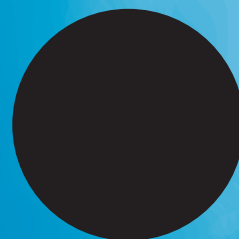




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FOREWORD

The principal aim of the OECD's Environmental Performance Reviews programme is to *help member countries improve their individual and collective performances in environmental management* with the following primary goals:

- to help *individual governments* assess progress;
- to promote a continuous policy *dialogue among member countries*, through a peer review process; and
- to stimulate *greater accountability* from member countries' governments towards their public opinion, within developed countries and beyond.

Environmental performance is assessed with regard to the degree of achievement of *domestic objectives and international commitments*. Such objectives and commitments may be broad aims, specific qualitative goals, precise quantitative targets or a commitment to a set of measures to be taken. Assessment of environmental performance is also placed within the context of historical environmental records, the present state of the environment, the physical endowment of the country in natural resources, its economic conditions and demographic trends.

These systematic and independent reviews have been conducted for all member countries as part of the first cycle of reviews. The OECD is now engaged in the second cycle of reviews directed at *promoting sustainable development*, with emphasis on implementation of domestic and international environmental policy, as well as on the integration of economic, social and environmental decision-making.

The present report reviews environmental performance of Finland. The OECD extends its most sincere thanks to all those who helped in the course of this review, to the representatives of member countries to the Working Party on Environmental Performance, and especially to the examining countries (Austria, Japan and the Netherlands) and their experts. The OECD is particularly indebted to the Government of Finland for its co-operation in expediting the provision of information and the organisation of the experts' mission to Finland, and in facilitating contacts with many individuals both inside and outside administrative and governmental structures. The present review benefited from grant support from Switzerland and Hungary.

The OECD Working Party on Environmental Performance conducted the review of Finland at its meeting on 18 February 2009 and approved its conclusions and recommendations.

Lorents G. Lorentsen
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TABLE OF CONTENTS

1. CONCLUSIONS AND RECOMMENDATIONS	15
1. Environmental Management	16
Strengthening the implementation of environmental policies.....	16
Air.....	17
Noise.....	19
Waste	21
Nature and biodiversity	22
2. Towards Sustainable Development.....	24
Integrating environmental concerns into economic decisions.....	24
Integration of environmental and social decisions	25
3. International Co-operation	26

Part I

ENVIRONMENTAL MANAGEMENT

2. AIR	29
Recommendations.....	30
Conclusions	30
1. Policy Objectives.....	31
2. Air Pollution Trends	34
2.1 Traditional air pollutants.....	34
2.2 Toxic contaminants.....	38
2.3 Assessment	39
3. Ambient Air Quality.....	40
3.1 Urban air quality	40
3.2 Rural air quality	41
3.3 Assessment	42
4. Transport Policy	43
4.1 Fuel quality	46
4.2 Vehicles.....	46
4.3 Public transport.....	48
4.4 Assessment	48
5. Energy Policy	50
5.1 Energy efficiency	51
5.2 Renewable energy.....	51
5.3 Assessment	53
Selected Sources	57

3. NOISE	59
Recommendations.....	60
Conclusions	60
1. Institutional Framework	61
1.1 Legislation and objectives	61
1.2 Institutional setting	63
2. Progress in Managing Noise Exposure	63
2.1 Trends and effects	63
2.2 Street traffic noise.....	65
2.3 Road traffic noise.....	65
2.4 Railway noise	66
2.5 Air traffic noise.....	67
2.6 Industrial and construction noise.....	67
3. Financing Noise Abatement.....	67
4. Future Developments	68
Selected Sources	72
4. WASTE	73
Recommendations.....	74
Conclusions	74
1. Policy Framework	75
2. Performance in Meeting Targets	77
2.1 Waste generation and progress towards reduction targets	77
2.2 Waste recovery.....	79
2.3 Waste disposal and thermal treatment	88
2.4 Soil remediation.....	90
2.5 Waste management expenditure	91
3. Looking Forward.....	91
3.1 National Waste Plan to 2016	91
3.2 Reforms underway.....	92
Selected Sources	95
5. NATURE AND BIODIVERSITY	97
Recommendations.....	98
Conclusions	98
1. Objectives of Finnish Policy on Nature and Biodiversity	99
2. Institutional Framework	101
3. Protection of Species.....	102
4. Habitat Protection.....	107
4.1 Network of protected areas.....	108
4.2 Protection of water habitats	112

5. Sectoral Integration: Forestry and Tourism.....	115
5.1 Forests: a key role in preserving nature and biodiversity.....	115
5.2 Nature tourism: a rapidly growing sector.....	119
6. International Co-operation.....	120
7. Financing Nature and Biodiversity Conservation.....	120
Selected Sources.....	124

Part II

SUSTAINABLE DEVELOPMENT

6. ENVIRONMENT – ECONOMY INTERFACE.....	125
Recommendations.....	126
Conclusions.....	126
Integrating environmental concerns into economic decisions.....	126
Strengthening the implementation of environmental policies.....	127
1. Sustainable Development.....	128
1.1 Decoupling environmental pressures from economic growth.....	128
1.2 Sustainable development and institutional integration.....	134
1.3 Sustainable development in practice: market-based integration.....	138
1.4 Environmental expenditure and financing.....	149
2. Implementing Environmental Policy.....	152
2.1 Planning and objective setting.....	152
2.2 Legal and institutional framework.....	153
2.3 Regulatory instruments.....	157
2.4 Economic instruments.....	162
2.5 Private sector initiatives.....	166
2.6 Land use planning.....	168
Selected Sources.....	174
7. ENVIRONMENTAL – SOCIAL INTERFACE.....	177
Recommendations.....	178
Conclusions.....	178
1. Environment and Health.....	182
1.1 Objectives.....	182
1.2 Exposure to health risks.....	183
1.3 Environmental health perspectives.....	187
2. Environmental Democracy.....	188
2.1 Provision and access to environmental information.....	188
2.2 Public participation.....	190
2.3 Access to justice.....	192

3. Sustainable Development in Education.....	193
4. Environment and Employment.....	194
Selected Sources	198

Part III

INTERNATIONAL COMMITMENTS

8. INTERNATIONAL CO-OPERATION	201
Recommendations.....	202
Conclusions	202
1. Climate Change.....	204
1.1 Challenging trends.....	204
1.2 Climate and energy policies	206
1.3 Post Kyoto	210
1.4 Forest sinks.....	211
2. Marine Pollution: The Baltic Sea.....	212
2.1 Pollution from land-based sources: domestic measures	213
2.2 Pollution from land-based sources: international co-operation.....	217
2.3 Pollution from ships	220
3. Trade and the Environment	223
3.1 Ozone depleting substances.....	223
3.2 Hazardous substances.....	225
3.3 Endangered species.....	227
4. Official Development Assistance	228
5. Regional and Bilateral Co-operation.....	229
5.1 Nordic co-operation.....	230
5.2 Arctic co-operation.....	230
5.3 Baltic co-operation.....	232
5.4 Bilateral co-operation with Russia	233
Selected Sources	239

REFERENCES

I.A Selected environmental data.....	242
I.B Selected economic data	244
I.C Selected social data	246
II.A Selected multilateral agreements (worldwide).....	248
II.B Selected multilateral agreements (regional).....	254
III. Abbreviations	258
IV. Physical context.....	261
V. Selected environmental websites.....	262

LIST OF FIGURES, TABLES AND BOXES

Figures

Map of Finland.....	13
2.1 Air pollutant emissions.....	36
2.2 Transport sector.....	44
4.1 Municipal waste generation.....	81
4.2 Municipal waste generation and treatment.....	81
4.3 Consumption and recovery of paper and cardboard.....	84
5.1 Fauna and flora.....	104
5.2 Threatened species, by habitat type.....	108
5.3 Protected areas.....	109
5.4 State and forest-owner funding of investments in non-industrial private forestry.....	116
5.5 Implementation of land acquisition programmes.....	118
6.1 Economic structure and trends.....	131
6.2 Energy structure and intensity.....	133
6.3 Material intensity.....	135
6.4 Road fuel prices and taxes.....	145
7.1 Social indicators.....	181
8.1 Greenhouse gas emissions in relation to the Kyoto target.....	206
8.2 CO ₂ emission intensities.....	207
8.3 Population connected to public waste water treatment plant.....	215
8.4 Trade in hazardous waste.....	226
8.5 Official development assistance.....	228

Tables

2.1 Performance regarding EU and other international air targets.....	32
2.2 Legal ambient air quality standards for the protection of human health.....	33
2.3 Emissions of traditional air pollutants.....	34
2.4 Atmospheric emissions of heavy metals.....	35
2.5 Atmospheric emissions of persistent organic pollutants.....	35
2.6 Fine particle emission outlook.....	39
2.7 Trends in exceedances of air quality standards.....	41

2.8	Acid deposition.....	42
2.9	Air emissions from transport.....	45
2.10	EU emission standards for vehicles.....	47
3.1	Guidelines for environmental noise.....	62
3.2	Inhabitants living in areas subject to day time noise.....	64
4.1	Performance in meeting sectoral targets of the National Waste Plan.....	77
4.2	Treatment and disposal of packaging materials	80
4.3	Production, movement, treatment and disposal of hazardous waste	80
4.4	Performance in meeting the waste stream targets of the National Waste Plan	82
4.5	Municipal waste treatment and disposal.....	83
4.6	Waste incineration plants.....	89
4.7	Waste management expenditure by the public sector.....	90
5.1	Known and threatened species	103
5.2	Threatened species, by primary threat factor	105
5.3	Protected and wilderness areas.....	109
5.4	Public funding of nature conservation programmes.....	121
6.1	Economic trends and environmental pressures	132
6.2	Revenues from environment-related taxes	143
6.3	Environment-related taxes.....	147
6.4	Energy prices in selected OECD countries	148
6.5	Environmental expenditure.....	150
6.6	Public environmental expenditure	151
6.7	Selected environment-related legislation.....	154
6.8	Accidents reported to the Safety Technology Authority	157
6.9	Reports of environmental offences to the Police.....	162
7.1	Regional population distribution	182
7.2	Public health effects of selected environmental factors	184
8.1	Greenhouse gas emissions.....	205
8.2	Key climate change adaptation challenges, by sector	208
8.3	Key climate policy measures for the Kyoto period	209
8.4	Progress in implementing the 3rd National Water Protection Programme	214
8.5	Nutrient loads from Finland to the Baltic Sea.....	216
8.6	Gross nitrogen and phosphorus balance estimates	216
8.7	Pollution hot spots in the Baltic Sea catchment area.....	217
8.8	Control of ships calling at Finnish ports	222

Boxes

2.1	The Kola Peninsula.....	43
2.2	The regional transport subsidy	50
2.3	Energy efficiency agreements.....	52
3.1	Noise Action Plan of the City of Helsinki.....	66
3.2	Designating quiet areas	69
4.1	Waste management in the Helsinki Metropolitan Area.....	86
5.1	National Biodiversity Strategy and Action Plan for the conservation and sustainable use of biodiversity (2006-16).....	100
5.2	Implementation of the Bonn Convention	105
5.3	Hunting, fishing and reindeer herding.....	111
5.4	Implementation of the Ramsar Convention.....	113
5.5	Importing wood from Russia.....	117
6.1	The economic context.....	129
6.2	UE support mechanisms of regional and agricultural policy in Finland	140
6.3	Support to renewable energy sources	141
6.4	Prevention of major industrial accidents	156
6.5	Best Available Techniques (BAT) and General Binding Rules (GBRs) in industrial operations.....	158
6.6	Economic instruments	163
6.7	Promoting eco-innovation	167
7.1	Social context	179
7.2	Addressing exposure to indoor radon.....	185
7.3	Environmental data (Hertta) and compliance monitoring data (Vahti) systems	189
8.1	The Gulf of Finland: bilateral co-operation to reduce marine pollution	218
8.2	Corporate environmental responsibility and the paper mill of Fray Bentos (Uruguay).....	224
8.3	Environmental co-operation within regional Nordic, Baltic and Arctic frameworks	231

Signs

The following signs are used in Figures and Tables:

- . . : not available
- : nil or negligible
- . : decimal point

The sign * indicates that not all countries are included.

Country Aggregates

OECD Europe: All European member countries of the OECD (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).

OECD: The countries of OECD Europe plus Australia, Canada, Japan, the Republic of Korea, Mexico, New Zealand and the United States.

Country aggregates may include Secretariat estimates.

