KEY ENVIRONMENTAL INDICATORS

OECD ENVIRONMENT DIRECTORATE

FOREWORD

As part of their commitment to transparency and accountability, and to better information of the public, OECD Member countries have recently expressed increasing interest in a reduced number of environmental indicators selected from existing larger sets to draw public attention to key environmental issues of concern and to inform about progress made.

The OECD work programme on environmental indicators has led to several sets of indicators each responding to a specific purpose: an OECD Core Set of environmental indicators to measure environmental progress, and various sets of indicators to integrate environmental concerns in sectoral policies (e.g. energy, transport, agriculture). Indicators are also derived from natural resource and environmental expenditure accounts.

The present report is a new product of the OECD work programme on environmental indicators. It includes a selection of key environmental indicators and will be regularly updated. The indicators presented are extracted from the OECD Core Set of environmental indicators and benefit from the experience gained in using environmental indicators in the OECD's policy and evaluation work.

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 at the occasion of the OECD meeting of Environment Ministers in May 2001 and on the responsibility of the Secretary General of the OECD.

Joke Waller-Hunter
Director, OECD Environment Directorate

The indicators in this report largely come from "Towards Sustainable Development – Environmental Indicators 2001". The data used to calculate the indicators are harmonised through the work of the OECD Working Group on Environmental Information and Outlooks (WGEIO). Some were revised on the basis of comments from national Delegates, as received by 30 March 2001.

For further details and comments on basic data sets, on reference years and on the indicators presented, the reader is referred to "OECD Environmental Data - Compendium 1999", and to "Towards Sustainable Development - Environmental Indicators 2001" (forthcoming). Details on OECD and other international data sources used in this report can be found under "References and bibliography".

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 sub-national differences.

KEY ENVIRONMENTAL INDICATORS

TABLE OF CONTENTS

INTRODUCTION

INTRODUCTION

BACKGROUND

The OECD, with the support of its Member countries, has long been a pioneer in the field of environmental indicators with the development and publication of the first international sets of environmental indicators and their regular use in country environmental performance reviews.

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

WHY KEY INDICATORS ?

While the indicator sets used to date have proven very useful in policy and reporting work, there is now increasing interest in a reduced number of indicators selected from these larger sets to inform civil society and to support wider communication with the public.

To respond to this demand, the OECD has identified a shortlist of key environmental indicators building on previous work and on consensus already achieved: they derive from the OECD Core Set of environmental indicators (publications 1991, 94, 98, 2001), and from the results of the OECD Rome Conference (December 1999) that discussed a first shortlist of indicators.

SELECTION CRITERIA

The selection of these indicators takes into account:

- Their policy relevance with respect to major challenges for the next decade; in particular they relate to both 1) pollution issues and 2) natural resources and assets; indicators describing sectoral trends are not considered.
- Their analytical soundness.
- Their measurability: necessary data sets are already available for a majority of OECD countries; when improvements in data availability and developments in concepts and definitions are foreseen, medium term indicators are proposed.

INTERPRETATION IN CONTEXT

The indicators selected 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.

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 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).*

These 10 indicators have been very useful in charting environmental progress, and their selection has benefited from the experience gained in using environmental indicators in the OECD's country environmental performance reviews.

INTRODUCTION

A DYNAMIC PROCESS

The list of indicators presented here 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.

LINK TO OTHER OECD AND INTERNATIONAL WORK

The set of key environmental indicators is closely linked to other environmental indicator sets developed and used by the OECD, including indicators developed as part of the OECD-wide programme on sustainable development and sectoral sets of environmental indicators (e.g. the OECD set of agri-environmental indicators). It further benefits from continued co-ordination with the work carried out by other international organisations (e.g. UNCSD, European Union).

THIS PUBLICATION

CONTENT

The present report is a new product of the OECD work programme on environmental indicators. It includes 10 indicators extracted from the OECD Core set of environmental indicators and from the publication "Towards sustainable development – Environmental indicators 2001" (forthcoming).

PURPOSE

The report is published at the occasion of the OECD meeting of Environment Ministers (Paris, 16 May 2001) and is expected to be endorsed by Ministers as a tool for use in OECD work and for public information and communication by OECD.

It is intended to give a broad overview of environmental issues in OECD countries, and to raise public awareness about progress made and to be made. It will be updated at regular intervals as a supplement to the OECD Core Set of environmental indicators and to the OECD Compendium of environmental data. Together with other indicators of the OECD Core Set, it will also contribute to follow-up work on the OECD environmental strategy.

DATA AND INDICATORS

The data used to calculate the indicators come from "OECD Environmental Data – Compendium 1999" and from the OECD SIREN database, which is regularly updated with information provided by Member countries authorities, from internal OECD sources and from other international sources.

Most data for the late 1990s refer to 1997; further details on reference years and definitions can be found in the 1999 OECD Compendium and in "Towards Sustainable Development – Environmental Indicators 2001" (forthcoming).

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

OECD experience shows that environmental indicators are cost-effective and powerful tools for the monitoring and reporting of environmental progress and for the measurement of environmental performance. However, experience also shows significant lags between the demand for and the supply of environmental indicators.

GENERAL PROGRESS

Continued efforts are being done by the OECD to:

- Improve the availability, quality and comparability of basic data sets.
- Link the indicators more closely to domestic goals and international commitments.
- Link the indicators more closely to sustainability issues.
- Assist in further development and use of environmental indicators in OECD Member countries, and promote the exchange of related experience with non-OECD countries and other international organisations.

SPECIFIC PROGRESS

More specifically, it is planned to:

- Regularly update and publish the small set of key environmental indicators.
- Further develop concepts and data for medium term indicators (see table page 8).
- Complement the indicators with information reflecting sub-national differences.
- Review indicator aggregation methods currently in use at national and international level, and produce aggregated indices when feasible and policy relevant (e.g. GHG emission index).

KEY INDICATORS

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.*

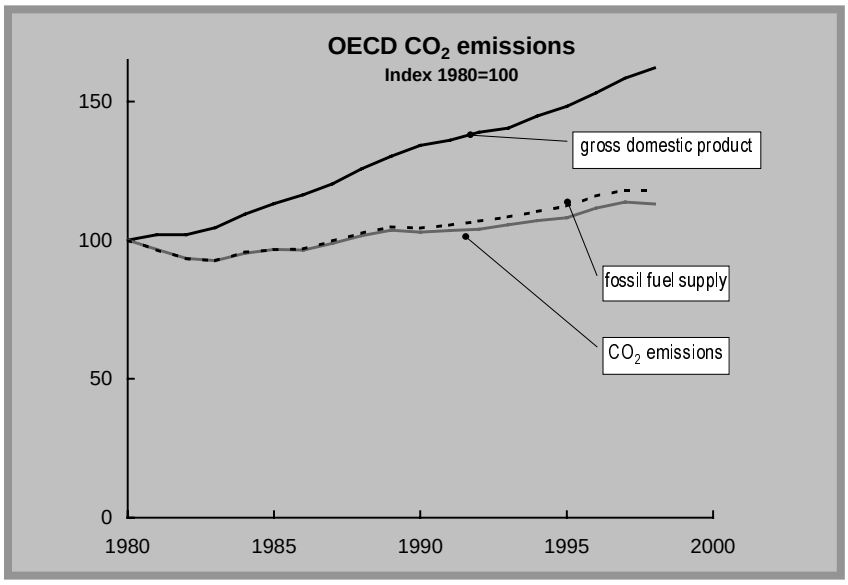
MEASURING PERFORMANCE

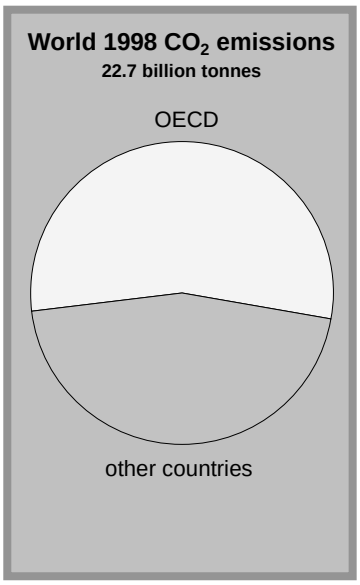
- *Environmental performance can be assessed against domestic objectives and international commitments: The main international agreement is the United Nations Framework Convention on Climate Change (1992). Its 1997 Kyoto Protocol establishes differentiated national or regional emission reduction or limitation targets for six GHG for 2008-12 and for the base year 1990.*

- *The indicators presented here relate to CO_2 emissions from energy use. They show emission intensities per unit of GDP and per capita for 1998, and related changes since 1980. All emissions presented here are gross direct emissions, excluding sinks and indirect effects.*

