only.
NLD • Traffic by trams and subways is included.
PRT • Provisional data, under revision.
ESP • Data refer only to traffic on motorways and national roads.
SWE • Data include traffic by Swedish passenger cars abroad and goods vehicles with load capacity > 3.5 tonnes.
TUR • Data refer only to traffic on motorways and national roads.
UKD • Data refer to Great Britain only.

MOTOR VEHICLES

Data sources: OECD, European Conference of Ministers of Transport (ECMT), EUROSTAT, IRF, American Automobile Manufacturers' Association (AAMA), national statistics

- ♦ Total stock includes passenger cars, goods vehicles, buses and coaches. Data refer to autonomous road vehicles with four or more wheels, excluding caravans and trailers, military vehicles, special vehicles (for emergency services, construction machinery, etc.) and agricultural tractors.
- ♦ Private car ownership is expressed as passenger cars per capita. Data refer to passenger cars seating not more than nine persons (including the driver), including rental cars, taxis, jeeps, estate cars/station wagons and similar light, dual-purpose vehicles.
- ♦ Data describe the situation as of 31 December of the year.
- ♦ Data include Secretariat estimates and provisional data.

JPN • Include recreational vehicles. Fiscal year ending 31 March.
AUS • Figures reported on 31st October of the reference year.
AUT • Includes special vehicles and agricultural tractors.
BEL • Data are reported on 1 August of the reference year.
CZE • Includes delivery vans.
HUN • Change in methodology in 1998. Include special-purpose vehicles.
LUX • Figures are reported on 1st January of the reference year.
NOR • Exclude lorries registered as mobile homes and lorries with capacity of more than 30 tonnes.
PRT • Include recreational vehicles and vans.
ESP • Exclude road tractors (454445 in 2001).
CHE • Data are reported on 30 September of the reference year.
UKD • Total stocks include special purpose vehicles.

ROAD INFRASTRUCTURE

Data sources: OECD, ECMT, EUROSTAT, IRF, national statistics

- ♦ Roads refer to motorways, main or national highways, secondary or regional roads, and others. In principle, the data refer to all public roads, streets and paths in urban and rural areas, but not private roads.
- ♦ Motorways refer to a class of roads differing from main or national, secondary or regional, and other roads.
- ♦ Data describe the situation as of 31 December of the year.
- ♦ Data include Secretariat estimates and provisional data.
- ♦ Data for 2002 or 2001.

CAN • Data refer to public network only. Figures expressed in 2-lane equivalent kilometres. Total road network in the latest years: 1408.8 thousands 2-lane equivalent km.
MEX • Break of time series in 1994.
USA • Exclude Bureau of Land Management roads.
JPN • Fiscal year ending 31 March.
AUS • Roads types taken into account changed in 1985.
NZL • Fiscal year ending 31 March.
AUT • Include Motorways, State, Provincial and Communal roads.
BEL • Including unpaved municipal roads. Exclude agricultural roads and paths.
CZE • Exclude approximately 70000 km of local roads.
FIN • Urban streets, ramps and ferry routes are excluded.
FRA • Exclude 700000km of rural roads.
DEU • After 1992, includes an estimated 413000km of communal roads.
GRC • Figures are based on motorways, main or national roads, and secondary or regional roads. Describes the situation as of April 30 each year.
HUN • Figures are based on motorways, main or national roads, and secondary or regional roads. Prior 1996: include unpaved roads. 2002: exclude municipal roads.
NLD • Include unpaved roads.
PRT • Exclude Madeira and Azores.
SVK • From 1995, include urban roads.
ESP • National Road Network only. Exclude urban and interurban roads.
SWE • Private roads are excluded.
TUR • National and provincial roads only. Village roads are excluded.
UKD • Data refer to Great Britain only prior to 1990.