Currency

Monetary unit: Euro (EUR)

In 2008, EUR 0.68 = USD 1

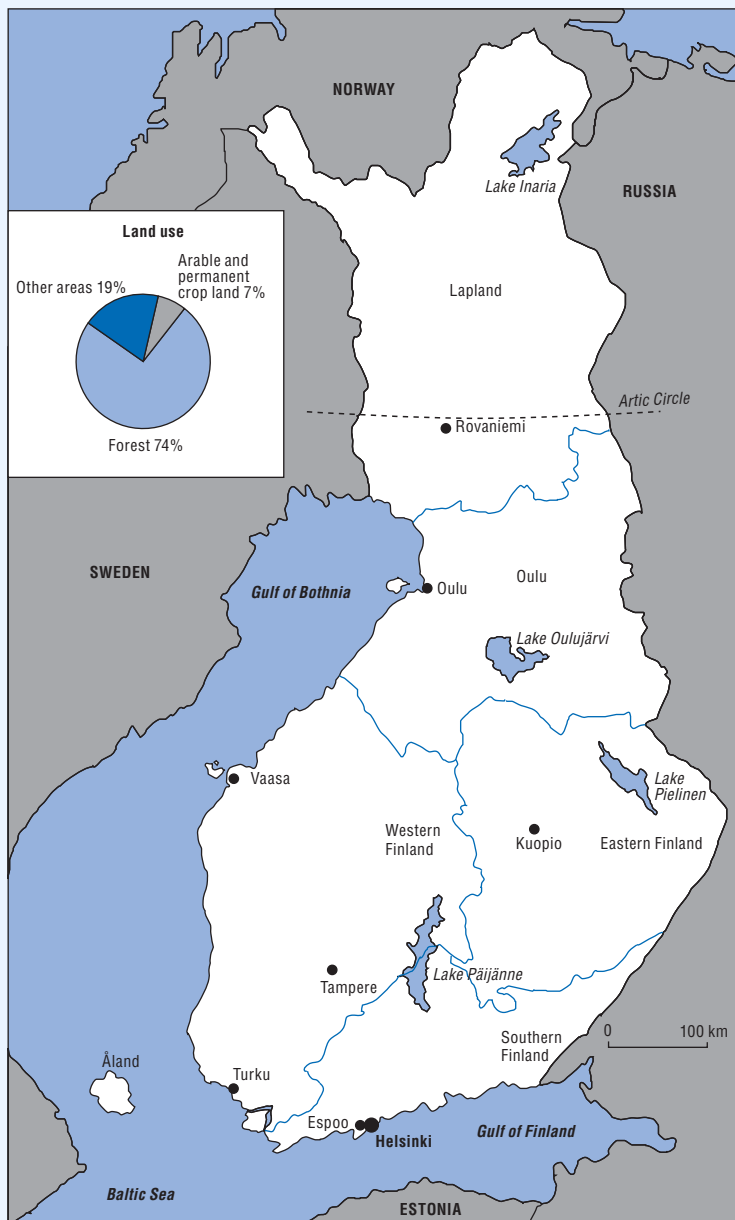
Cut-off Date

This report is based on information and data available up to December 2008.

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Map of Finland



Source: OECD, Environment Directorate.

1

CONCLUSIONS AND RECOMMENDATIONS*

This report examines Finland's progress since the previous OECD Environmental Performance Review in 1997, and the extent to which the country has met its *domestic objectives and honoured its international commitments*. The report also reviews Finland's progress in the context of the OECD *Environmental Strategy for the First Decade of the 21st Century*.** Some 43 recommendations are made that should contribute to further environmental progress in Finland.

Over the review period (1997-2008), Finland has sustained the *economic growth* initiated just before it acceded to the European Union in 1995; the Finnish economy has grown at a higher rate than the OECD average and Finland now ranks in the first half of OECD member countries in regard to its GDP per capita. The economic activity is expected to fall to 0.6% in 2009, as recession takes hold across OECD, before rising slowly to 1.8% in 2010. The current economic crisis could be seen as an opportunity to promote environmentally-friendly investment (*e.g.* in energy efficiency and cleaner energy) in the context of Finland's efforts to stimulate its economy. Openness to international trade and foreign direct investment, a high education level of the population, and a strong innovation record also place Finland in a good position to benefit from the opportunities of globalisation.

Finland has promoted *sustainable development* as part of its diplomacy, including in its relations with the east, with Nordic countries and as part of the European Union. The review period saw consolidation of progress and further

* Conclusions and Recommendations reviewed and approved by the Working Party on Environmental Performance at its meeting on 18 February 2009. Also available in Finnish and in Swedish.

** The objectives of the OECD Environmental Strategy are covered in the following sections of these Conclusions and Recommendations: maintaining the integrity of ecosystems (Section 1), decoupling of environmental pressures from economic growth (Sections 2.1 and 2.2) and global environmental interdependence (Section 3).

alignment with EU environmental acquis. But despite its low population density, Finland has experienced great pressures on its sensitive environment, as expressed by high energy and material intensities. Environmental policy priorities include addressing climate change, fostering co-operation to improve water quality of the Baltic Sea, enhancing biodiversity in forests, and improving waste management and material efficiency.

To meet these *challenges*, Finland will need to: *i*) strengthen its environmental management efforts (e.g. for waste and nature protection); *ii*) further integrate environmental concerns into economic decisions; and *iii*) reinforce international co-operation on environmental issues.

1. Environmental Management

Strengthening the implementation of environmental policies

Environmental legislation has been significantly enhanced over the review period: the 2000 Land Use and Building Act, the 2000 Environmental Protection Act, including subsequent amendments, and media specific legislation are consistent with the EU acquis. Introduced in 2000 and covering a larger number of installations than required by the EU IPPC Directive, *integrated permitting* has resulted in increased compliance rates. Better *compliance monitoring*, through regular inspections, advanced information database (Hertta) and inspection database (Vahti), has helped to swiftly prosecute non-compliance cases. A wide range of *economic instruments*, introduced over the review period, have provided incentives to industry and consumers to reduce environmental impacts. The *PPP and UPP* have been implemented further and cost recovery of waste and waste water services has increased. Industry has entered into *energy efficiency agreements* and increasingly relies on environmental management certification. Finland has set up an efficient financing scheme for *eco-innovation*. Active involvement of *municipalities* (staff arrangements, funding, policy instruments) has strengthened the implementation of environmental policies. The 1995 National environmental policy programme (with the 2005 horizon) established consensus-based targets and stimulated the preparation of various environmental policies and programmes.

However, nationally established environmental targets have often a guiding nature and are not sufficiently taken into account in *sectoral programming* (e.g. transport, agriculture) and at the municipal level to balance short-term economic considerations. *Cost-effectiveness* of plans and policy instruments is rarely assessed. Integrated permitting has not been accompanied by sufficient efforts to ensure *consistency of enforcement across the country*. There is a need to

streamline environmental permitting and reduce related administrative burden, further using *notifications and General Binding Rules* for regulating industrial operations. The institutional reform of the permitting system should be accompanied by a strengthened *enforcement capacity*. Meeting environmental objectives in *land use planning* is hampered by lax enforcement of construction permits. This has led to an increasing urban sprawl that raises energy consumption and generates various forms of pollution. Reducing *material intensities* should require more attention from industry and public authorities and be part of public procurement policies. Overall, environmental expenditure have decreased as a share of GDP over the review period from some 1.2% to less than 0.9%.

Recommendations:

- strengthen *environmental efforts* (e.g. investments, technological innovation), in the context of Finland's efforts to stimulate its economy;
- review the *linkages and possible synergies among environmental policy programmes*, including time-bound targets and objectives, within the framework of Finland's sustainable development strategy;
- pursue the reform of *environmental permitting* to streamline and simplify procedures while enhancing the consistency and effectiveness of enforcement actions;
- review the use of *economic instruments* to increase their environmental effectiveness and economic efficiency;
- further promote *eco-innovation* through green procurement, environmental labelling and the active involvement of businesses and other stakeholders, and consider how environmental policy instruments could be designed to better promote innovation;
- extend the scope of *energy efficiency agreements* to include material efficiency;
- strengthen coordination of *land use planning* between municipalities and state authorities; ensure effective enforcement of land use plans in coastal areas.

Air

Finland has met its policy objectives to reduce *emissions* of traditional air pollutants (for SO₂, heavy metals, POPs) or is on track to meet them (for VOCs, NH₃). Emissions of many heavy metals (arsenic, chrome, lead and nickel) have

decreased in recent years as well as emissions of most persistent organic pollutants (POPs). Finnish incinerators for hazardous waste all comply with the EU air emission limit values. Integrated assessment models are being developed to find cost-effective solutions for reducing air pollutant emissions, including fine particles. Urban *air quality* is generally high. For example, urban population exposures to air pollution by ozone and PM₁₀ have remained low by EU standards. Finnish lakes are recovering well from serious acidification problems. Concerning *transport*, emissions have decreased and are expected to further decrease, despite an increase in road traffic volume. Tax differentiation was successfully used to have only sulphur-free diesel and gasoline used on the Finnish market in 2005, ahead of the EU deadline. Efforts have been made to increase the market share of public transport in major urban areas, including through targeted subsidies and tax concessions. Transport system plans have been drawn up to better manage urban traffic congestion. Transport operators have entered into voluntary agreements to improve energy efficiency.

Recommendations:

- pursue efforts to *reduce NO_x emissions*, to meet the NO_x reduction objectives for large combustion plants, and be prepared to respond to more stringent limit values by 2020, as part of the forthcoming EU Emissions Ceilings Directive;
- explore the potential of *economic instruments*, such as emission trading, nitrogen emission taxation and road pricing; ensure that they are consistent with existing instruments, such as road fuel taxes and vehicle taxes, so as to improve economic efficiency and environmental effectiveness;
- explore the potential *ancillary benefits of the new climate and energy policies*, particularly on NO_x and particles;
- ensure coherence of recent and forthcoming *transport system plans* with land use plans, at regional and local levels, with a view to improving traffic management and promoting environment-friendly transport;
- implement EU environmental sustainability criteria for the *production of biofuels*; carry out a cost-benefit analysis to determine the relative value of biofuels, fossil and other alternative fuels.

However, curbing *NO_x and particle emissions* remains challenging for Finland, which has not met its policy objective of reducing NO_x emissions. There

is also no target for reducing particulates emissions, which fluctuate from year to year. Increased use of wood in domestic combustion remains a challenge for particle pollution. Emissions of *copper, mercury and zinc* have increased in recent years, as well as emissions of hexachlorobenzene (HCB). Fine particles remain a serious urban air quality problem. Daily PM₁₀ concentrations exceed the limit values in the most polluted areas, and it may be difficult for Finland to comply in time (by 2010) with EU's annual limit value for NO₂. The exceedance of critical loads of eutrophication affects nearly half of the ecosystems. Not enough has been made to improve the situation in the *Kola peninsula* in north-west Russia, close to the Finnish border, where emissions from industrial complexes comprise extremely high levels of SO₂, dust copper and nickel. While *road transport* is increasing for both passengers and freight, there is no road pricing per se in Finland and the end-use price of diesel is lower than the OECD-Europe average. There is a tax incentive to promote the use of biofuels (as allowed by the EU energy tax directive) for which blending with road fuels has become mandatory in 2008.

Noise

Efforts to reduce noise have a long history in Finland, as a *low-noise environment* is considered part of healthy and pleasant living conditions. Attention given to noise problems by Parliament and Government has led to *quantitative objectives* in the 2004 Noise Abatement Action Plan and the 2006 Government Resolution on Noise Abatement. *Regulations* (e.g. speed limit in city centres, noise emission and immission thresholds, regulations of aircraft take-off and landing) and *investments* (e.g. low-noise pavements, noise barriers, renewal of rail fleet and rail maintenance) have been implemented. The first *economic incentives* (air traffic noise charge, introduction of noise criteria in public procurement) have been recently introduced. Their objective is to *reduce exposure to noise* from city traffic and from night-time air traffic. In response to the 2002 EU Directive on Environmental Noise, national road and railway authorities, and the City of Helsinki, started producing noise maps and noise action plans. *Municipalities* also started to integrate noise issues in their air pollution reduction, public transport and green procurement programmes. A noise abatement database is currently being established.

Even though large areas of Finland are still free from noise problems, *one sixth of the population* is exposed to daytime noise levels exceeding 55dB from motorways, railways and industry, and this share is likely to increase. The *increase of traffic volumes* has offset progress made in reducing exposure to

excessive noise by noise abatement measures. Daytime noise levels of 65 dB are common in urban areas; noise levels up to 70 dB, with potential significant adverse effects on human health, are reached in the busiest urban areas. Noise maps and *noise abatement action plans*, as required by the European Union, are still to be drawn up for many municipalities. *Implementation of national land use objectives* is not sufficient, and land use planners should work to prevent the harmful effects of noise and to reduce annoyance and disruption of activities from noise. Efforts to *reduce noise at source* (e.g. low noise road pavements, low-noise equipment) have been limited; focus has been on (less cost-effective) noise mitigation through noise barriers. Noise thresholds are not binding and noise peak levels for industry are not sufficiently regulated. *Financial resources devoted to noise management* (including by the road administration and municipalities) are not commensurate with the quantitative objectives adopted. The *use of studded tyres* should be restricted to reduce both noise levels and small particulate emissions. An up-to-date and comprehensive information programme is to be developed to help monitor noise levels.