- *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

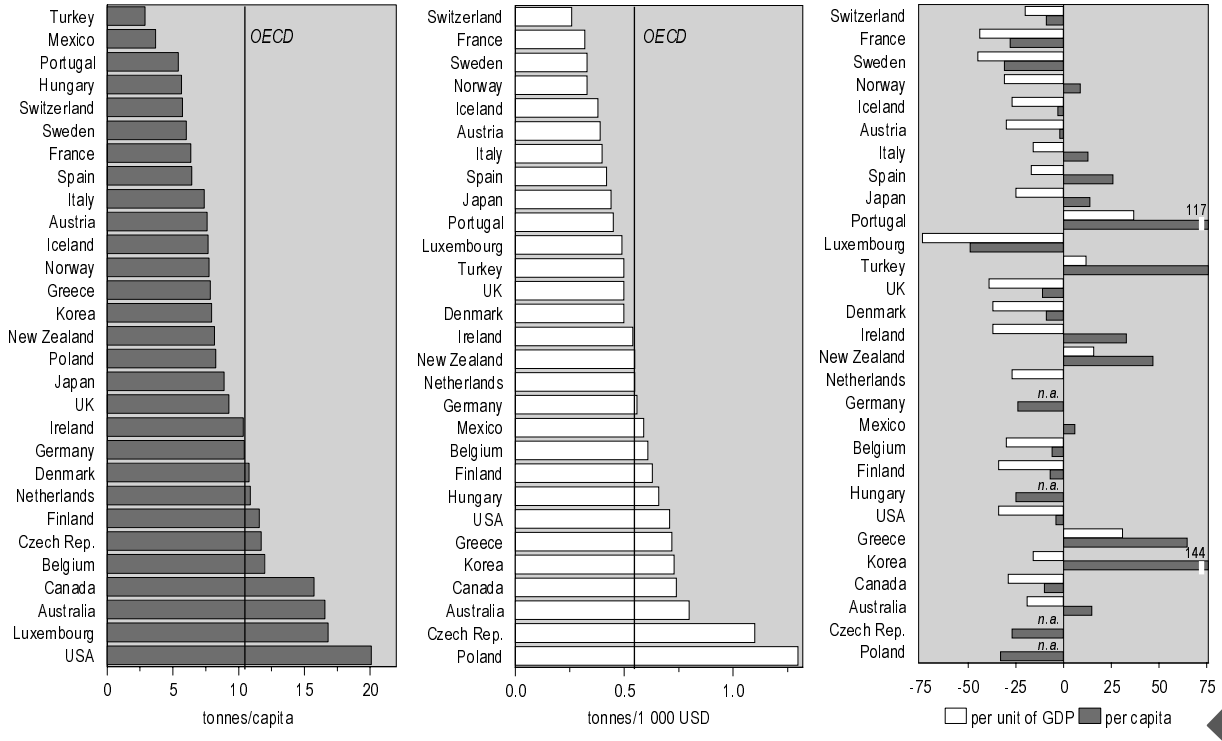




- *Despite wide variations in emission trends, a number of OECD countries have de-coupled their CO_2 emissions from GDP growth, but most countries have not succeeded in meeting their own national commitments. Their CO_2 emissions continued to increase throughout the 1990s, despite gains in energy efficiency (i.e. weak de-coupling). Since 1980, CO_2 emissions from energy use have however grown more slowly in OECD countries as a group than they have world-wide.*

CURRENT STATE – EMISSION INTENSITIES

CO_2 per capita | **CO_2 per unit of GDP** | **% change since 1980**



Individual OECD countries' contributions to the greenhouse effect, and rates of progress towards stabilisation, vary significantly. Over the past 20 years, CO_2 emissions from energy use have continued 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 recent years however, annual growth rates of CO_2 emissions from energy use in these regions have been slowing down.

In OECD Europe, CO_2 emissions from energy use have fallen between 1980 and 1995, as a result of changes in economic structures and energy supply mix, energy savings and, in some countries, of decreases in economic activity over a few years. Recently however, CO_2 emissions from energy use have been on the increase.

THE BASIS: THE OECD CORE SET OF ENVIRONMENTAL INDICATORS

Core set indicators	
ISSUE – CLIMATE CHANGE	
Pressures	♦ **Index of greenhouse gas emissions** – CO_2 emissions – CH_4 emissions – N_2O emissions – PFC, HFC, SF_6 emissions
Conditions	♦ **Atmospheric concentrations of GHG** ♦ **Global mean temperature**
Responses	♦ **Energy efficiency** – Energy intensity – Economic and fiscal instruments

Measurability

Data on GHG emissions are reported annually to the Secretariat of the UNFCCC. Progress has been made with national GHG inventories, but data availability remains best for CO_2 emissions from energy use.

Continued efforts are needed to further improve the completeness of national GHG inventories and their consistency over time, and to construct a GHG emission index covering the 6 gases of the Kyoto Protocol (CO_2, CH_4, N_2O, PFCs, HFCs and SF_6). At OECD level, related trends and intensities closely parallel those of CO_2 emission from energy use.

Further efforts are also needed to better evaluate sinks and indirect effects and to calculate net GHG emissions.

OZONE LAYER

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 supply of methyl bromide and HCFCs (by 2005 and 2020 respectively) in industrialised countries, and to reduce international movements of existing CFCs.

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 175 parties, including all OECD countries.

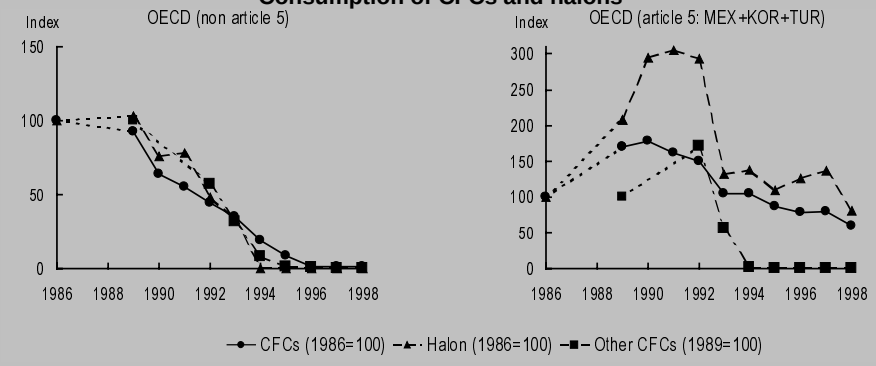
The indicators presented here relate to the consumption (i.e. production + imports - exports) of CFCs, halons, HCFCs, and methyl bromide, as listed in Annex A, B, C and E of the Montreal protocol. Basic data are weighted with the ozone depleting potentials (ODP) of the individual substances.

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 in particular with indicators on ground-level UV-B radiation and on atmospheric concentrations of ODS over cities.