ROAD FUEL PRICES AND TAXES

Data sources: Energy Prices and Taxes Database, third Quarter 2004, IEA-OECD

- ♦ Taxes: includes taxes that have to be paid by the consumer as part of the transaction and are not refundable.
- ♦ Diesel fuel: diesel for commercial use.
- ♦ Leaded premium: 2003 or latest available year.
- ♦ Unleaded gasoline: unleaded premium (95 RON) except as noted.
- ♦ Prices: expressed in USD at 2000 prices and PPPs.
- ♦ Total energy consumption by road traffic: all fuels used in road vehicles (including military) as well as agricultural and industrial highway use; excludes gasoline used in stationary engines, and diesel oil in tractors that are not for highway use.

CAN • Unleaded gasoline: unleaded regular.
MEX • Unleaded gasoline: unleaded regular.
JPN • Unleaded gasoline: unleaded regular.
KOR • Unleaded gasoline: unleaded regular.
AUS • Unleaded gasoline: unleaded regular.
BEL • Leaded premium: 2003: 2002.
ISL • Data from Statistics Iceland.

AGRICULTURE

INTENSITY OF USE FROM NITROGEN AND PHOSPHATE FERTILISERS

Data sources: OECD; FAOSTAT data, 2004; International Fertilizer Industry Association; national statistical yearbooks; UN/ECE; UNEP

- ♦ Use of nitrogen and phosphate fertilisers: data refer to the nitrogen (N) and phosphoric acid (P2O5) content of commercial fertilisers, and relate to apparent consumption during the fertiliser year (generally 1 July to 30 June) per unit of agricultural land.
- ♦ Agricultural land: refers to arable and permanent crop land and permanent grassland. "Arable l." refers to all land generally under rotation, whether for temporary crops or meadows, or left fallow. "Permanent crops l." comprises those lands occupied for a long period that do not have to be planted for several years after each harvest. "Permanent grassland" includes land used for five years or more for herbaceous forage, either cultivated or growing wild.

- Data include estimates.
- Phosphate fert.: includes ground rock phosphates.

MEX • Fertiliser year: calendar year.
USA • Includes data for Puerto Rico.
KOR • Fertiliser year: calendar year.
BEL • Data for Belgium include Luxembourg.
Phosphate fert.: excludes other citrate soluble phosphates.
DNK • Fertiliser year: August-July.
FRA • Phosphate fert.: fertiliser year: May-April.
GRC • Fertiliser year: calendar year.
HUN • Fertiliser year: calendar year.
ISL • Fertiliser year: calendar year.
ESP • Fertiliser year: calendar year.
SWE • Fertiliser year: June-May. Nitrogen fert.: data include forest fertilisation.
TUR • Fertiliser year: calendar year.
UKD • Fertiliser year: June-May.

NITROGEN BALANCES

See the OECD Environmental Indicators 2001 and OECD (2001) Environmental Indicators for Agriculture Volume 3: Methods and Results (to be updated early in 2006).

LIVESTOCK DENSITIES

Data sources: OECD; FAOSTAT data, 2004; UN/ECE

- head of sheep equivalent: based on equivalent coefficients in terms of manure: 1 cattle= 6 sheep; 1 sheep=1 goat=1 pig; 1 chicken= 0.06 sheep.

Coefficients used to estimate nitrogen from livestock

	kg of dry matter per year	Coefficients for N content in excrement (% of dry matter)
Cattle	1 500	5.0
Horses	1 200	4.4
Sheep and goats	250	3.0
Pigs	250	4.4
Poultry (hens)	15	5.3

Source: IEDS-UN/ECE

Coefficients used to estimate phosphate from livestock

	kg of dry matter per year	Coefficients for P2O5 content in excrement (% of dry matter)
Cattle	1 500	1.8
Horses	1 200	1.4
Sheep and goats	250	0.6
Pigs	250	2.5
Poultry (hens)	15	3.5

Source: IEDS-UN/ECE

BEL • Data for Belgium include Luxembourg. Chickens density: 2003: 2002 data. Livestock % of change: 1980-2000. Total agricultural production % of change: 1980-2002.
CZE • Selected livestock densities % of change since 1980: Data used for 1980 are Secretariat estimates.
DNK • Sheep and goats: sheep only.
IRL • Sheep and goats: sheep only.
POL • Sheep and goats: sheep only.
SVK • Selected livestock densities % of change since 1980: data used for 1980 are Secretariat estimates. Chickens density 2003: 2002.
SWE • Sheep and goats: sheep only.
UKD • Sheep and goats: sheep only.