Recommendations:

- further specify *noise regulations* (e.g. obligatory excessive noise thresholds, thresholds for peak levels, thresholds in urban areas) and enforce their application by national, regional and local authorities; designate and manage quiet areas;
- fund *noise abatement projects* with priority given to reducing noise at source and to areas with daytime noise exceeding 65 dB, areas with large numbers of people exposed, recreational areas, and areas with educational and healthcare institutions;
- *integrate noise concerns within other policies* (e.g. zoning in land use planning, road and congestion pricing, “green” procurement in public transport, tourism policies, nature conservation);
- develop further noise *monitoring* (e.g. along rail and roads, combined with air quality monitoring in the Helsinki area, for hotspots action programmes according to the EU Environmental Noise Directive);
- further expand research on the adverse effects of noise on *human health* and well-being; including the *economic assessment* of noise measures.

Waste

Waste generation from the *manufacturing industry* has been decoupled from economic growth, with waste minimisation targets being met by oil, chemical, and base metals industries. Waste recovery is high in pulp and paper, wood and food industries. *Municipal waste generation* has decreased more rapidly than planned under the National Waste Plan (NWP) and is low compared to OECD average. Recovery rates for glass, plastic, paper, fibreboard, metal and end-of-life vehicles exceed the targets set in Extended Producer Responsibility schemes. Progress has been supported by a number of laws adopted or amended during the review period, which promoted waste reduction and aligned Finland waste regulatory framework with that of the EU. Several instruments are now in place to curb waste generation and to stimulate waste recovery; these include a tax for waste landfilling, municipal waste charges, and Extended Producer Responsibility schemes for several waste streams. Municipal waste services have been reorganised at the regional level and are self-financed. Instruments and facilities have been developed for the management of *construction and hazardous waste* and to address land contamination. A new *National Waste Plan to 2016*, adopted in 2008 after wide consultation with stakeholders, sets ambitious and innovative targets and promotes increased material efficiency in consumption and production.

However, the *1998 National Waste Plan (NWP)* objectives have only been partly achieved. Waste volumes have increased in *some manufacturing sectors*, in particular in pulp and paper, as waste prevention is not sufficiently integrated in environmental permitting. The total volume of waste generated by manufacturing industries per unit of GDP is still more than twice the OECD average. Waste recovery remains below targets in oil, chemical and base metal industries, as well as in the construction and energy sectors. *Hazardous waste* generation has increased, partly reflecting changes in waste classification and better reporting, and far exceeds the NWP target. Recovery targets have not been met and most hazardous waste is still landfilled. *Municipal waste recovery rate* is low; it represents only half of the set target. Sorting at source is insufficient to ensure proper recycling. Recovery of biowaste is particularly lagging, as alternatives to landfilling are underdeveloped and waste disposal in landfills remains prevalent. Even though several waste landfill sites were closed in 2007, one currently operating landfill does not fully comply with the 1999 EU Landfill Directive. Waste-related infrastructures and capacities are lacking to ensure adequate recovery of waste (sorting at source, combined heat and power recovery). *Waste monitoring* remains a concern. Specific waste streams (*e.g.* hazardous waste disposed of in private landfills, hazardous waste produced by households) are not adequately monitored.

Recommendations:

- ensure proper implementation of the new *National Waste Plan to 2016*; measure progress through improved waste statistics, at national, local and firm levels;
- fully use environmental permitting procedures to promote *waste prevention*, including better definitions of waste prevention measures and the development of guidelines for site inspections;
- promote *market mechanisms for waste sorting and recovery*; in particular, adjust the waste tax to respond to the National Waste Plan priorities; extend the tax to cover private industrial landfills;
- further reduce material intensity through “cradle to cradle” and 3R approaches, and systematically promote *Extended Producer Responsibility schemes* for separate waste collection and recovery;
- improve *waste management infrastructure*; in particular, develop the capacity for recovery of biowaste, carry out further studies and build consensus on waste incineration with combined heat and power recovery.

Nature and biodiversity

A new National Biodiversity Strategy covers the period 2006-16. The integration of nature and biodiversity conservation concerns in national legislation has been strengthened. Finland has ratified most international agreements in the field of nature and biodiversity conservation. Concerning *species*, the third Red List of threatened species was published in 2000. There have been positive developments in the protection of species including for migratory species and aquatic wildlife. Management plans have been established for several game species. A national strategy on *invasive alien species* is under preparation to *prevent their spread*. Concerning *habitats*, the first Red List of habitat types in Finland was published in 2008. Nearly all Finnish *forests* are certified. Wood harvesting is below maximum sustainable removal. Some 300 000 hectares of private land have been protected for nature conservation purposes. The Forest Biodiversity Programme for Southern Finland for the period 2008-16 (METSU) was launched, including targets to extend protected forests. Site selection criteria to protect the most valuable forest sites were improved. Nature *tourism* accounts for a quarter of the overall tourism activity and is rapidly growing; an Action Programme for Developing Recreational Use of Nature and Nature Travel was adopted.

However, the National Biodiversity Strategy 2006-16 does not set quantitative targets. *Biodiversity* continues to decline; for instance, five new species of birds have become threatened since the previous Red List evaluation in the early 1990s. Little progress has been achieved in expanding the *protected areas* since the OECD Environmental Performance Review of 1997. There are gaps in the national protected areas network, particularly in regard to forests and shore habitats in the South, and ecological connectivity. Drafting a proposal for the Natura 2000 network proved to be a difficult task. Most of the Natura 2000 sites were already included in protected national areas or programmes. Many peatlands have been degraded over time; only 13% of remaining Finnish mires are protected. A national strategy on mires and peatlands is under preparation. Eutrophication remains a significant challenge in the Gulf of Finland and in the Archipelago Sea. Many rare Finnish *forest habitats* are threatened and not sufficiently protected. Support to private forest owners under the 1997 Act on Financing of Sustainable Forestry is based on expected timber sale revenues instead of environmental outcomes. Though increasing, government support to environmental management is a small part of total government support to private forestry. There is a need to streamline the institutional framework for nature and biodiversity conservation.

Recommendations:

- set up long and short-term, quantitative and outcome-oriented, national and regional targets to guide implementation of the *National Biodiversity Strategy and Action Plan*; periodically assess achievements;
- set up a *national peatland strategy* to guide efforts for their conservation and management, including peatland exploitation for energy use; complete management plans for all Ramsar sites;
- enhance *protection of marine areas* in the Baltic Sea; finalise the ongoing inventory of marine biodiversity, develop EIA, and conduct risk assessments for ship routes in the Baltic Sea;
- enhance *protection of rare and threatened forest habitats*; link any support to private forest owners to otherwise unremunerated but beneficial public services;
- increase the *financial contribution of the tourism industry* towards nature conservation, for example through public private partnerships and user fees on recreation services.

2. Towards Sustainable Development

Integrating environmental concerns into economic decisions

Finland made progress over the review period in *decoupling* environmental pressures from economic growth for some conventional pollutants (e.g. SO_x and NO_x emissions) and for water abstractions. *Sustainable development* has been brought into mainstream policies with the Finnish National Commission on Sustainable Development working continuously since 1993 and led by the Prime Minister for 14 years, now presided over by the Minister of Labour in the Ministry of Employment and the Economy. National sustainable development strategies have been developed and followed up with evaluation and monitoring procedures; links have been established with the regional level. In the field of taxation, the *restructuring of the car registration tax and annual circulation tax* on the basis of CO₂ emissions is a very positive step. SEA has been introduced and implemented in sectoral strategies.

Recommendations:

- undertake an “*ecological tax reform*”, as indicated in the government 2003-07 policy documents, to review and revise prices, taxes and subsidies in the relevant sectors (e.g. energy, transport, agriculture, industry);
- continue to aim at internalising externalities and implementing the *polluter pays and user pays principles* to integrate further environmental concerns into energy, agriculture, industry and transport policies;
- give special attention to the use of specific *economic instruments* (e.g. green certificates to promote renewable energy, tax on NO_x emissions, road pricing);
- strengthen *energy efficiency efforts* with particular emphasis on the building sector, and capture the *multiple related benefits*.

However, there is still a need to *decouple* CO₂ emissions from energy production and consumption, and pesticide use has increased. Finland should redouble efforts to reduce its *high energy and material intensity indicators*, in line with its domestic and international general policy orientations. The lack of *quantitative targets* in the Finnish national strategy for sustainable development,

together with the search for a consensual approach among all stakeholders, makes the delivery of concrete or tangible results uncertain. There is a need to *further integrate environmental concerns and sustainable development principles* into sectoral policies and practices (e.g. industry, energy, agriculture, transport), particularly at the implementation level. There is scope to eliminate *environmentally harmful subsidies* (e.g. various energy tax exemptions, tax exemptions for industrial landfills). Although *energy intensity* (total primary energy supply per unit of GDP) has declined over the review period, it remains quite high in comparison with other European and OECD countries. Improvements in energy efficiency (e.g. in the building, transport and industry sectors) should bring multiple benefits (in economic efficiency, security of supply, GHG emissions, and air pollution and related health costs). This is appropriate in the context of Finland's efforts to stimulate its economy. Energy and transport taxes, prices and related subsidies may usefully be reviewed.

Integration of environmental and social decisions

Progress in reducing *health effects* of traditional pollutants (e.g. heavy metals, dioxins) has been supported by policy and institutional actions by environment and health authorities. Reducing *children's exposure to pollution has become a priority*. Concerning *environmental democracy*, state of the environment reports, based on comprehensive databases, are published regularly. Environment and national sustainable development indicators have been used to report on progress to the public. Emergency situation warning systems have also been developed. *Provisions of the Aarhus Convention* and the EU related Directive have been integrated into the Finnish legal framework, including the EIA and land use planning frameworks. Access to courts has been freely exercised by individual citizens and NGOs, backed by well developed *environmental damage liability and compensation* schemes. *Environmental education* has been extended through new learning curricula, teachers' training, and networking. It has been supplemented by teaching in nature and environmental schools.

However, *health impact* of particulate emission from *wood burning*, especially in combination with traffic pollution, is still a concern. Greater emphasis needs also to be placed on addressing incidents of waterborne diseases from insufficient drinking water treatment, as well as health impacts from noise and non-conventional pollutants, such as radon. A wider and better use of analysis of the health impact of pollution would help set targets at regional and local levels. *Environmental information* systems, especially environmental compliance information, should be made more accessible to the public on a

sectoral and geographical basis. *Environmental education* could be further developed. *Employment* in environmental goods and services has not been growing; a wider application of “green” public procurements can provide new business opportunities, especially for SMEs. *Tourism*, associated with nature and biodiversity in rural areas, should be promoted, thus offering multiple benefits, such as health, employment and environmental awareness.

Recommendations:

- further integrate *environmental health issues into policy making in other sectors*, focusing on sectors where the most important health benefits can be achieved, and on the most cost-effective measures;
- reduce the health impact of particulate emissions from *road transport and small-scale wood combustion in urban areas*; strengthen *water supply management* of small water companies, co-operatives and private wells to reduce incidents of waterborne diseases; promote further efforts to reduce *exposure to radon*;
- promote *corporate environmental reporting*, including from small and medium-sized enterprises;
- further improve access of the general public to *pollution and compliance information* on a geographical and sectoral basis;
- further develop high quality teaching material and learning methods in *environmental education*; establish specialised courses on the environment and sustainable development at all education levels with stronger links to environmental research and innovation; enhance co-operation between different actors in formal and non-formal education for the coherent implementation of national strategies on education for sustainable development;
- promote policies that enhance *employment opportunities* associated to environmental goods and services, including “green” procurement, nature conservation and environment-related tourism.

3. International Co-operation

Finland attaches importance to environmental and sustainable development issues in its overall diplomacy. It has been a proactive partner in *multilateral environmental co-operation* and has contributed to raising international awareness concerning responses to climate change, biodiversity degradation, and material intensity issues associated with consumption and production patterns.

Finland considers that environment and trade should be at an equal level in international law. It continues to encourage *regional environmental co-operation* within *Nordic, Baltic, Arctic and European frameworks*. As a member of the *European Union* since 1995, Finland has implemented or is implementing EU directives and is involved in the EU environmental action (particularly in the Baltic region and in co-operation with Russia). Finland has done its part to reduce the pollution load of the *Baltic Sea*, and to help control industrial and municipal point sources of pollution in the Gulf of Finland. Prosecution has been strengthened to address deliberate illegal discharges of bilge oil associated with the increase of shipping in the Baltic Sea. *Bilateral co-operation with Russia* has focused on specific environmental issues and tangible results (*e.g.* creation of a Green Belt of protected natural areas on both sides of the border, waste water treatment in Saint Petersburg).

Recommendations:

- *review and revise the taxation of energy products*, as part of the preparation and implementation of the new Climate Strategy;
- take measures in the farming sector to *reduce nutrient loading in coastal waters* in the context of the Common Agricultural Policy reform, the Nitrates Directive and the HELCOM Baltic Sea Action Plan; in particular, consider introducing more targeted agri-environmental measures;
- extend to *hazardous and noxious substances* the measures taken to prevent, control and respond to oil pollution from ships;
- strengthen efforts to develop *sustainable forest management in north-west Russia* in the context of EU-Russia environment dialogue;
- increase the level of *official development assistance* (with UN target of 0.7% of GNI in mind) and its share devoted to environment; contribute to strengthening the capacity of recipient countries to absorb possible increases in financial flows (*e.g.* through CDM projects);
- ratify and implement global and regional environmental agreements; continue to promote synergies between *Multilateral Environmental Agreements*; in particular, pursue efforts towards setting up an international chemical strategy.