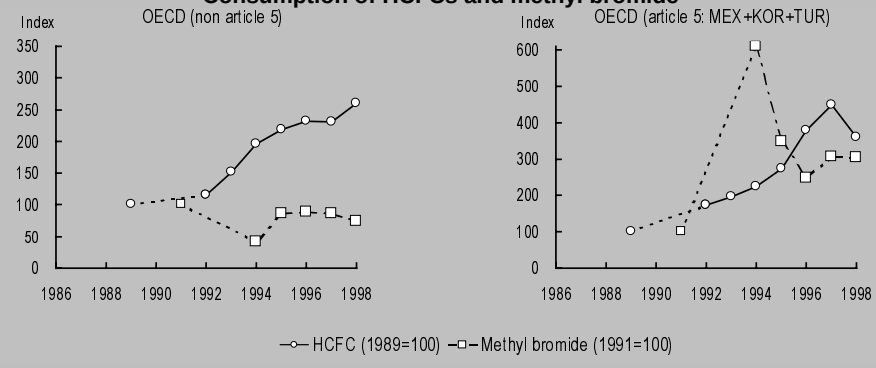
MONITORING TRENDS

2

Consumption of CFCs and halons

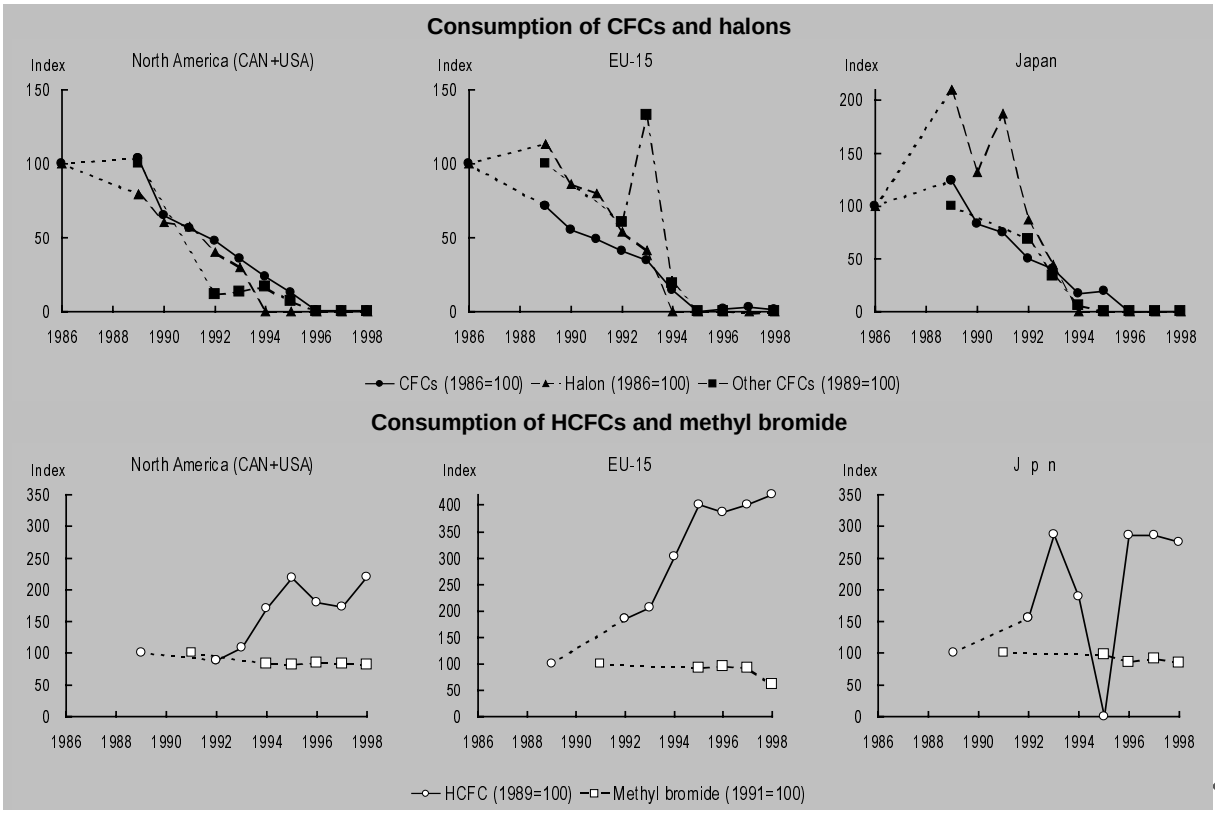


Consumption of HCFCs and methyl bromide



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

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 (e.g. from previous production or consumption).

Growth rates of HCFC consumption and related concentrations in the atmosphere are still increasing. HCFCs have only 2 to 5 % of the ozone depleting potential of CFCs. Under current international agreements they will not be phased out completely for 20 years and will remain in the stratosphere for a long time thereafter.

THE BASIS: THE OECD CORE SET OF ENVIRONMENTAL INDICATORS

Core set indicators		Measurability
ISSUE – OZONE LAYER DEPLETION		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, should further be aggregated into a consumption index.
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**	
Responses	♦ Stratospheric ozone levels ♦ **CFC recovery rate**	

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

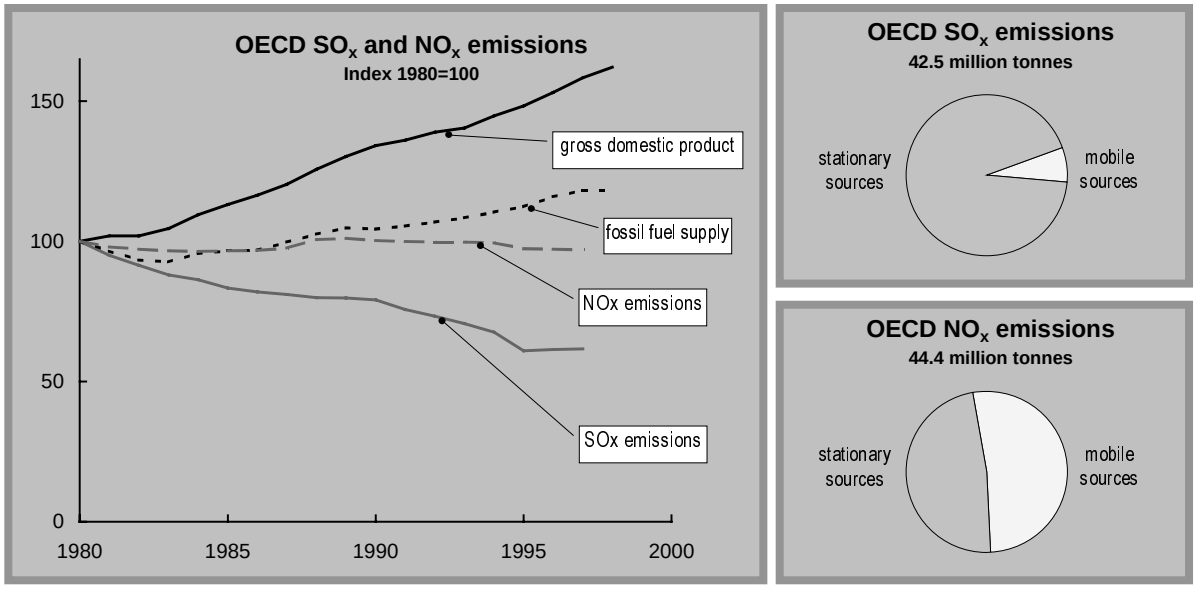
Environmental performance can be assessed against domestic objectives and international commitments. In Europe and North America, acidification has led to several international agreements among which the Convention on Long-Range Transboundary Air Pollution (1979), and its protocols to reduce emissions 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 and per capita for the late 1990s, and related changes since 1980.

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.

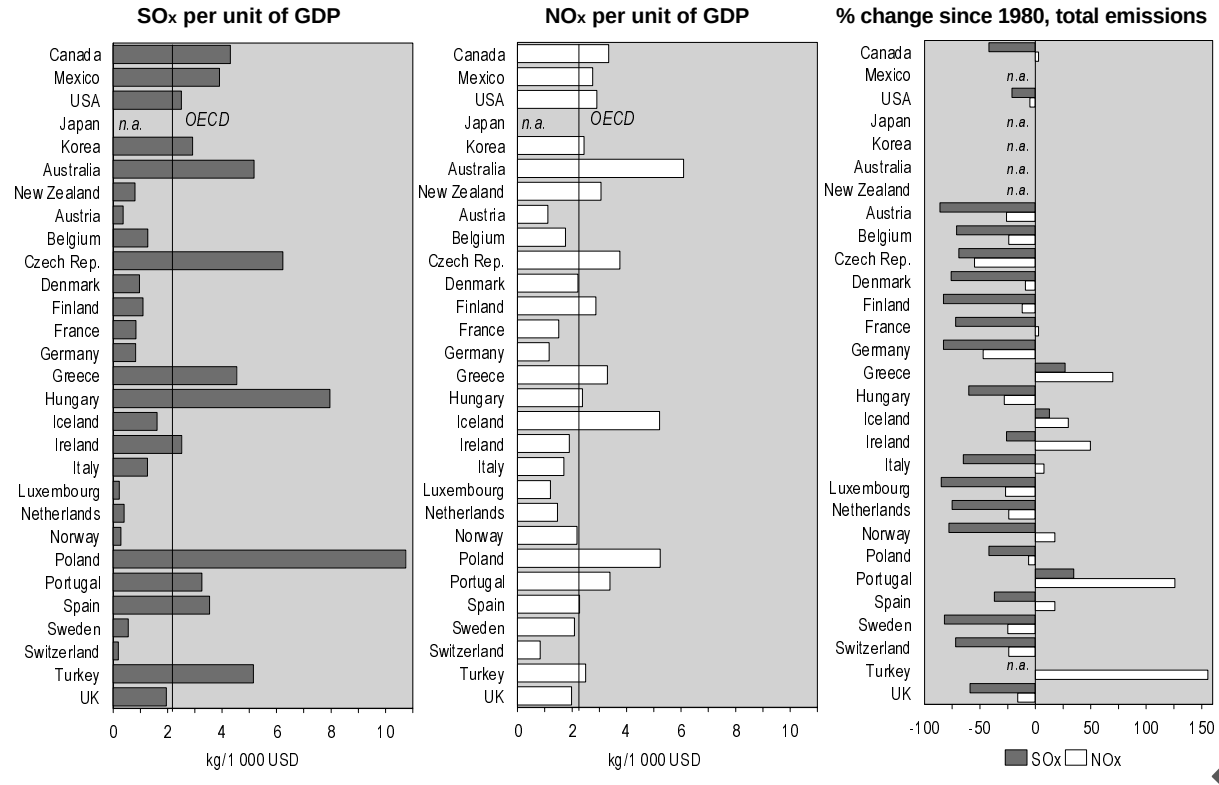
3

MONITORING TRENDS



Over the past 20 years, emissions of acidifying substances and related transboundary air pollution have been considerably reduced throughout the OECD. Compared to 1980 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 1980.