INTENSITY OF USE OF PESTICIDES

Data sources: OECD, FAO, national statistical yearbooks, European Crop Protection Association

- Unless otherwise specified, data refer to active ingredients.
- Unless otherwise specified, data refer to total consumption of pesticides, which include: insecticides (acaricides, molluscicides, nematocides and mineral oils), fungicides (bactericides and seed treatments), herbicides (defoliants and desiccants), and other pesticides (plant growth regulators and rodenticides).
- Unless otherwise specified, data refers to three years averages around 2001 (2000 to 2002) and 1990 (1989 to 1991).

CAN • Data 2000s: estimate based on Crop Life Canada's sales, average for 1999 and 2000. Survey coverage has varied greatly (different active ingredients, registrants and products); survey trends may therefore not reflect actual trends but simply changes in the survey coverage. Total includes animal repellents and fumigants. 1990: one-year average (1990).
MEX • Data refer to national production. Early 2000s: average 1998-2000.
USA • Data refer to agricultural pesticides only. Early 2000s: average 1999-2001.
JPN • Data refer to sales of agricultural chemicals (for crops and turf) and are estimates from formulation weight amounts. Early 2000s : average 1999-2001.
KOR • Data refer to national production. Early 2000s : average 2001-2003.
AUS • 1990, early 2000s: one-year values (1992, 1999).
NZL • Data refer to use in agriculture. Early 2000s: one-year value (1998).
AUT • Data refer to sales. Early 2000s : average 1999-2001.
BEL • Data refer to sales. Early 2000s: average 1998-2000.
CZE • Data refer to agricultural pesticides and sales of chemical pesticides. Include: animal repellents, additives, adhesives and other pesticides. Early 2000s : average 2001-2003.
DNK • Sales for use in plant production in open agriculture.
FIN • Data include forest pesticides and refer to sales.
FRA • Data refer to quantities sold to agriculture. Early 2000s : average 2001-2003.
DEU • Data refer to sales.
GRC • Data refer to sales. 1990: average of 1989, 1991 and 1992.
HUN • Data refer to sales in active ingredients, estimated as 50% of the formulated weight.

AGRICULTURAL PRODUCTION

Data sources: OECD; FAOSTAT data, 2004

- Data refer to indices of agricultural production based on price-weighted quantities of agricultural commodities produced for any use except as seed and feed. The commodities covered are all crops and livestock products originating in each country.
- Data may differ from national data due to differences in concepts of production, coverage, weights, time reference and methods of calculation.

BEL • Data for Belgium include Luxembourg. Crops % of change: 1980-2000. Total agricultural % of change: 1980-2002

AGRICULTURAL VALUE ADDED

Data sources: National Accounts of OECD Countries, OECD, Paris, 2004

- Data also include hunting, forestry and fishing.
- Data refer to 2002 or latest year available.