However, there is a need to strengthen efforts to address *climate change* mitigation concerns. A new, long-term, climate and energy strategy has been submitted to Parliament (following those of 2001 and 2005) in the framework of

the new EU energy and climate change package. In 2006 Finland's GHG emissions had increased by 13% compared to 1990, well above the Kyoto commitment of 0%. The CO₂ emission per unit of GDP and the energy intensity of Finland are high among OECD countries. Meeting the Kyoto target will have to be achieved with the aid of further national measures, emission trading and the Kyoto mechanisms. Concerning the *Baltic Sea*, domestic measures are needed to further reduce nutrient loading from Finnish agriculture. The heavy presence of dioxine in the Baltic has led to an exception to EU directives for Finland (and Sweden). There is also a need to strengthen pollution prevention from ships (e.g. oil pollution, pollution from hazardous and noxious substances, waste dumping). Finland should further promote bilateral co-operation on *sustainable forest management* in north-west Russia so as to facilitate timber trade (Russia recently imposed an export tariff on its timber) while addressing illegal logging, in the EU and WTO contexts. Although identified as a key horizontal issue in Finland's development co-operation, environmental concerns should be better addressed and monitored in Finland's *official development assistance*.

2

AIR*

Features

- Particulate emissions
- Ambient air quality
- Transboundary air pollution
- Transport emissions
- Renewable energy

* The present chapter reviews progress since the previous OECD Environmental Performance Review of 1997. It also reviews progress with respect to the objectives of the 2001 OECD Environmental Strategy.

Recommendations

The following recommendations are part of the overall conclusions and recommendations of the environmental performance review of Finland:

- pursue efforts to *reduce NO_x emissions*, to meet the NO_x reduction objectives for large combustion plants, and be prepared to respond to more stringent limit values by 2020, as part of the forthcoming EU Emissions Ceilings Directive;
- explore the potential of *economic instruments*, such as emission trading, nitrogen emission taxation and road pricing; ensure that they are consistent with existing instruments, such as road fuel taxes and vehicle taxes, so as to improve economic efficiency and environmental effectiveness;
- explore the potential *ancillary benefits of the new climate and energy policies*, particularly on NO_x and particles;
- ensure coherence of recent and forthcoming *transport system plans* with land use plans, at regional and local levels, with a view to improving traffic management and promoting environment-friendly transport;
- implement EU environmental sustainability criteria for the *production of biofuels*; carry out a cost-benefit analysis to determine the relative value of biofuels, fossil and other alternative fuels.

Conclusions

Finland has met its policy objectives to reduce *emissions* of traditional air pollutants (for SO₂, heavy metals, POPs) or is on track to meet them (for VOCs, NH₃). Emissions of many heavy metals (arsenic, chrome, lead and nickel) have decreased in recent years as well as emissions of most persistent organic pollutants (POPs). Finnish incinerators for hazardous waste all comply with the EU air emission limit values. Integrated assessment models are being developed to find cost-effective solutions for reducing air pollutant emissions, including fine particles. Urban *air quality* is generally high. For example, urban population exposures to air pollution by ozone and PM₁₀ have remained low by EU standards. Finnish lakes are recovering well from serious acidification problems. Concerning *transport*, emissions have decreased and are expected to further decrease, despite an increase in road traffic volume. Tax differentiation was successfully used to have only sulphur-free diesel and gasoline used on the Finnish market in 2005, ahead of the EU deadline. Efforts have been made to increase the market share of public transport in major urban areas,

including through targeted subsidies and tax concessions. Transport system plans have been drawn up to better manage urban traffic congestion. Transport operators have entered into voluntary agreements to improve energy efficiency.

However, curbing *NO_x and particle emissions* remains challenging for Finland, which has not met its policy objective of reducing NO_x emissions. There is also no target for reducing particulates emissions, which fluctuate from year to year. Increased use of wood in domestic combustion remains a challenge for particle pollution. Emissions of *copper, mercury and zinc* have increased in recent years, as well as emissions of hexachlorobenzene (HCB). Fine particles remain a serious urban air quality problem. Daily PM₁₀ concentrations exceed the limit values in the most polluted areas, and it may be difficult for Finland to comply in time (by 2010) with EU's annual limit value for NO₂. The exceedance of critical loads of eutrophication affects nearly half of the ecosystems. Not enough has been made to improve the situation in the *Kola Peninsula* in north-west Russia, close to the Finnish border, where emissions from industrial complexes comprise extremely high levels of SO₂, dust copper and nickel. While *road transport* is increasing for both passengers and freight, there is no road pricing per se in Finland and the end-use price of diesel is lower than the OECD-Europe average. There is a tax incentive to promote the use of biofuels (as allowed by the EU energy tax directive) for which blending with road fuels has become mandatory in 2008.



1. Policy Objectives

The most important legislation for controlling air pollution in Finland is the *2000 Environmental Protection Act*, which replaced the 1982 Air Pollution Control Act and applies to all polluting activities, except emissions from transport that are regulated under the 2002 Vehicles Act.

In 2002, the Finnish Government approved a national programme setting maximum annual limits for emissions of sulphur dioxide (SO₂), nitrogen oxides (NO_x), ammonia (NH₃) and volatile organic compounds (VOCs) to be complied with by 2010. The *Air Pollution Control Programme 2010* has been specifically designed to transpose the EU National Emission Ceilings (NEC) Directive.¹ Finland's commitments under the NEC Directive are quite similar to those under the Gothenburg Protocol to the Convention on Long-range Transboundary Air Pollution (LRTAP) (Table 2.1). Finland must also comply with the 1998 Protocols on Heavy Metals and Persistent Organic Pollutants (POPs) to the LRTAP.

Finnish *air quality objectives* include *i*) binding limit values and *ii*) non-binding target values (Table 2.2). The air quality binding limit values on SO₂, NO₂, PM₁₀, lead, benzene and CO and the non-binding target value of ground-level ozone correspond to those of the new EU air quality directive.² The provisions concerning air quality have been transposed into national legislation by the Environmental Protection Act, the Government Decree on air quality (711/2001) and the Government Decree on ozone in ambient air (783/2003). Finland must also comply

Table 2.1 Performance regarding EU and other international air targets

Pollutants	Protocols ^a and EU directives	Objectives		Reductions achieved or current level	
		Reduction (%) or ceiling (kt)	Period or year	Reduction (%) or 2006 emissions (kt)	Period or year
SO ₂	Helsinki	-30	1980-93	-79	1980-93
	Oslo	-80	1980-2000	-87	1980-2000
	Gothenburg	-55 ^b	1990-2010	-67	1990-2006
NO _x	2001/81/EC ceilings	110 kt	2010	85 kt	2006
	Sofia	-30 ^c	1986-98	-18	1986-98
	Gothenburg	-43 ^b	1990-2010	-32	1990-2006
VOCs	2001/81/EC ceilings	170 kt	2010	193 kt	2006
	Geneva	-30	1988-99	-26	1988-99
	Gothenburg	-38 ^b	1990-2010	-41	1990-2006
NH ₃	2001/81/EC ceilings	130 kt	2010	133 kt	2006
	Gothenburg	-11 ^b	1990-2010	-5	1990-2006
	2001/81/EC ceilings	31 kt	2010	36 kt	2006
Heavy metals					
Cadmium	Aarhus	0	1990 cap	-79	1990-2006
Lead	Aarhus	0	1990 cap	-92	1990-2006
Mercury	Aarhus	0	1990 cap	-9	1990-2006
POPs ^d					
Dioxins/furans	Aarhus	0	1994 cap	-57	1990-2006
PAHs	Aarhus	0	1994 cap	-15	1990-2006
PCBs	Aarhus	0	1994 cap	-40	1990-2006

a) Protocols to the UN-ECE Convention on Long-range Transboundary Air Pollution (LRTAP). Finland has ratified all of them.

b) Equivalent to a ceiling of 117 kt (SO₂), 163 kt (NO_x), 141 kt (VOCs) and 34 kt (NH₃).

c) Non binding voluntary target ("Sofia Declaration"), which was stated in addition to the formal freezing obligation.

d) Persistent organic pollutants: includes eleven pesticides, two industrial chemical products and three by-products. Production ban: aldrin, chlordane, chlordecone, dieldrin, endrin, hexabromobiphenyl, mirex and toxaphene. Restricted use and long-term elimination: dichloro-diphenyl-trichloroethane (DDT), hexachlorocyclohexane (HCH, including lindane) and PCBs. Reduced emissions: dioxins, furans, PAHs and hexachlorobenzene (HCB).

Source: Inventory submission to the LRTAP, 15th March 2008.

with EU target values on arsenic, cadmium, nickel and benzo(a)pyrene (a polycyclic aromatic hydrocarbon).³ Finland needs to further adjust its national legislation to include the new EU air quality directive's limits on fine particles.

An important *step forward* will be made with the implementation in Finland of the 2005 EU Thematic Strategy on Air Pollution. The Strategy sets specific health and environmental impact reduction objectives for 2020. To achieve these objectives, SO₂ emissions across the EU will need to decrease by 82% (from the 2000 level), NO_x emissions by 60%, VOCs by 51%, ammonia by 27%, and primary PM_{2.5} (particles emitted directly into the air) by 59%. The levels of the necessary emission reductions in each EU member state will be determined later, and incorporated in the new Emissions Ceilings Directive.

Table 2.2 **Legal ambient air quality standards for the protection of human health**

Pollutant	Averaging period	Unit	Value	Maximum number of overruns per year	Year of compliance
Limit values ^a					
SO ₂	Daily mean	µg/m ³	125	3	2005
	1 hr mean		350	24	2005
NO ₂	Annual mean		40	0	2010
	1 hr mean		200	18	2010
PM ₁₀	Annual mean	µg/m ³	40	0	2005
	Daily mean		50	35	2005
PM _{2.5}	Annual mean		25 ^b	0	2015
Lead	Annual mean	µg/m ³	0.5	0	2005
Benzene	Annual mean	µg/m ³	5	0	2010
CO	8 hr daily max	mg/m ³	10	0	2005
Target values ^c					
Ozone	8 hr daily max	µg/m ³	120	25 ^d	2010
Arsenic	Annual mean	ng/m ³	6	0	2013
Cadmium	Annual mean	ng/m ³	5	0	2013
Benzo(a)pyrene	Annual mean	ng/m ³	1	0	2013
Nickel	Annual mean	ng/m ³	20	0	2013

a) The limit value must be attained within a given period.

b) Indicative limit value of 20 µg/m³ by 2020 (to be reviewed by the Commission in 2013).

c) The target value is to be attained where possible over a given period.

d) Three-year average.

Source: EU Directives 2008/50/EC and 2004/107/EC.

2. Air Pollution Trends

Finland has met (on SO₂, heavy metals, POPs) or is on its way to meet (VOCs, NH₃) its policy objectives, *except for NO_x emissions* (Table 2.1). In recent years there has been good progress in reducing emissions for most, but not all, air pollutants (Tables 2.3, 2.4 and 2.5). Nevertheless, Finland continues to have relatively high air pollution intensities (expressed per unit GDP), although they are lower than or equal to the OECD average (Figure 2.1). This partly reflects the quite high energy intensity of Finland.

2.1 Traditional air pollutants

SO₂ emissions have increased from 74 000 tonnes in 2000 to 85 000 tonnes in 2006 (Table 2.3), though they remain below the 2010 ceiling of 110 000 tonnes (NEC Directive). In contrast NO_x emissions have decreased from 235 000 tonnes (2000) to 193 000 tonnes (2006), though they remain well above the 2010 ceiling of 170 000 tonnes. Energy production is the main source of NO_x and SO₂ emissions. NO_x emissions are also generated in the transport sector. As for energy, large combustion plants (with generating capacities of more than 50 megawatts) built before 1 July 1987 had to comply from 1 January 2008 with the same emission limit

Table 2.3 Emissions of traditional air pollutants, 2006, by source

(000 tonnes)

	NO _x	CO	NM VOC	SO ₂	NH ₃	TSP ^a	PM ₁₀	PM _{2.5}
Energy	118	260	56	67	0	48	33	26
Transport	66	248	39	2	2	21	12	5
Production processes	8	3	9	15	1	10	6	2
Solvents	0	0	28	0	0	2	1	1
Agriculture	0	0	0	0	33	5	3	1
Waste	1	0	1	1	0	0	0	0
Total	193	511	133	85	36	86	55	35
Change (%) 2000-06 ^b	-8	-16	-17	+12	+9	+19	+17	-5

a) Total Suspended Particulates.

b) Since 2000 emission data have been calculated with the new air emission data system IPTJ (Ilmapäästö tietojärjestelmä). Reliable official estimates for particulate emissions are available since 2000 only.