CURRENT STATE – EMISSION INTENSITIES



Emission intensities for SOx show significant variations among OECD countries. Total emissions have decreased significantly in a majority of the countries. European countries' early commitments to reduce SOx emissions have been achieved, and new agreements have been adopted in Europe and North America to reduce acid precipitation even further (Gothenburg Protocol).

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. In some European countries however, the commitment to stabilise NO_x emissions by the end of 1994 to their 1987 levels (Sofia Protocol) has not been met.

THE BASIS: THE OECD CORE SET OF ENVIRONMENTAL INDICATORS

Core set indicators		Measurability
ISSUE: ACIDIFICATION		
Pressures	♦ **Index of acidifying substances** – Emissions of NOx and SOx	International data on SOx and NOx emissions are available. 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 (PM10, PM2.5, 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.
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**	

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

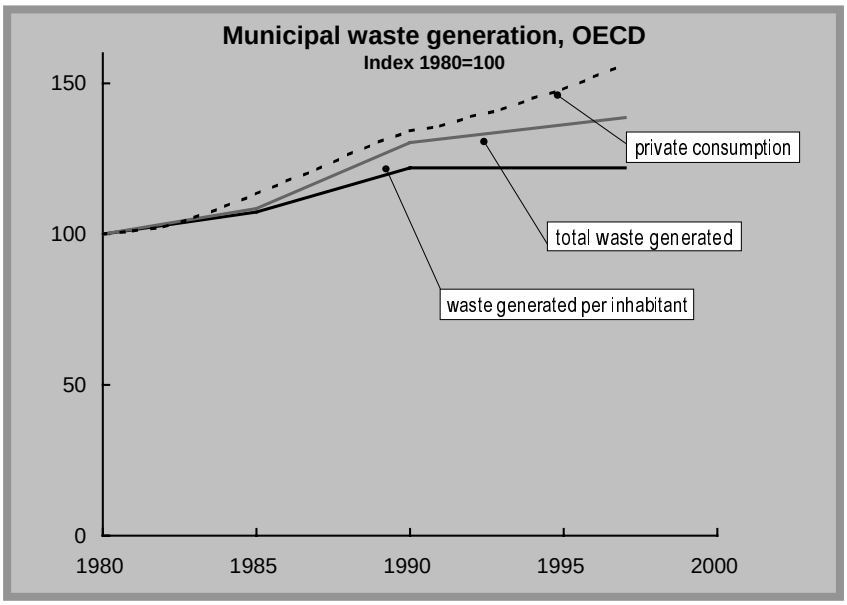
- *Environmental performance can be assessed against national objectives and international agreements such as OECD Decisions and Recommendations and the Basel Convention (1989).*

- *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 late 1990s, and related changes since 1980.*

- *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

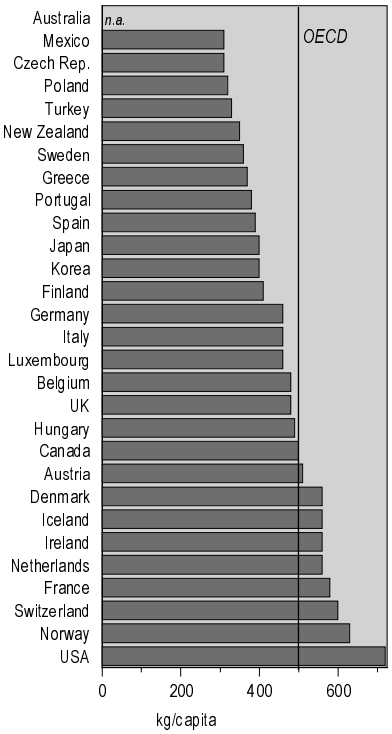
MONITORING TRENDS



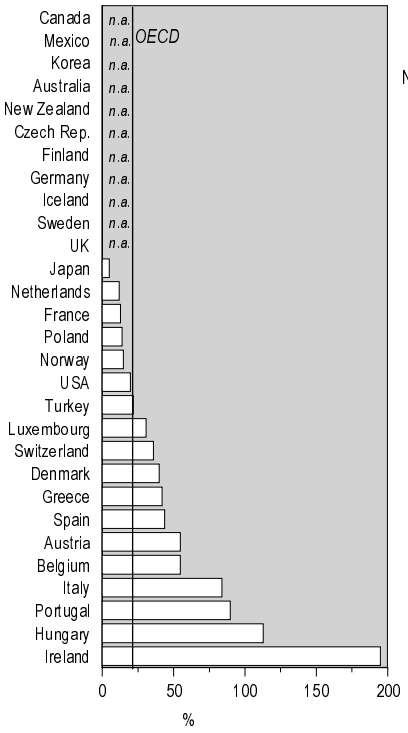
- *The quantity of municipal waste generated in the OECD area has risen from 1980 and reached 540 million tonnes in the late 1990s (500 kg per inhabitant). Generation intensity per capita has risen mostly in line with private final consumption expenditure and GDP, with however a slight slowdown in recent years.*

CURRENT STATE – GENERATION INTENSITIES

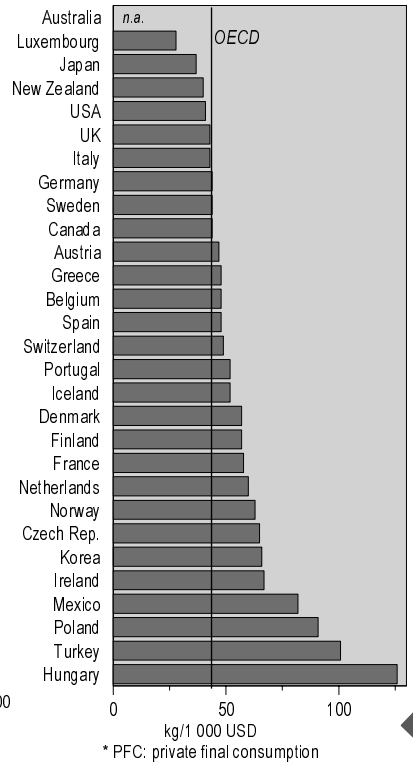
Municipal waste per capita



(per capita) change since 1980



Municipal waste per unit of PFC*



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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;
- 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

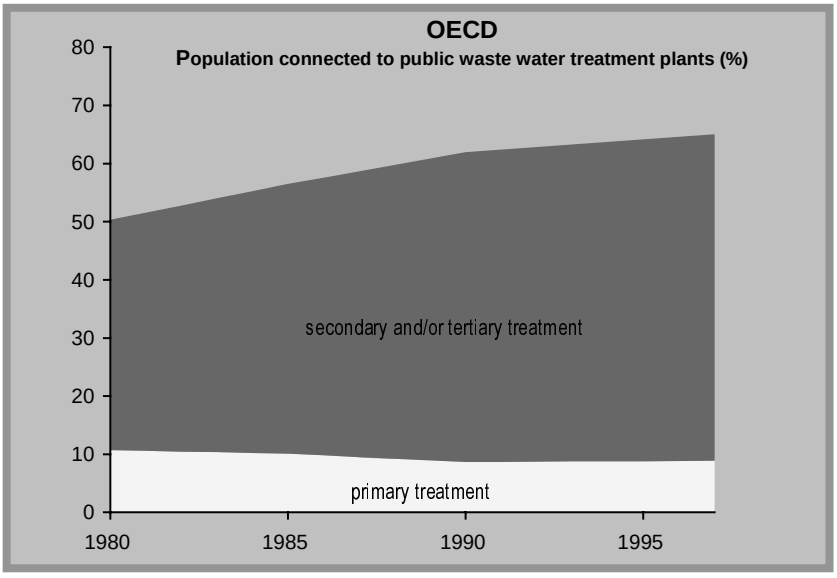
Environmental performance can be assessed against domestic objectives (e.g. receiving water standards, effluent limits, pollution load reduction targets) and international commitments. Main international agreements and legislation include the OSPAR Convention on the Protection of the North-East Atlantic 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).