OECD • Secretariat estimate

ISL • Early 2000s: average 1999-2001.
IRL • Data refer to sales. Early 2000s: average 1999-2001. 1990: average 1990-1992.
ITA • Data refer to sales. Early 2000s: average 1999-2001.1990: estimate from trend in formulation weight.
LUX • Data refer to sales. Early 2000s: average 1997-1999. 1990: two years average (1991 and 1993)
NLD • Data refer to sales of chemical pesticides and include soil disinfectants (about half of the total consumption in 1990, 15% in 2002).
NOR • Data refer to sales from importers to dealers/distributors.
POL • Data include animal repellents and other pesticides.
PRT • Data refer to sales. Early 2000s: average 1999-2001. 1990: average 1991-1993.
SVK • Data refer to sales. 1990: average 1991-1993.
ESP • Data refer to sales.
SWE • A tax was applied to pesticides in 1995. Data refer to sales.
CHE • Data refer to sales and have been estimated to represent 95 per cent of the total market volume; Liechtenstein included.
TUR • Data refer to sales. Powdered sulphur and copper sulphate excluded. Early 2000s: average 1999-2001
UKD • Great Britain only. Data include sulphuric acid, which represents approx. 40% (1995) of the total.

EXPENDITURE

POLLUTION ABATEMENT AND CONTROL EXPENDITURE

Data source: OECD

- Pollution abatement and control (PAC) expenditure according to the abater principle. PAC activities are defined as purposeful activities aimed directly at the prevention, reduction and elimination of pollution or nuisances arising as a residual of production processes or the consumption of goods and services. Excludes expenditure on natural resource management and activities such as the protection of endangered species, the establishment of natural parks and green belts and activities to exploit natural resources (such as the supply of drinking water).
- Public sector: includes public specialised producers of environmental protection services.
- Total expenditure: the sum of public, business and specialised producers expenditure (excluding households); values in USD per capita: at current prices and purchasing power parities.

CAN • 2000 data. Business sector: excludes construction , agriculture, aquaculture, fishing and trapping, education services, health and social services; includes expenditure on pollution abatement and control and pollution prevention, environmental monitoring, environmental assessment and audits, reclamation and decommissioning, purchased waste management and sewerage service and other. Includes Secretariat estimates for other manufacturing industries.
MEX • 2000 data. Public sector: data refer to expenditure by the federal government, the capital city government, and two public enterprises
JPN • 1999 data. Business sector: data include a Secretariat estimate for current expenditure.
KOR • 2000 data.
AUS • 1996 data.
AUT • 1999 data. Private specialised producers: Secretariat estimates.
BEL • 2000 data.
CZE • 2002 data. Public and business sectors: investment only. Private specialised producers: includes internal current expenditure by public producers.
DNK • 2000 data.
FIN • Public sector: 2000 data. Business sector (1999): data include payments for bought services.
FRA • 2002 data.
DEU • Public sector and total: 1999 data. Business sector: 2000 data. Partial total not including investments in integrated technologies and expenditure by private specialised producers.
GRC • 1999 data.
HUN • 1998 data. Public and business sectors: investment only. Private specialised producers: internal current expenditure by public and private producers.
ISL • 2000 data including expenditure on wastewater and waste only.
IRL • 1998 data.
ITA • Public sector (2000): Eurostat estimate derived from National accounts data reported under the COFOG category 05 "Environmental protection". Business sector (1997): data refer to enterprises with 20 employees or more and do not include investments in integrated technologies. Total: 1997 data.
LUX • 1997 data.
NLD • 1998 data.
NOR • Public sector: 2000 partial data covering only public specialised producers (i.e. municipal departments) active in the field of wastewater management.
POL • 2000 data.
PRT • 2000 data.
SVK • 2000 data.
ESP • 1999 data. Business sector and total: Secretariat estimates.
SWE • Secretariat estimates for 2002.
CHE • 1999 provisional data.
TUR • 1997 data.
UKD • 2000 data. Business sector: data refer to enterprises within ISIC/NACE 10-41 only.

OFFICIAL DEVELOPMENT ASSISTANCE

Data source: OECD-DAC Database (www.oecd.org/dac/stats/statlinks)

- 2004: preliminary data. Data refer to loans (except military loans), grants and technical co-operation by the public sector to developing countries. Data cover OECD Development Assistance Committee (DAC) Member countries. The new System of National Accounts (SNA) tends to depress donors' ODA/GNP ratios in the mid-1990s.

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