Source: SYKE, February 2008.

Table 2.4 **Atmospheric emissions of heavy metals, 2006, by source**
(tonnes)

	Lead	Cadmium	Mercury	Arsenic	Chrome	Copper	Nickel	Zinc
Energy	19	1	0.5	2	12	14	20	97
Transport	1	0	0	0	0	0	0	0
Production processes	5	0.3	0.5	1	11	6	5	17
Solvents	0	0	0	0	0	0	0	0
Agriculture	0	0	0	0	0	0	0	0
Waste	0	0	0	0	0	0	0	1
Total	25	1.3	1	3	23	20	25	115
Change (%) 1990-2006	-92	-79	-13	-92	-20	-78	-60	-80
Change (%) 2000-06 ^a	-30	-15	+71	-35	-16	+20	-24	+65

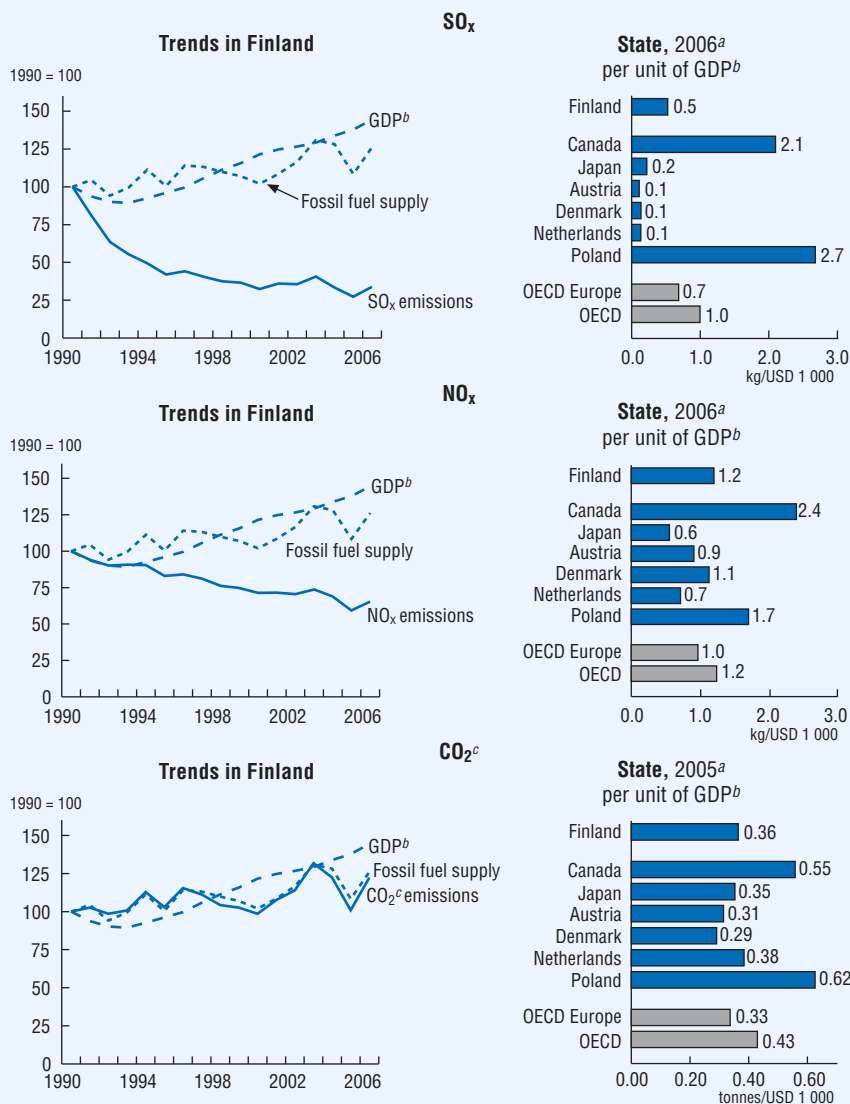
a) Since 2000 emission data have been calculated with the new air emission data system IPTJ (Ilmapäästötietojärjestelmä).
Source: SYKE, January 2009.

Table 2.5 **Atmospheric emissions of persistent organic pollutants, 2006, by source**

	Dioxins and furans (PCDD/F) (g I-TEQ)	Polyaromatic hydrocarbons (PAH-4) (tonnes)	Hexachorobenzene (HCB) (kg)	Polychlorinated biphenyls (PCB) (kg)	Pentachlorophenols (PCP) (kg)
Energy	6	12	3	23	3
Transport	3	1	1	19	0
Production processes	5	0	35	22	0
Solvents	0	0	0	0	0
Agriculture	0	0	0	0	0
Waste	0	0	4	113	12
Total	14	13	43	177	15
Change (%) 1994-2006 ^a	-53	-15	+7	-44	-25
Change (%) 2000-06 ^a	-56	-13	+3	-20	-77

a) Since 2000 emission data have been calculated with the new air emission data system IPTJ (Ilmapäästötietojärjestelmä).
Source: SYKE, February 2008.

Figure 2.1 Air pollutant emissions



a) Or latest available year.

b) GDP at 2000 prices and purchasing power parities.

c) Emissions from energy use only; excludes international marine and aviation bunkers; sectoral approach.

Source: OECD-IEA (2007), *CO₂ Emissions from Fuel Combustion*; OECD (2007), *OECD Economic Outlook No. 82*; OECD-IEA (2008), *Energy Balances of OECD Countries*.

values for SO₂, NO_x and particulates as the plants that were permitted between 1 July 1987 and 27 November 2002, pursuant to the Large Combustion Plants (LCP) Directive.⁴ Since 2008, the emission limit value for NO_x emissions has been 500 mg/Nm³, and starting 2016 it will be 200 mg/Nm³. In the case of new plants licensed after 27 November 2002, the LCP Directive sets stricter emission limit values for SO₂, NO_x and particulates and a NO_x limit value of 200 mg/Nm³ for plants over 100 MWth. The Commission has made a proposal to *i*) expand the application of the Integrated Pollution Prevention and Control (IPPC) Directive to also cover power plants with generating capacities of more than 20 megawatts, and *ii*) tighten the emission limit values for combustion plants over 50 megawatts.

As for *transport*, a reason for the relatively high NO_x emissions has been the slow renewal of the vehicle fleet due to high vehicle registration taxation (*e.g.* used cars have been imported from Germany and other countries), but recent decisions have been taken to improve this situation. Further reductions of NO_x emissions will also be achieved through the tightening of EU emission limit values for engines. The Commission is also studying the feasibility of reducing NO_x emissions from the *residential sector* (starting by introducing standards for natural gas-fired boilers and water heaters). Finland foresees that implementation of the new climate and energy policies will call for such structural changes to the energy mix that further reductions of NO_x and SO₂ will then be achieved.

There is no target for reducing *particulate emissions* at the moment, but national emission ceilings of fine particles for 2020 are more than likely (as part of the ongoing revision of the NEC directive). The total mass of particulate emissions fluctuates from year to year, reflecting variations in the open air peat production that in turn reflects dependency of the Nordic power market.⁵ Fine particle emissions from vehicles will be reduced through gradual introduction of new EU emission standards for vehicles, along with renewal of the car fleet. In addition, implementation of the current and forthcoming climate and energy policies (Chapter 8) is expected to reduce emissions of gases (*i.e.* SO₂, NO_x, VOCs and NH₃) associated to secondary particles. Increased use of wood in domestic combustion is a challenge for particle pollution control as there are no emission limit values for small scale combustion. General guidance on “good practice in residential combustion” has been published in 2003 and a more specific guidance document has been made available to the local health protection authorities in September 2008. Technical specifications for new wood stoves and boilers (max. 300 kW) are under preparation, focusing on PM and carbon monoxide emissions due to residential combustion.

Carbon monoxide emissions have decreased since 2000. There is no target for future CO emission reductions. However, a steady decreasing trend is foreseen to continue due to better engines of vehicles and non-road applications.

VOC emissions have decreased from 154 000 tonnes (2000) to 133 000 tonnes (2006) and the 2010 target is to keep them under 130 000 tonnes (NEC Directive). By the end of 2007, all new and existing installations using organic solvents had to comply with EU emission limit values for VOCs.⁶ In December 2008, the European Commission proposed a directive to supplement existing technical requirements at petrol filling stations⁷ to further reduce VOC emissions associated with refuelling of petrol cars at service stations. The Commission is also studying the feasibility of reducing further the solvent content of paints, varnishes and vehicle refinishing products (this would require amending the VOC Paints Directive 2004/42/EC).

2.2 Toxic contaminants

Finland has met its LRTAP commitment to maintain emissions of certain *heavy metals* below their 1990 levels (Table 2.1). Since 2000 emissions of arsenic, chrome, lead and nickel have decreased, but those of copper, mercury and zinc have increased (Table 2.4). Annual changes in emissions of heavy metals primarily reflect fluctuations in the production of non-ferrous metals and energy production. The main emission sources are industrial processes for chromium and zinc, industrial combustion for lead, nickel and zinc, and fuel combustion for nickel and zinc. Industrial installations, combustion plants, waste incineration and co-incineration plants are all subject to integrated permitting procedure under the Environmental Protection Act. According to the Act the emission reduction measures and limit values in permits should be based on best available techniques.

Finland has met its LRTAP commitment to maintain emissions of certain *persistent organic pollutants* (POPs) below their 1994 levels (Table 2.1). Since 2000, *emissions of POPs* but hexachlorobenzene (HCB) have decreased (Table 2.5). The major stationary sources of dioxins and furans (PCDD/F) are power plants, residential combustion, iron and steel production and, to a lower extent, waste incineration. For HCBs the main source is chemical industry. The main source of polyaromatic hydrocarbons (PAHs) is residential wood combustion. The use of POP compounds is restricted or forbidden. Their emissions mainly originate from incomplete combustion.

The two Finnish *incinerators for hazardous waste* both comply with the air emission limit values set by the EU waste incineration directive that Finland transposed into its legislation in 2003.⁸ This applies to heavy metals, dioxins and furans, as well as SO₂, NO_x and CO. Concerning *municipal incineration plants*, the one in Turku has received an environmental permit that complies with the directive, but complaints

regarding the granting of the permit have been brought to the Vaasa Administrative Court. The two other municipal waste incineration plants (Riihimäki and Kotka) are recent and benefit of the most advanced air pollution control technologies.

2.3 Assessment

In 2002 an inter-ministerial expert group estimated that Finland would be able to fulfil its obligations through *air pollution control measures already adopted or envisaged*. As a consequence, Finland's Air Pollution Control Programme 2010 consists largely of a description of these measures. The Programme comprises measures for reducing emissions from energy generation, transport, agriculture and industry, and also sets out ways to curb emissions from non-road machinery, leisure boats and the small-scale combustion of wood.

EU member States are free to choose the most cost-effective way to fulfil their obligations under the *National Emission Ceilings Directive*. Integrated assessment models have been developed by the UN-ECE to find cost-effective solutions in meeting international commitments, such as the 1999 *Gothenburg Protocol* to the LRTAP. Such models have been gradually adapted in Finland by the Finnish Environment Institute. In recent years the modelling work has focused on fine particles through the "KOPRA project" (Finnish Meteorological Institute, 2007). Under a business as usual scenario, *PM_{2.5} emissions* are expected to decrease by 2020 at moderate pace (Table 2.6).

Table 2.6 **Fine particle emission outlook, by sector**
(tonnes PM_{2.5})

	2000	2005	2020	
			Baseline scenario	Policy scenario ^a
Traffic and machinery ^b	11 000	10 000	6 100	5 500
Power plants and industrial combustion	6 100	5 400	6 500	6 000
Domestic combustion	8 600	8 800	7 700	6 900
Industrial processes	3 100	3 300	4 900	4 900
Dust and other sources	3 300	4 800	5 100	3 500
Total	32 100	32 300	30 300	26 800

a) Policy scenario of the National Climate and Energy Strategy, submitted to Parliament in November 2008.

b) Including traffic induced dust.

Source: Finnish Environment Institute.

However, curbing NO_x and particle emissions remains challenging for Finland. The main instruments for emission reduction have been, and are expected to continue to be *driven by EU regulations* (e.g. those for vehicles, engines and products). There is still room for improving regulatory approaches (e.g. setting particle emission limit values for small scale wood combustion). But *the potential of economic instruments* has not been fully exploited. Studies on economic instruments and fiscal measures, such as emission trading between Finnish and Estonian power plants, and on possible nitrogen emission tax, have been done and released for public comment. Further emission reductions of air pollutants (ancillary benefits) are expected from implementation of climate policy, particularly the EU emission trading scheme for greenhouse gases (Chapter 8).