The indicators presented here relate to waste water treatment. They show the percentage of the national population actually connected to public waste water treatment plants in the late 1990s. The extent of secondary (biological) and/or tertiary (chemical) treatment provides an indication of efforts to reduce pollution loads.

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.

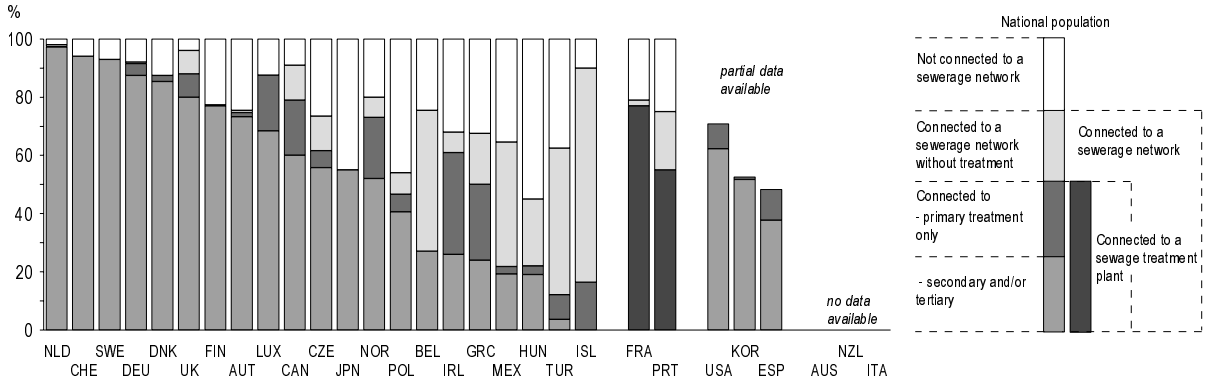
5

MONITORING TRENDS



OECD countries have progressed with basic domestic water pollution abatement. The OECD-wide share of the population connected to a municipal waste water treatment plant rose from 50 % in the early 1980s to more than 60 % 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. 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.
Conditions	♦ **BOD/DO in inland waters** ♦ **Concentration of N & P in inland waters**	
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**	

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.

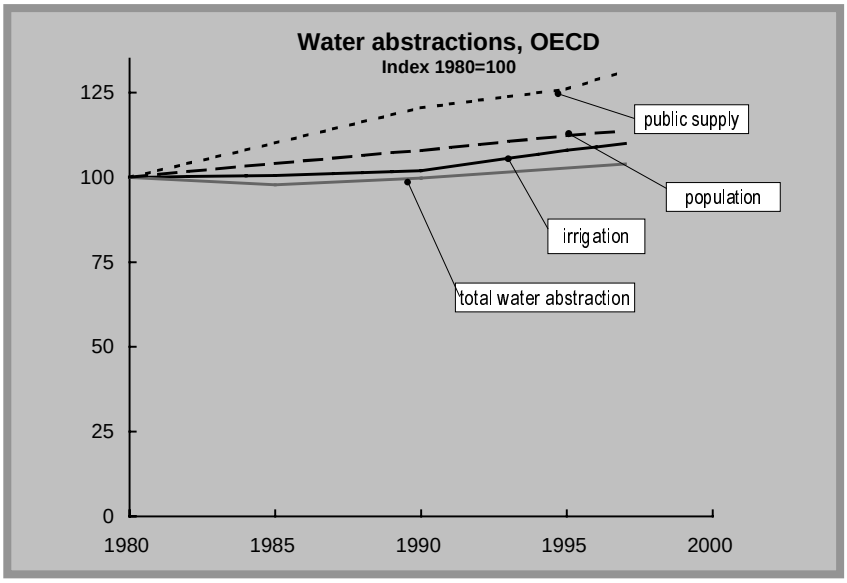
MEASURING PERFORMANCE

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.

The indicators presented here relate to the intensity of use of water 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 late 1990s.

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 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.

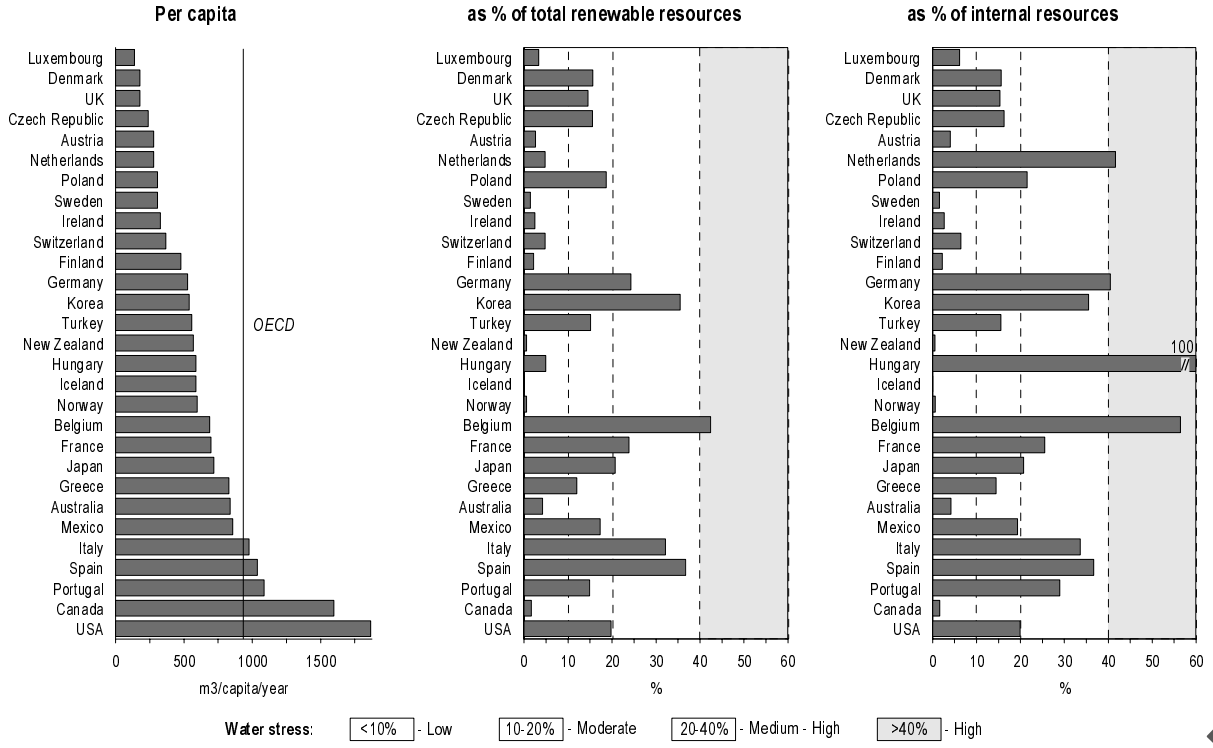
MONITORING TRENDS



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, late 1990s



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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 this century. Agriculture is the largest user of water world-wide; global abstractions for irrigation 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

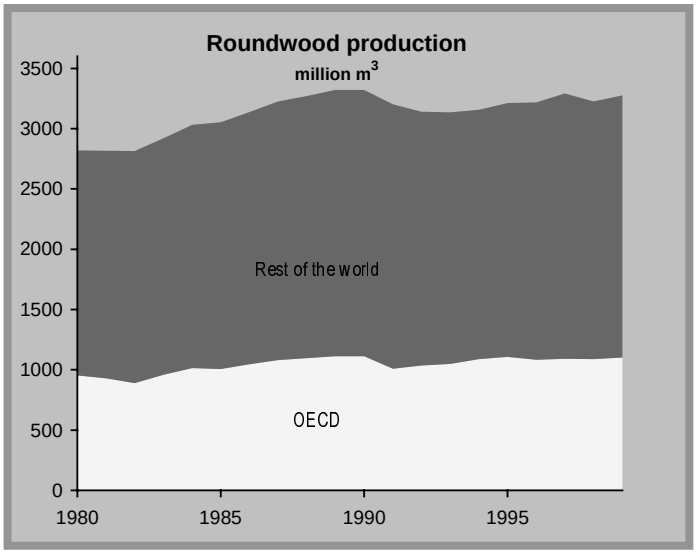
Environmental performance can be assessed against national objectives and international principles on sustainable forest management adopted at UNCED (Rio de Janeiro, 1992). Other international initiatives are the Ministerial Conferences for the Protection of Forests in Europe (Strasbourg, 1990; Helsinki, 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.

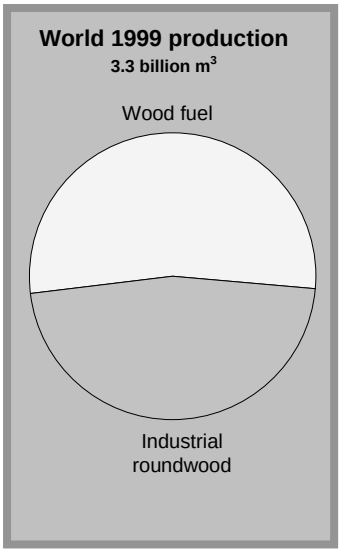
The indicator presented here relates to the intensity of use of forest resources (timber), relating actual harvest to annual productive capacity for the late 1990s. Trends in roundwood production are provided as a complement.

When interpreting these indicators, 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 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

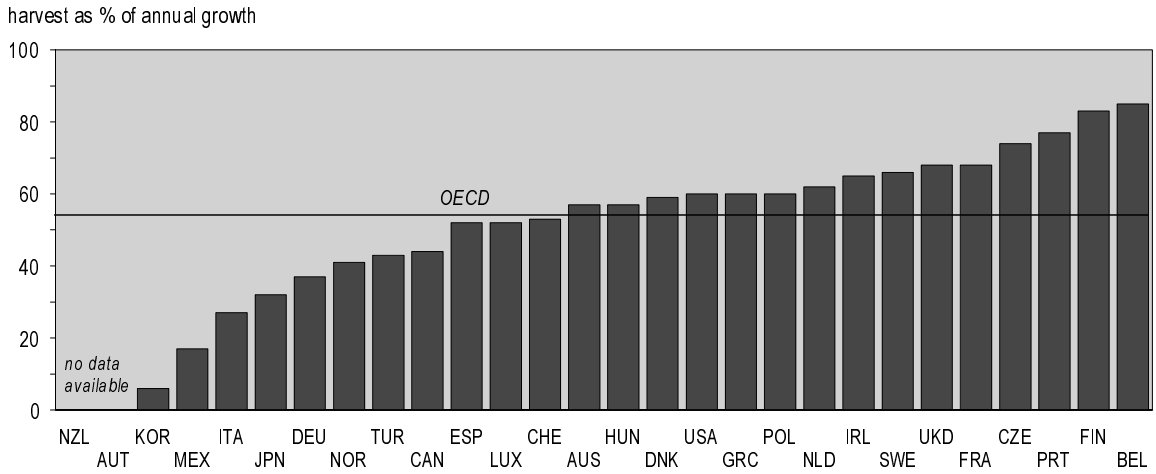
MONITORING TRENDS





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		Measurability
ISSUE: FOREST RESOURCES		
Pressures	♦ **Intensity of forest resource use** (actual harvest/productive capacity)	Data on the intensity of use of forest resources can be derived from forest accounts and from international forest statistics (e.g. from FAO and UN-ECE) for most OECD countries. Historical data however often lack comparability or are not available.
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)	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.
Responses	♦ **Forest area management and protection** (e.g. % of protected forest area in total forest area; % of harvest area successfully regenerated or afforested)	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

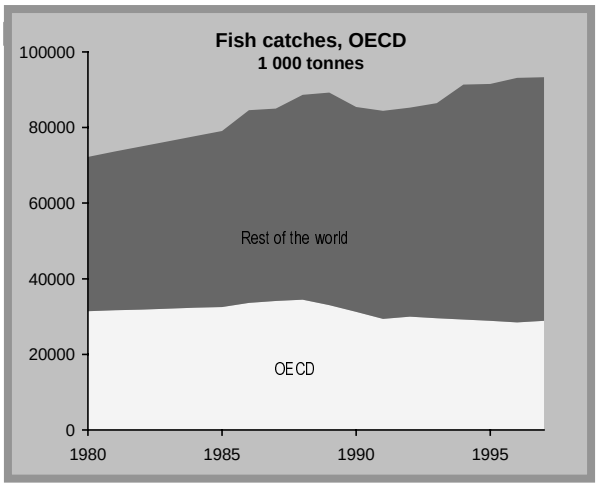
Environmental performance can be assessed against domestic objectives and bilateral and multilateral agreements such as those on conservation and use of fish resources (Atlantic Ocean, Pacific Ocean, Baltic Sea, etc.), the Rome Consensus on world fisheries, the Code of Conduct for Responsible Fishing (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, plans are being made to address the issue of illegal, unreported and unregulated (IUU) fishing.

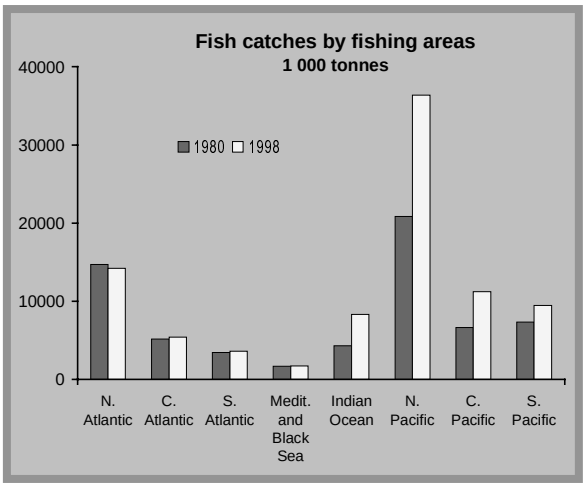
The indicator presented here relates to fish catches expressed as % of world captures and changes in total catches since 1980. Fish production from aquaculture is not included. The data cover catches in both fresh and marine waters.

When interpreting these indicators it should be kept in mind that they give insights into quantitative aspects of fish resources. They 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. They can further be related to data on national fish consumption.

8

MONITORING TRENDS

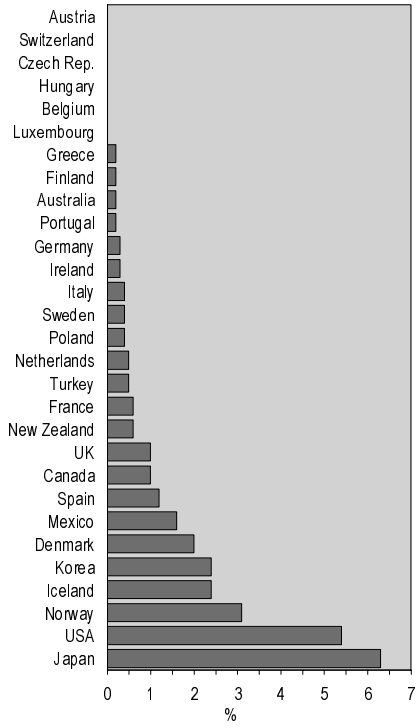




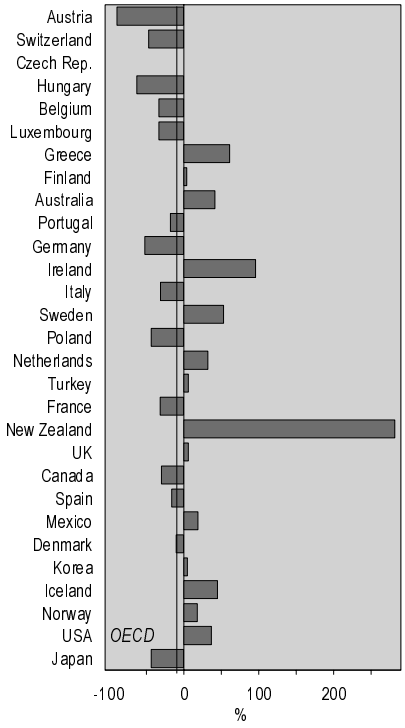
Of 441 marine stocks fished world-wide, more than 28 % are estimated to be overfished (18%), depleted (9%) or recovering (1%), while about 47 % are fully exploited. Trend analysis shows large differences among OECD countries and among fishing areas, with high increases in some areas (e.g. the Pacific and Indian Oceans) and decreases in others (e.g. the North Atlantic). Only a few of the fish stocks in areas closest to OECD countries have significant potential for additional exploitation; the North Atlantic and parts of the Pacific areas are already being overfished.

CURRENT STATE - FISH CATCHES

Share of world catches



Total catches: change since 1980



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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 is gaining in 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.

THE BASIS: THE OECD CORE SET OF ENVIRONMENTAL INDICATORS

Core set indicators	
ISSUE – FISH RESOURCES	
Pressures	♦ **Fish catches**
Conditions	♦ **Size of spawning stocks** – Overfished areas
Responses	♦ **Fishing quotas** (Number of stocks regulated by quotas) – Expenditure for fish stock monitoring

Measurability

Fish catches and production data are available from international sources 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.

Data on the size of major fish populations exist but are scattered across national and international sources.