3. Ambient Air Quality

3.1 Urban air quality

Urban air quality in Finland is *generally good*. For example urban population exposures to air pollution by ozone and PM_{10} remain relatively low by EU standards. However, during periods of atmospheric inversions (mostly in the winter and spring) concentrations of pollutants in Finnish cities may compare to those in cities of similar size elsewhere in Europe. *Fine particles remain a serious problem*⁹. $\text{PM}_{2.5}$ concentrations, on average, are below $10\mu\text{g}/\text{m}^3/\text{annum}$ and depend to a large extent on transboundary pollution, but related emissions from traffic, industries, power stations, small combustion plants as well as residential combustion should all be further reduced.¹⁰ The streets must also be cleaned more effectively from sand after the winter season.¹¹ Population average exposure to domestic primary fine particulates has been estimated at $2.6\mu\text{g}/\text{m}^3$, which is equivalent to 900 premature deaths annually. This can be attributed to direct vehicle emissions (650), residential combustion of wood (150) and re-suspension from traffic (100) (PILTTI project).

Urban air quality has not improved as expected, even though traffic emissions have been curbed. No clear trends in NO_2 , O_3 or PM_{10} concentrations in Finnish cities can be detected during the period 1997-2006.¹² While since 2000 and transposition of the relevant EC air quality legislation (1999/30/EC and 2000/69/EC) the current limit values for SO_2 , NO_2 , CO and lead have not been exceeded, daily PM_{10} concentrations continue to exceed the limit values at the most polluted areas (e.g. busy traffic lanes, “canyon” streets with poor dispersion conditions) (Table 2.7), though still compliant with EU ambient air quality standards in terms of maximum number of exceedances per year per site (Table 2.2). Based on current trends it may be difficult for Finland to comply with the more stringent annual NO_2 limit value that will apply from 1 January 2010. Compliance on time (by 2010) with the annual limit value for

benzene is less likely to be a problem. Ozone target values for 2010 have not been exceeded since transposition of directive 2002/3/EC, but concentrations have increased at some urban and rural background stations.

3.2 Rural air quality

The bulk deposition of sulphate has declined 40-60% in most parts of the country since 1990 thanks to measures to combat pollution from industrial plants, power stations and motor vehicles in Finland and Europe. Some 5 000 smaller lakes in Finland are now considered to be *recovering well from serious acidification problems* and populations of acid sensitive fish species (e.g. roach) are increasing. But natural

Table 2.7 Trends in exceedances of air quality standards, selected sites

City	Monitoring station	Type of station and area	Number of exceedances			
			PM ₁₀ 24-hour limit (50 µg/m ³) ^a		O ₃ maximum daily 8-hour mean (120 µg/m ³) ^b	
			2000	2005	1997-99	2004-06
Helsinki	Vallila 1	Traffic, urban	7 (7)	11	..	..
	Töölö	Traffic, urban	10 (15)	9 ^c	0	1 ^c
	Kallio 2	Background, urban	1 (3)	2	0 ^d	6
Oulu	Oulun keskusta 2	Traffic, urban	.. (7)	11	..	..
	Pyykösjärvi	Background, suburban	.. (3)	2	..	..
Turku	Turun kauppatori	Traffic, urban	.. (13)	8	..	..
Espoo	Leppävaara2	Traffic, suburban	15 (22)	15 ^c	..	..
	Luukki	Near city background, rural	0 (0)	..	5	10
Vantaa	Tikkurila 3	Traffic, suburban	11 (11)	24	..	..
	Tikkurila 2	Background, urban	..	..	2	6

a) Maximum number of permitted exceedances: 35 days per year by 2005. In the Airbase, PM₁₀ data up to 2000 are expressed at temperature 293°K and pressure 101.3 kPa while the data from 2001 are expressed at ambient conditions. Numbers of exceedances in 2000 are therefore underestimated compared to those in 2005. In brackets are the numbers of exceedances for 2000 expressed at ambient conditions, taken from the National Air Quality Database.

b) Maximum number of permitted exceedances: 25 days by 2010-12 (averaged over 3 years).

c) 2004.

d) 1999-2001.

Source: EEA Airbase ; National Air Quality Database.

habitats in sensitive areas are still burdened by more acidifying deposition than they can naturally cope with; SO₂, NO_x and NH₃ emissions must be cut further. Climate change with potential trends in temperature, precipitation and runoff, is expected to affect future chemical and biological recovery from acidification.¹³ The *exceedance of critical loads of eutrophication is still a problem* in Finland. In 2000, 47% of ecosystems were not protected against eutrophication (TFIAM/CIAM, 2007).

3.3 Assessment

Overall, although air quality did not improve over the review period, it remains high. A considerable proportion of the air pollutants that cause acidification and eutrophication in Finland *originate in other countries* (Table 2.8). The implementation of the NEC directive throughout the EU should reduce the emissions of SO₂ and NO_x as well as NH₃ and subsequent eutrophying and potential acidifying deposition over Finland, while also curbing long-range ozone and particulate pollution, and thus improving air quality. However, emissions from the Kola Peninsula are projected to

Table 2.8 Acid deposition, 2006
(%)

Country of origin or receiving country	Into Finland		From Finland	
	SO _x	NO _x ^a	SO _x	NO _x ^a
Finland	16	12	26	17
Russia	16	17	23	31
Poland	14	7	–	–
Baltic Sea	8	9	16	8
Germany	–	9	–	–
United Kingdom	–	8	–	–
BIC	6	–	–	–
Estonia	5	–	–	–
North East Atlantic	–	–	13	15
Sweden	–	–	11	10
Norway	–	–	2	3
Others	35	38	9	15
Total	100	100	100	100

a) Oxidised nitrogen oxides.

Source: EMEP.

increase (Box 2.1). Sulphur and nitrogen emissions from international shipping are also a growing problem for Finland: in south-western Finland, 10-20% of the sulphur deposition is derived from international shipping. All HELCOM countries but Estonia, Poland and Russia have ratified the 1999 Protocol to abate acidification, eutrophication and ground level ozone to the LRTAP Convention (Gothenburg Protocol).

4. Transport Policy

Transport contributes a significant share of air pollution in Finland, along with energy. Road transport represents by far the primary mode of transport for both passengers and freight; it accounts for more than 80% of total final energy consumption by the transport sector (Figure 2.2). The number of motor vehicles

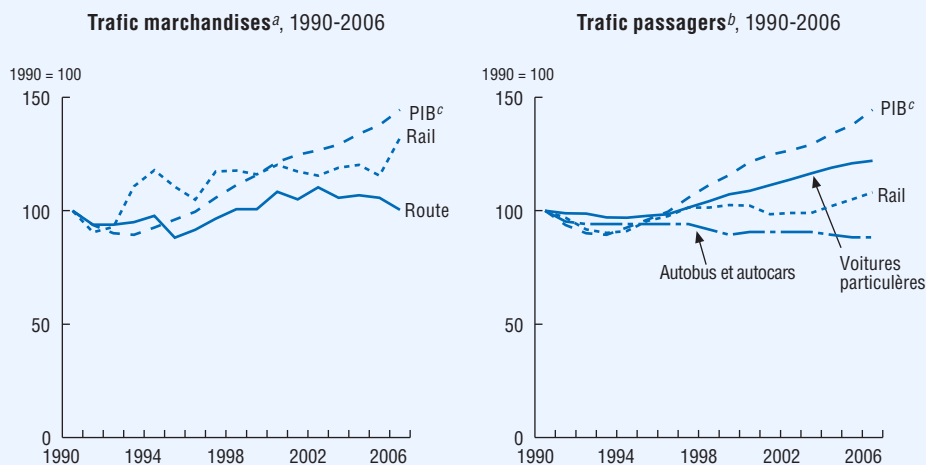
Box 2.1 The Kola Peninsula

A main environmental threat in the joint Finnish, Norwegian and Russian border area is the neighbouring Pechenganikel industrial complex, located on the Kola Peninsula in north-west Russia. Emissions from the complex comprise extremely high levels of SO₂, dust and a wide range of heavy metals, primarily copper and nickel. Arsenic, cadmium, copper, nickel and zinc depositions measured at the Severtijärvi station in the border area to the Kola Peninsula amount to 3-5 times the deposition at other Finnish background stations in the north. The huge emissions of the metallurgical complexes in the Kola Peninsula decreased significantly during the 1990s due to reduced production and reduced reliance on sulphur-rich Siberian ore. However, heavy metal emissions are still very high and can be projected to increase (Stebel *et al.*, 2007). Russia has not ratified the 1998 Protocol on heavy metals to the LRTAP.*

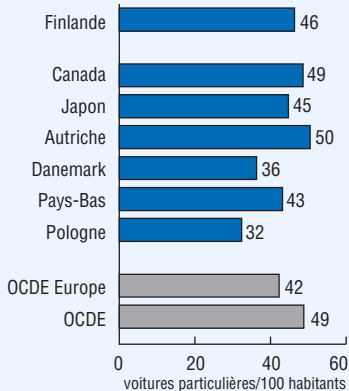
Not enough has been made to improve the situation. A positive step has been transboundary co-operation on air quality monitoring since 2003 (the Pasvik monitoring programme). The joint environmental monitoring network covers the catchment area of the River Paz. Approximately 70% of the surface area of the catchment is situated in Finland, 5% in Norway and 25% in Russia. The central lake, Lake Inari, is the deepest and the third largest lake in Finland. The programme has helped to create a joint monitoring database and harmonise long-term monitoring. Finland questions whether supporting Russian companies in their emission reduction efforts would be consistent with the polluter pays principle.

* According to the protocol, which entered into force in 2003, Parties have to reduce their emissions of cadmium, lead and mercury below their levels in 1990.

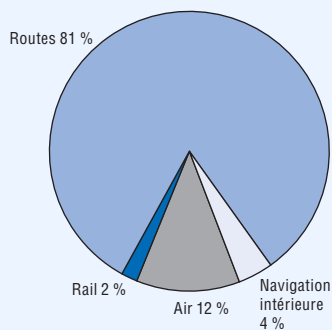
Figure 2.2 Transport sector



Taux de motorisation, 2005



Consommation finale totale d'énergie dans les transports, 2006



a) Index of relative change since 1990 based on values expressed in tonne-kilometres.

b) Index of relative change since 1990 based on values expressed in passenger-kilometres.

c) GDP at 2000 prices and purchasing power parities.

Source: OECD Environment Directorate; OECD-IEA (2008), *Energy Balances of OECD Countries*.

increased (from 2.3 to 2.8 million in 1998-2005) as did the road traffic volume (from 45 to 51 billion veh./km) (OECD, 2007). However, *emissions from transport have decreased and are expected to further decrease*, although the energy consumption of the transport sector will remain high (Table 2.9).

The Finnish Ministry of Transport and Communications (MTC) has an environment management programme for transport policy since 1994. The Ministry's present environmental goals are outlined in the Environmental Guidelines for the Transport Sector until 2010 adopted in 2005. In April 2007, the MTC presented a new long-term strategy, called "*Transport 2030*" that aims at promoting sustainable transport. On the basis of the strategy, in March 2008 the MTC submitted a government transport policy to Parliament. Both the strategy and the government transport policy identify climate change as one of the major challenges of transport policy in the coming decades. In March 2008, the MTC set up an advisory commission to prepare a long-term plan (with time horizon 2020) on how to implement climate policy in the transport sector. The commission has not completed its work yet. It is provisionally intended to reduce GHG emissions from the transport sector by 2.3 million tonnes (16.7%) from the present level. This would include measures to further coordinate land use and transport planning, promote and better organise public transport, cycling and walking, enhance technology, as well as measures to meet EU targets for energy efficiency (9% by 2016) and bio-fuels.

Table 2.9 **Air emissions from transport,^a outlook 2026**

(000 tonnes)

		SO ₂	NO _x	CO	PM
Total from transport	2000	20	160	366	7
	2006	18	122	253	5
	2026	6	69	133	3
Road in total transport (%)	2000	1	49	91	65
	2006	0.4	43	86	57
	2026	0.1	29	68	33

a) Includes all traffic inside the Economic Region of Finland. This is a national way to make an emission inventory in Finland, which is based on different allocations of emissions than in the inventory report to the LRTAP (e.g. it includes international traffic).

Source: LIPASTO 2006, emission calculation model.

4.1 Fuel quality

The structure of taxation has been such that those who drive a lot are encouraged to buy diesel cars (Chapter 6). The *market share of diesel fuelled cars* out of new registered passenger cars was only 5% in 1990 but increased to 20% in 2006 and as high as 50% in 2008 due to recent changes in the registration tax. As a result, consumption of diesel rose (from 1.6 to 2.1 Mtoe in 1990-2004) while that of gasoline decreased (from 2.1 to 1.9 Mtoe) (OECD, 2007).

All *road fuels* (fuels for road transport) are unleaded (since 1994) and “sulphur-free”¹⁴ (since 2005). Tax differentiation was successfully used to have only “sulphur-free” diesel and gasoline used on the Finnish market in 2005, ahead of the EU deadline of 1 January 2009.¹⁵ Similarly, for gas oils intended for use by *non-road vehicles* such as farm and forestry tractors, Finland has implemented the EU Directive 2003/17/EC ahead of schedule. This directive introduced a maximum sulphur content of 2 000 parts per million (ppm) to be decreased to 1 000 ppm by 1 January 2008. In Finland the 1 000 ppm limit came into force in 2004 and, since 2005, a significant share of the fuel market for non-road vehicles is at 50 ppm. By comparison, maximum sulphur content in heavy fuel oil (generally used in combustion plants), gas oil (used in heating boilers), as well as marine gas oil (used by inland waterways vessels) were not to exceed 10 000 ppm by 1 January 2003 and 1 000 ppm by 1 January 2004.¹⁶ Since 11 August 2006, the maximum sulphur content of *marine fuels* (fuels for maritime transport) used by Finnish flag vessels in the Baltic Sea¹⁷ should not exceed 15 000 ppm.¹⁸ A more stringent standard (1 000 ppm by 1 January 2010) applies to marine fuels used by ships at berth in Finnish ports. Fuel quality is monitored according to the relevant EC legislation and Fuel Quality Monitoring Standard (EN 14274:2004).

The act on the *promotion of biofuels*, adopted in April 2007, sets an obligation for transport fuel service providers to add biofuels in transport fuels (2% in 2008, 4% in 2009 and 5.75% in 2010). The Ministry of Employment and the Economy has launched a R&D Programme to develop new, second generation biofuels (EUR 9 million for 2007-08). Feasibility and impacts of synthetic diesel oil are studied in buses and waste management trucks in the City of Helsinki with government support through tax concessions.

4.2 Vehicles

Private car ownership has increased and is now higher than the OECD Europe average when expressed in vehicles/100 persons (Figure 2.2). The average age of the vehicle fleet is 10.5 years, but it is expected to decrease gradually following reduction of the registration tax (by an average of one-sixth) as part of the passenger car tax

reform that was recently adopted (Chapter 6). Cars are to be inspected annually, starting in the third year of registration.

Vehicle emission limits for NO_x, CO and particulate matter have been made more stringent, in line with EU requirements (Table 2.10). Emissions are regulated by the EU for most vehicle types, including cars, lorries, buses, trains, tractors, barges, excluding seagoing ships and airplanes. In 1996 Euro 2 introduced different emission limits for diesel and gasoline vehicles. Diesels have more stringent CO standards but are allowed higher NO_x emissions. Gasoline-powered vehicles are exempt from particulate matter standards, but vehicles with direct injection engines will be subject to a limit of 0.005 g/km for Euro 5 and Euro 6. Euro 5 and Euro 6 standards for passenger cars, which will come into force on 1 September 2009 and 1 September 2014, emphasise further reductions of emissions of particulates and NO_x, especially for diesel vehicles. With regard to heavy-duty vehicles, Euro III, IV and V standards include voluntary, stricter emission limits for extra low emission vehicles, known as “enhanced environmentally friendly vehicles” (EEVs). In December 2008, the Commission’s proposed Euro VI standards were agreed upon, which will become effective from 2013 and are closer in stringency to the US 2010 standards.

Table 2.10 **EU emission standards for vehicles^a**
(g/km; g/kWh)

Standard	Entry into force ^b	Passenger cars ^c						Heavy-duty vehicles ^d			Entry into force ^b	Standard
		Petrol			Diesel			CO	NO _x	PM		
		CO	NO _x	PM	CO	NO _x	PM					
Euro 3	1-1-2000	2.30	0.15	–	0.64	0.50	0.05	4.0	7.0	0.25	1-10-1996	Euro II
Euro 4	1-1-2005	1.0	0.08	–	0.5	0.25	0.025	2.1	5.0	0.10	1-10-2000	Euro III
Euro 5	1-9-2009	1.0	0.06	0.005 ^e	0.5	0.18	0.005	1.5	3.5	0.02	1-10-2005	Euro IV
Euro 6	1-9-2014	1.0	0.06	0.005 ^e	0.5	0.08	0.005	1.5	2.0	0.02	1-10-2008	Euro V

a) The standards for passenger cars (g/km) and heavy-duty vehicles (g/kWh) are in no way comparable. Emissions standards for hydrocarbons and, for heavy-duty vehicles, smoke are not included in this table. CO₂ are not currently regulated for any type of vehicle.

b) Refers to new type approvals. The EC Directives also specify a second date – one year later – which applies to first registration (entry into service) of existing, previously type-approved vehicle models.

c) Also applies to light commercial vehicles (gross weight below 1 305 g).

d) Diesel trucks and urban buses (gross weight over 3 500 kg). Standards refer to diesel engines tested on the European Stationary Cycle (ESC).

e) Only for vehicles with direct injection engines.

Source: EU Directives 98/69/EC and 1999/96/EC; Regulation (EC) No. 715/2007.

Finland has ratified the 1997 Protocol (Annex VI) to the 1973 Convention for the Prevention of Pollution from Ships, as modified by its 1978 London Protocol (MARPOL 73/78), which sets *limits on SO_x and NO_x emissions from ship exhaust* and prohibits deliberate emissions of ozone-depleting substances.

Non-Road Mobile Machinery (NRMM)¹⁹ is a small but significant source of NO_x and particulate emissions, two pollutants that affect air quality in Finland. Since 1997 it has established mandatory standards for emissions from NRMM, pursuant to EU requirements.²⁰ Successive Directives (2001, 2002, 2004) have tightened these standards and extended standards to other categories of NRMM.

4.3 Public transport

Public transport has been *subsidised by the Government budget* with around EUR 80-85 million a year (Chapter 6). In addition, municipalities subsidise their local public transport. In 2009 the Government will introduce a new subsidy to increase the market share of public transport in major urban areas. Value-added tax for public transport services is 8% (instead of 22%). Public transport vehicles are exempt from annual circulation tax. Since 1 January 2006 *employers* may pay part of the “commuter tickets” to their employees using public transport (*i.e.* 25% of ticket price). For example, such a scheme was introduced in 2007 for employees of the City of Turku.

Transport system plans had already been drawn up at both regional and local levels before the millennium. More than 20 local or regional plans have been put forward and five are under preparation. They cover all urban areas with a population of 50 000 or more and should contribute to better managing urban traffic congestion.

Voluntary energy efficiency and energy saving agreements apply to a range of branches. Concerning transport operators, there are agreements with freight transport and public transport operator associations. The aim is to reach at least a 9% improvement in energy efficiency of freight and public transport in 2008-16. The key commitments relate to energy efficient requirements for procurement of transport services, eco-driving and technical measures (*e.g.* tyre pressures, other inspection and maintenance measures).

4.4 Assessment

The instrument mix (taxes, regulations, voluntary approaches) has contributed to the decrease of transport emissions. The shift to *vehicle taxation* (registration and circulation taxes) on the basis of CO₂ emissions *is a very positive step*. However, *fuel*

taxation of diesel has remained much lower than that of unleaded gasoline (Chapter 6). Emission reductions, particularly for diesel vehicles, can be expected from the recent (Euro V) and forthcoming (Euro 5 and Euro 6) *vehicle emission standards*.

In June 2007, the MTC appointed an *ad hoc* working group to examine the possible introduction of *road user charges*. It was intended that road charging could start through a pilot scheme for freight transport on the most important east-west road corridor in Finland,²¹ possibly in the context of the Eurovignette directive.²² In spring 2008, the MTC commissioned a study on how congestion charges could contribute to meeting the transport policy goals and social expectations in the Helsinki region. Differentiated road pricing schemes according to vehicle emission standards would be an excellent way of internalising damages associated to vehicles' air emissions; they should be consistent with the road fuel taxes and vehicle taxes so as to improve economic efficiency and environmental effectiveness. They should also be consistent with the *regional transport subsidy* that partially compensate small and medium-sized enterprises established in low population density areas for the additional transport costs due to long-distance transport (Box 2.2).

Voluntary approaches can offer a higher economic efficiency than “command and control” policies by providing firms with increased flexibility in how they achieve environmental improvements. However, the agreements should incorporate mechanisms to equalise marginal abatement costs between all polluters, and their environmental targets should contribute to environmental improvements beyond existing legal requirements (OECD, 2003).

Further opportunities to reduce air pollutant emissions from transport can be exploited by *rational management of urban transportation*. Transport system plans should be developed in parallel with land use plans.

Good progress has been made to increase *fuel quality*. The increase of bio-fuel use is mainly due to mandatory blending with road fuels and concessions to the excise tax on motor fuels (as allowed by the EU energy tax directive).²³ As part of the new EU climate and energy package (approved by the European Parliament in December 2008), a directive on the promotion of the use of energy from renewable sources mandates the increased use of bio-fuels in the EU in order to achieve, by 2020, at least a 20% share for renewable energy and at least a 10% share for bio-fuels in road transport. The directive provides for sustainability criteria that bio-fuels must meet in order to count towards the renewable fuel targets. The sustainability criteria require, *inter alia*, that *i*) any bio-fuel production pathway represent at least a 35% GHG savings over the relevant fossil fuel comparator, and that *ii*) bio-fuel not be produced from feedstock obtained from land with a high biodiversity value or land with high carbon stocks. The criteria will be binding for bio-fuel markets of all EU

Box 2.2 The regional transport subsidy

Since 1981, a subsidy has been made available to *small and medium-sized enterprises* established in the five regions of Lappi (2 inhabitants per square kilometer), Kainuu (4), Pohjois-Karjala (9.5), Pohjois-Pohjanmaa (10.6), and Etelä-Savo (11.4). It applies to transport within Finland^a of *goods manufactured by the enterprise*. The subsidy is paid for the whole continuous transport chain, whether by road, rail or sea. It is paid per kilometre for rail and road transports covering a distance of not less than 266 kilometres (not less than 101 kilometres for rail or road transport after inland navigation on the Saimaa waterway).

The aid is *calculated as a percentage of the transport cost*, increasing from 7% (266-300 km)^b to 29% (more than 1 001 km). For waterborne transports, starting from the Gulf of Bothnia (city of Merikarvia or north of it) or from the Saimaa waterway, the subsidy is paid on the basis of the weight of the consignment in port areas (EUR 2.05 per tonne or EUR 1.04 per tonne depending on the port or places of shipment).

In recent years the regional transport subsidy amounted to about *EUR 4 million a year* (EUR 4.7 million in 2007), of which some 10% for port operations. No subsidy was granted to cover the cost of transporting primary commodities, raw materials or intermediate products from the place of their production to the place of final processing, Finland complying with requirements of the EC common market.

a) The subsidy also applies to distances covered within the country in cases where transports start from the Arctic region of Finland and are destined for or will transit through the Arctic region of another country.

b) The 7% subsidy applies to distances of 101-130km for rail or road transport involving port operations.

countries. To prevent the use of land with high biodiversity value, such as tropical forests, for the production of bio-fuels, Finland should extend implementation of the sustainability criteria to imports of raw materials (*e.g.* palm oil).

5. Energy Policy

Finland's main energy policy goals are characterised by the three E's: *energy security, economic development, and environmental sustainability*. However, with the increasing importance of climate change, environmental aspects are more important in energy policies than previously. The Finnish Climate Change Strategy (2000) and

the Strategy to implement the Kyoto Protocol in Finland (2005) have been subject to a strategic environmental assessment. Much of the effort is driven by EU directives and takes into account competitiveness concerns.

5.1 Energy efficiency

Finland's *energy intensity* is higher than that of most OECD countries, partly reflecting the structure of its economy (prominence of energy-intensive sectors, such as pulp and paper, and steel) (Chapter 8 and Reference IB). This is despite a continuous decline and various efforts to improve energy efficiency. In 2002, the latest Action Plan for Energy Efficiency identified energy efficiency measures for the period 2003-06 with a 2010 target year in energy intensity. In 2005, this Action Plan was incorporated into the National Energy and Climate Strategy with a new national target (to achieve an additional 5% energy savings by 2015) and new measures following EU directives.

First, improving energy efficiency in *buildings* has been a policy priority. According to the current building codes, builders have to estimate the annual energy consumption of a building, which must comply with a maximum heat loss.²⁴ The new building regulations issued in December 2008, pursuant to the EU's energy performance of buildings directive (2002/91/EC), are about 30% tighter than existing ones; they will come into effect at the beginning of 2010. Secondly, energy efficiency measures in the transport sector have concentrated on *i*) sustainable transport planning in conjunction with urban land use planning, *ii*) voluntary energy saving agreements with public transport carriers and driver's associations and *iii*) eco-driving campaigns, among others. Further measures will come up as part of the 2007 long term *transport* strategy "Transport 2030". Thirdly, Finland has achieved significant progress in energy efficiency through *voluntary agreements with industry* (Box 2.3). Although initially estimated at saving 5.5 TWh by 2005, the actual savings were 7.1 TWh.²⁵

5.2 Renewable energy

Finland has already a *high share of renewable energy in its primary energy supply* (nearly a quarter). This reflects the extensive use of biomass (almost 85% of renewable energy supply) and hydropower. Less than 0.2% of renewable energy comes from new renewable (*e.g.* solar and wind). Further objectives have been set by the 2005 National Energy and Climate Strategy:

- use of renewable energy should grow (by at least 25% by 2015 and by at least 40% by 2025) so that the share of renewable energy is almost one-third of primary energy by 2025;

- use of forest residues , energy crop-derived biomass, and biogas and small scale wood facilities should grow (by approximately 65% by 2015 and 80% by 2025, compared to 2003);
- renewable electricity should account for 31.5% of total Finnish power consumption in 2010;
- biofuels should account for 5.75% of road transport fuels in 2010.