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

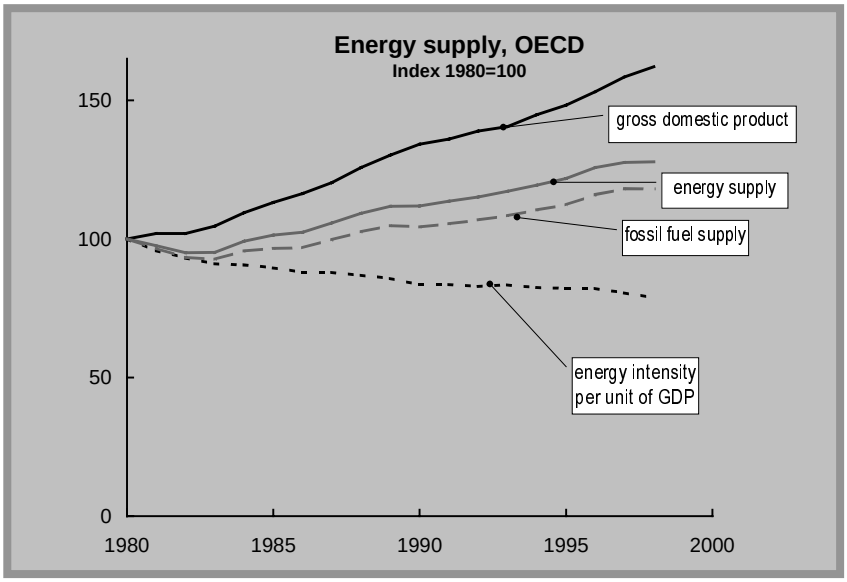
Environmental performance can be assessed against domestic objectives such as energy efficiency targets, and targets concerning the share of renewable energy sources; and against international environmental commitments that have direct implications for domestic energy policies and strategies (e.g. the United Nations Framework Convention on Climate Change (1992), 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, expressed per unit of GDP and per capita, and related changes since 1980. They reflect, at least partly, changes in energy efficiency and efforts to reduce atmospheric emissions.

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.

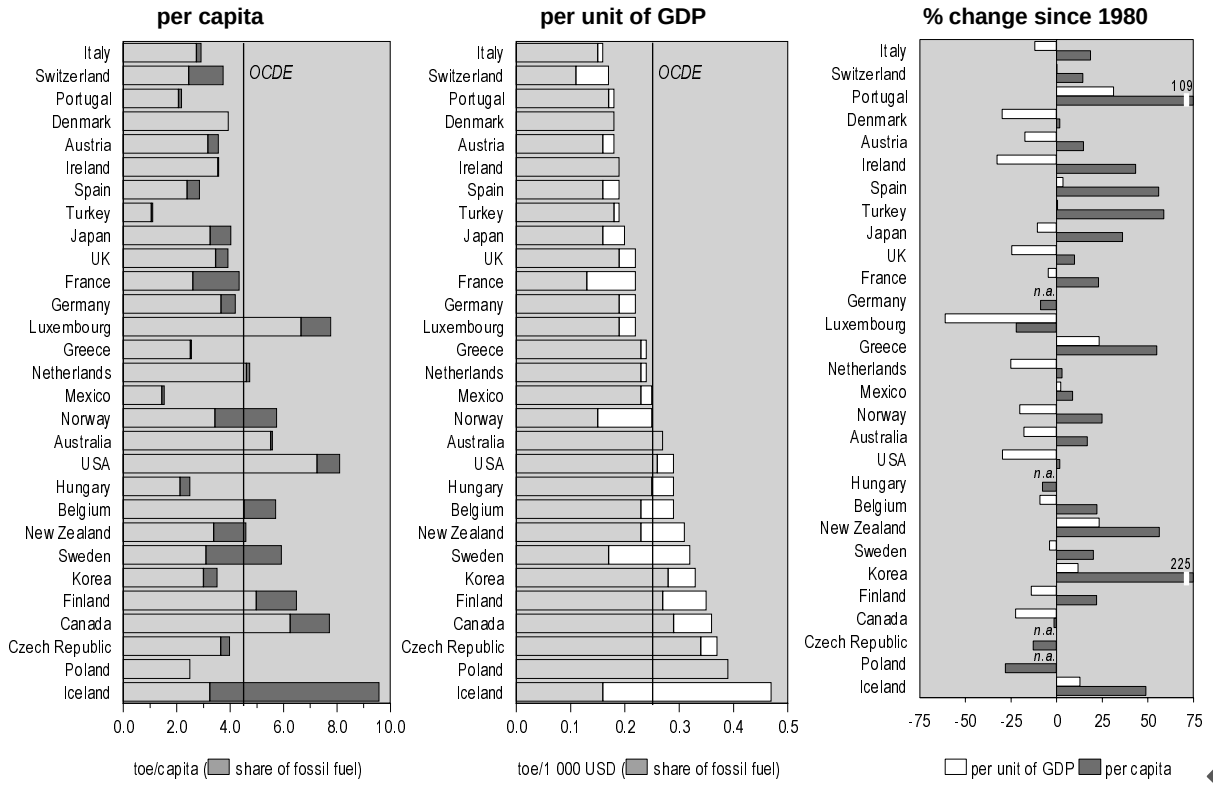
9

MONITORING TRENDS



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

CURRENT STATE - ENERGY SUPPLY INTENSITIES



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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 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 rose. This trend is particularly visible in OECD Europe. The rates of change, however, vary widely by country.

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

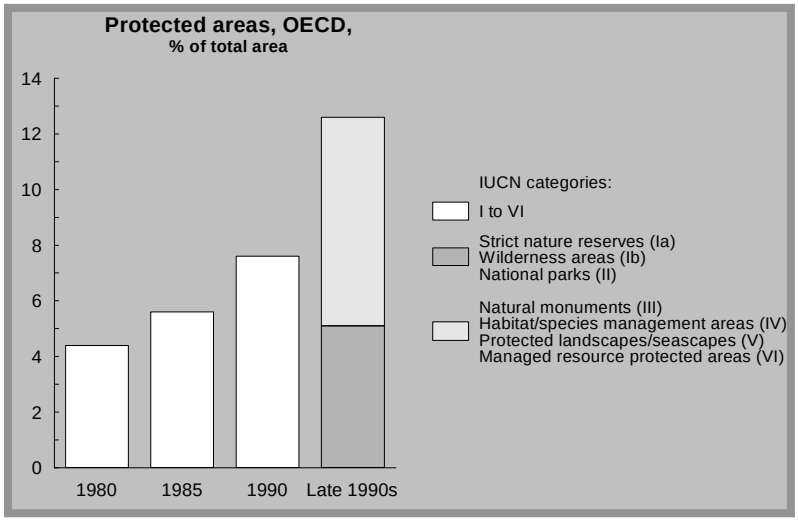
Environmental performance can be assessed against domestic objectives and international agreements such as: the Convention on Biological Diversity (1992), the Convention on the Conservation of Migratory Species of Wild Animals (1979), the Convention on International Trade in Endangered Species of Wild 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).

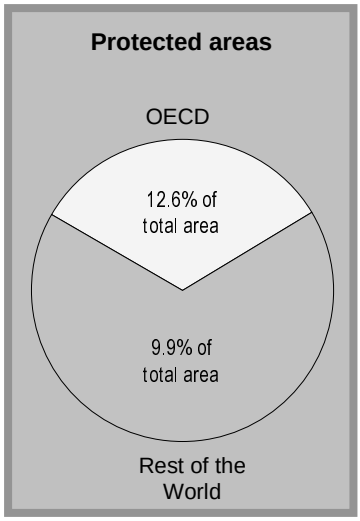
The indicators presented here relate to the number of threatened or extinct species compared to the number of known or assessed species. "Threatened" refers to species in danger of extinction and species likely to soon be in danger of extinction. Trends in protected areas are provided as a complement.

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.

10

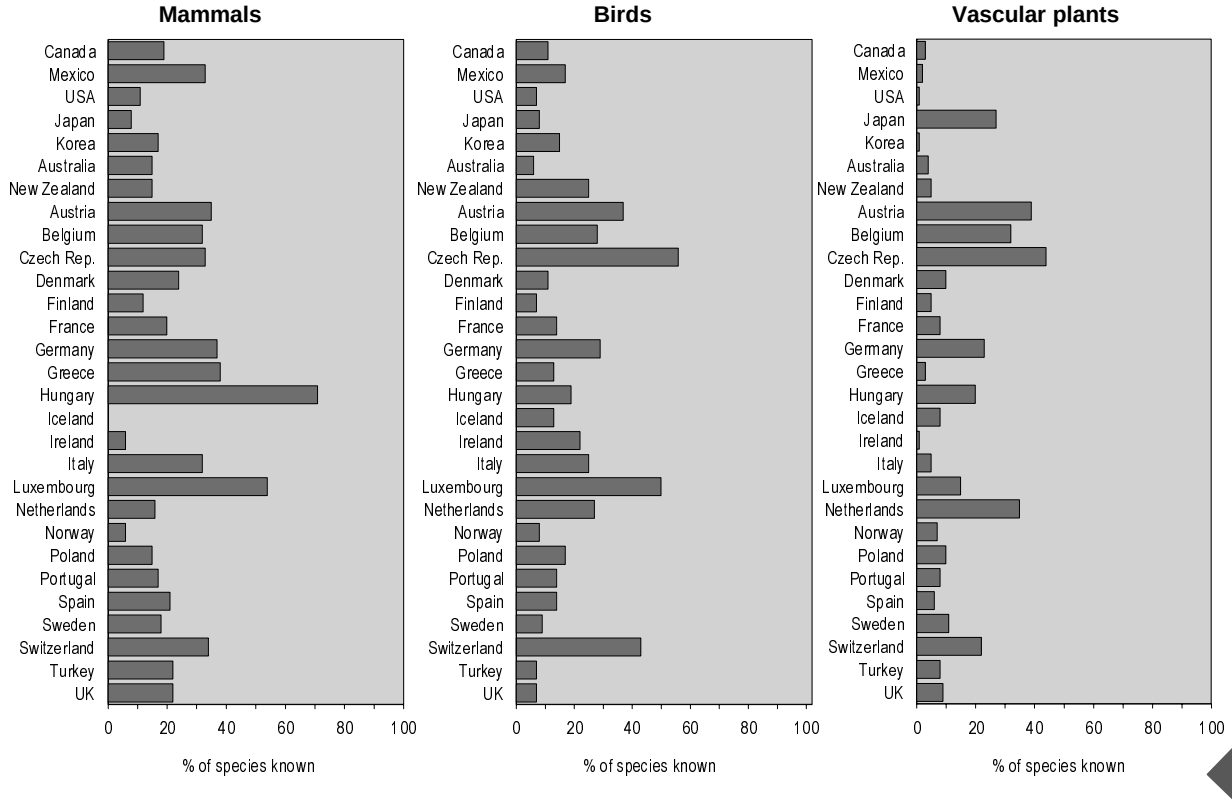
MONITORING TRENDS





The number and extent of protected areas has increased significantly since 1980 in almost all countries, reaching 12 % 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



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This indicator shows a high percentage of species threatened; figures higher than 30 % are often reached in particular for animal species. The levels are particularly high 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.)

THE BASIS: THE OECD CORE SET OF ENVIRONMENTAL INDICATORS

Core set indicators

ISSUE: BIODIVERSITY

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

Measurability

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.

ANNEX:
OECD FRAMEWORK FOR ENVIRONMENTAL INDICATORS

ANNEX

THE OECD PROGRAMME ON ENVIRONMENTAL INDICATORS

PURPOSES

The OECD programme on environmental indicators, initiated in 1989, has three major purposes:

- Tracking environmental progress;
- Ensuring that environmental concerns are taken into account when policies are formulated and implemented for various sectors, such as transport, energy, agriculture;
- Ensuring similar integration of environmental concerns into economic policies.

RESULTS[1]

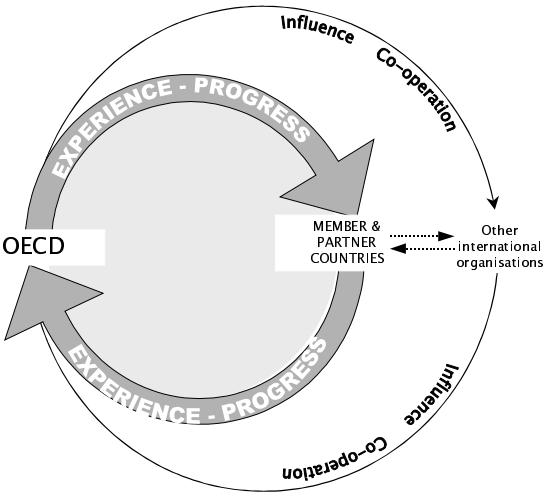
The OECD work on environmental indicators is carried out in close co-operation with OECD Member countries. It has led to:

- Agreement by Member countries to use the pressure-state-response (PSR) model as a common framework;
- Identification and definition of a core set of environmental indicators supplemented with sectoral sets of indicators, based on their policy relevance, analytical soundness and measurability;
- Measurement and publication of these indicators for Member countries.

USES

The OECD's environmental indicators are regularly published and used, for instance in countries' *environmental performance reviews*. They help analyse environmental policies and gauge the results and monitor the integration of economic and environmental decision making. These indicators also contribute to the broader objective of *reporting on sustainable development*.

LINKS WITH NATIONAL AND OTHER 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 (formerly Working Group on the State of the Environment).

Results of OECD work, and in particular its conceptual framework, have in turn influenced similar activities by a number of countries and international organisations. Continued co-operation is taking place in particular with: UNSD, UNCSD 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 Russia and China.

1. *For further details on the OECD work for environmental indicators, see:*
   - 🕮 *"Environmental Indicators – A Preliminary Set", OECD, Paris, 1991*
   - 🕮 *"Environmental Indicators – OECD Core Set", OECD, Paris, 1994*
   - 🕮 *"Towards Sustainable Development – Environmental Indicators", OECD, Paris, 1998 and 2001 [forthcoming]*

ANNEX

THE OECD SETS OF ENVIRONMENTAL INDICATORS

THREE CATEGORIES OF INDICATORS

Work carried out to date includes three categories of indicators, each corresponding to a specific purpose and framework.

TRACKING PROGRESS: THE OECD CORE SET OF ENVIRONMENTAL INDICATORS

The OECD Core Set is a set commonly agreed upon by OECD countries for OECD use. It is published regularly. The Core Set, of about 50 indicators, covers issues that reflect the main environmental concerns in OECD countries. It incorporates major indicators derived from sectoral sets as well as 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.

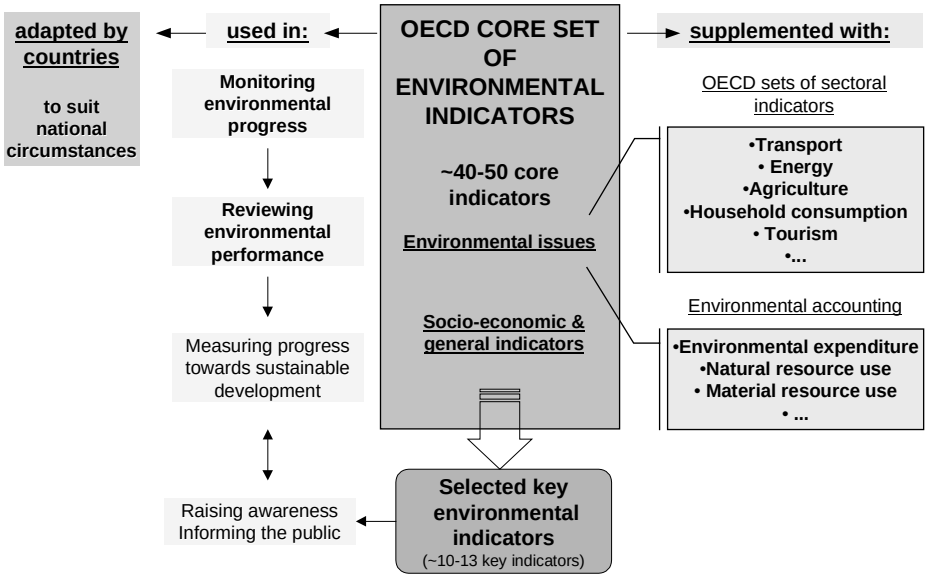
PROMOTING INTEGRATION: OECD SECTORAL INDICATORS

In addition, OECD sets of sectoral indicators focus on specific sectors. Indicators are classified following an adjusted PSR model:

- sectoral trends of environmental significance,
- their interactions with the environment (including positive and negative effects);
- related economic and policy considerations.

PROMOTING INTEGRATION: ENVIRONMENTAL ACCOUNTING

Environmental indicators are also derived from the OECD work on environmental accounting focusing on i) physical natural resource accounts, related to sustainable management of natural resources, and ii) environmental expenditure. Examples of these indicators are the intensity of natural resource use and the level and structure of pollution abatement and control expenditure.



All these indicator sets are closely related to each other. Countries are encouraged to adapt them to suit their national circumstances.

One important new element of the OECD's indicator work is the small set of key indicators intended to raise public awareness and to focus attention on key issues of common concern.

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