Box 2.3 Energy efficiency agreements

Origins and design

Launched in 1993 and extended in 1997, *energy efficiency agreements* between the government and industry branches aimed at reducing energy use and making energy efficiency part of everyday operations in companies. *Branch associations* were to promote energy efficiency among their members. In turn, *companies* were to carry out energy audits, draw up energy efficiency plans, and implement cost-effective saving measures. The agreements also envisaged companies to monitor energy efficiency continuously and to set numerical targets for energy efficiency improvements. Companies had to report annually to their branch associations. The *government* was to provide subsidies for energy audits and analyses, and under certain conditions, for energy-saving investments.

By end 2005, energy efficiency agreements had been signed between government ministries and *eight industry associations*. Over time, additional associations (energy, property and building, municipal, buses and coaches) were added. The agreements coverage included: 91% of electricity generation, 85% of industrial energy consumption; 81% of electricity distribution, 68% of district heating sales, 58% of municipal property stock and 23% of Finland's private and public service building stock.

Results

By end 2005, actual *energy savings* amounted to about 7.1 TWh per year (5.6 TWh in heating energy and fuels and 1.5 TWh in electricity), thereby saving EUR 135 million in energy costs and reducing carbon dioxide emissions by 2.3 million tonnes. Around 85% of energy savings were under the industrial conservation agreements and 11% under the power sector agreement. The remainder (about 4%) was reported under the agreements concerning: district heating (0.09 TWh per year), municipalities (0.07 TWh per year), electricity distribution (0.05 TWh per year) and property and building (0.04 TWh per year).

Administrative costs were about EUR 4 million, stimulating investments (over EUR 350 million, including EUR 50 million in the power sector). Between 1998 and 2005 EUR 12.1 million was provided for energy audits and EUR 16.5 million as investment subsidies.

Box 2.3 Energy efficiency agreements (*cont.*)

Follow-up

In 2007, a *third wave of energy efficiency agreements* (till 2016) was prepared. The new agreements signed by the Ministry of Employment and the Economy, the Confederation of Finnish Industries and its eight member associations, have been tailored to conform with the specific characteristics of participating business sectors (food industry, energy services, energy production, the wood refining industry, retail, accommodation and catering, the plastics industry and the technology industry). A separate programme for improving energy efficiency has been drafted for the energy-intensive industry. The Association of Finnish Local and Regional Authorities signed a new framework agreement for the municipal sector. In the public sector, emphasis is placed on including energy efficiency in public procurement contracts.

The new agreements seek to promote further the deployment of *new technology and innovation activities*, while including targets and measures for encouraging the use of renewable energy. These energy efficiency agreements are seen as part of the implementation of the EU directive on energy efficiency and energy services, and as contributing to Finland's efforts to meet its international commitments on climate change, in line with the 2005 National Energy and Climate Strategy.

5.3 Assessment

Efforts to raise *energy efficiency should capture multiple benefits*: *i)* reduced reliance on energy imports, *ii)* reduction of CO₂ emissions, *iii)* reduced air pollution and related health costs, and *iv)* improved economic efficiency of the energy sector. The later point would deserve careful attention, as it is likely that promotion of energy efficiency progress compares favourably to the promotion of renewable energy production. Beyond the above recommendations on energy taxation, determined action should be taken to improve energy efficiency and reduce Finland's quite high energy intensity.

To counter the risk of *over-subsidisation of renewable energy* through direct subsidy, the government should consider more market-based approaches in promoting renewable energy. Green certificates, which are priced according to the difference between the market price and the production costs could, in principle, solve the problem of over-subsidisation. Finland could use this promotion scheme cost-effectively within the Nordic electricity market, and incorporate the carbon price signal established by the European Union emissions trading schemes. If a new

renewables promotion scheme is implemented, it should be integrated within existing policies and not simply added on top of existing measures.

There is scope to strengthen *energy efficiency in the building sector*. Buildings codes are already quite good but could be improved, particularly when comparing with Nordic neighbours' standards (IEA, 2008). The new building regulations of December 2008 are a step in the right direction. As the current threshold for minimum performance requirements is 1 000 m², Finland should extend building regulations to include smaller buildings, thereby anticipating (rather than waiting for) the EU proposal to expand the scope of the building directive.

To fully capture the efficiency gains of *voluntary agreements with industry*, government should ensure that such voluntary agreements are sufficiently ambitious and should establish cost-effective incentives to go beyond the stated targets of the agreements. Government should also continue ensure that monitoring, transparency and enforcement are implemented.

Notes

1. Directive 2001/81/EC of the European Parliament and of the Council on national emission ceilings for certain atmospheric pollutants.
2. Directive 2008/50/EC of the European Parliament and of the Council on ambient air quality and cleaner air for Europe, which clarifies and simplifies the Air Quality Framework Directive 96/62/EC and three daughter directives: 1999/30/EC (SO₂, NO_x, PM₁₀, lead), 2000/69/EC (benzene, CO) and 2002/3/EC (ground-level ozone). Directive 2008/50/EC introduces new provisions on fine particles (PM_{2.5}).
3. Directive 2004/107/EC of the European Parliament and of the Council relating to arsenic, cadmium, mercury, nickel and polycyclic aromatic hydrocarbons in ambient air.
4. Directive 2001/80/EC of the European Parliament and of the Council on the limitation of emissions of certain pollutants into the air from large combustion plants. The Directive was brought into force in Finland in 2002.
5. The extent of peat production in Finland depends on summer weather conditions (sunshine) and the availability of power in the integrated Nordic power pool, which has a large share of precipitation-dependent hydro capacity. A joint research project on particulate emissions from biomass combustion was completed in 2008, involving ten research institutes from four countries (www.biomasspm.fi).
6. Council Directive 1999/13/EC on the limitation of emissions of volatile organic compounds due to the use of organic solvents in certain activities and installations.
7. Council Directive 94/63/EC on the control of volatile organic compound (VOC) emissions resulting from the storage of petrol and its distribution from terminals to service stations.
8. Government Decree on waste incineration (362/2003) transposes Directive 2000/76/EC of the European Parliament and of the Council on the incineration of waste. All existing waste incineration plants had to fulfil the criteria set by the directive by the end of 2005.
9. PM_{2.5} concentrations are currently measured at 11 stations in Finland, 4 of which are located in the Helsinki Metropolitan area.
10. The new EU air quality directive (2008/50/EC) obliges member states to reduce exposure to PM_{2.5} in urban background areas by up to 20% by 2020 depending on 2010 levels, bringing the exposure levels below 18 micrograms/m³ by 2015. In other areas, the member states will need to respect the PM_{2.5} target value set at 25 micrograms/m³ by as early as 2010 if possible, and at the latest by 2015 when the target value is to be replaced by a (binding) limit value.
11. The PM₁₀ ambient air quality objectives do not apply where values are exceeded due to the re-suspension of particulates following winter-sanding or salting of roads. Forthcoming 2010 EC guidelines should allow to better estimate the share of re-suspension in total PM₁₀ concentrations.
12. SO₂ concentrations declined already before the review period; they are generally very low with few exceptions, like in harbour areas.
13. In 2005 Finland released a National Strategy for Adapting to Climate Change (Chapter 8).
14. Fuel with a maximum sulphur content of 10 parts per million.

15. Directive 2003/17/EC of the European Parliament and of the Council amending Directive 98/70/EC relating to the quality of petrol and diesel fuels.
16. Council Directive 1999/32/EC relating to a reduction in the sulphur content of certain liquid fuels.
17. Annex VI to MARPOL designates the entire Baltic Sea as a “SO_x Emission Control Area”.
18. Directive 2005/33/EC of the European Parliament and of the Council amending Directive 1999/32/EC in regard to the sulphur content of marine fuels, and transposed in Finland by the Decree on the sulphur content of heavy fuel oil, gas oils and marine gas oils (689/2006).
19. “Non Road Mobile Machinery” consists of any mobile machine fitted with an internal combustion engine not intended for passenger or goods transport by road. This includes excavators and other construction equipment (*e.g.* drilling rigs, bulldozers, forklift trucks, road maintenance equipment, snow ploughs and mobile cranes) and, since 2004, locomotives and inland waterway vessels.
20. Directive 97/68/EC of the European Parliament and of the Council on the approximation of the laws of the Member States relating to measures against the emission of gaseous and particulate pollutants from internal combustion engines to be installed in non-road mobile machinery.
21. Highway 1 is part of the European E18 expressway and of the Trans-European Network (TEN). It is a major element of the Nordic Triangle, which links the Nordic capitals to each other, to Russia and to central Europe.
22. Directive 2006/38/EC on charging heavy goods vehicles for the use of certain infrastructures. Pursuant to the directive, as of 2010 countries which apply road tolls (based on distance travelled) or user charges (set for a given period) will have to differentiate them according to vehicle emission standards to favour cleaner vehicles.
23. Directive on restructuring the Community framework for the taxation of energy products and electricity (2003/96/EC).
24. Builders have some degree of flexibility here; for example greater heat loss from ventilation can be compensated by better insulation of the walls.
25. The process of evaluation, reporting and verification conducted by Motiva Oy is commendable. Motiva Oy is an independent state-owned company which provides expertise and project services to promote more efficient energy use and renewable energy sources.

Selected Sources

The government documents, OECD documents and other documents used as sources for this chapter included the following. Also see list of websites at the end of this report.

Finnish Environment Institute (2008), *Air Pollutant Emissions in Finland 1990-2006*, Informative Inventory Report to the Secretariat of the UN-ECE Convention on Long-Range Transboundary Air Pollution, 15 March 2008, SYKE, Helsinki.

Finnish Meteorological Institute (2007), *An Integrated Model for Evaluating the Emissions, Atmospheric Dispersion and Risks caused by Ambient Air Fine Particulate Matter*, Studies No. 1 STU-1, October 2007, in Finnish, Helsinki.

Norwegian Meteorological Institute (2008), *Transboundary Air Pollution by Main Pollutants (S,N,O₃) and PM: Finland*, EMEP/MSC-W, Data Note 1/2008, August 2008, Oslo.

OECD (2003), *Voluntary Approaches for Environmental Policy: Effectiveness, Efficiency and Usage in Policy Mixes*, OECD, Paris.

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Stebel *et al.* (2007), *State of the Environment in the Norwegian, Finnish and Russian Border Area*, The Finnish Environment, 6/2007, Lapland Regional Environment Centre, Rovaniemi.

TFIAM/CIAM (2007), *Review of the Gothenburg Protocol*, Background document to the UN-ECE review of the 1999 Gothenburg Protocol, Task Force on Integrated Assessment Modelling (TFIAM) of the UNECE Convention on Long-range Transboundary Air Pollution and the Centre for Integrated Assessment Modelling (CIAM), CIAM Report 1/2007.

3

NOISE*

Features

- Noise abatement objectives
- Sources of excessive noise
- Managing noise exposure
- Financing noise abatement and control
- Designating quiet areas

* The present chapter reviews progress since the previous OECD Environmental Performance Review of 1997. It also reviews progress with respect to the objectives of the 2001 OECD Environmental Strategy.

Recommendations

The following recommendations are part of the overall conclusions and recommendations of the environmental performance review of Finland:

- further specify *noise regulations* (e.g. obligatory excessive noise thresholds, thresholds for peak levels, thresholds in urban areas) and enforce their application by national, regional and local authorities; designate and manage quiet areas;
- fund *noise abatement projects* with priority given to reducing noise at source and to areas with daytime noise exceeding 65 dB, areas with large numbers of people exposed, recreational areas, and areas with educational and healthcare institutions;
- *integrate noise concerns within other policies* (e.g. zoning in land use planning, road and congestion pricing, “green” procurement in public transport, tourism policies, nature conservation);
- develop further noise *monitoring* (e.g. along rail and roads, combined with air quality monitoring in the Helsinki area, for hotspots action programmes according to the EU Environmental Noise Directive);
- further expand research on the adverse effects of noise on *human health* and well-being; including the *economic assessment* of noise measures.

Conclusions

Efforts to reduce noise have a long history in Finland, as a *low-noise environment* is considered part of healthy and pleasant living conditions. Attention given to noise problems by Parliament and Government has led to *quantitative objectives* in the 2004 Noise Abatement Action Plan and the 2006 Government Resolution on Noise Abatement. *Regulations* (e.g. speed limit in city centres, noise emission and immission thresholds, regulations of aircraft take-off and landing) and *investments* (e.g. low-noise pavements, noise barriers, renewal of rail fleet and rail maintenance) have been implemented. The first *economic incentives* (air traffic noise charge, introduction of noise criteria in public procurement) have been recently introduced. Their objective is to *reduce exposure to noise* from city traffic and from night-time air traffic. In response to the 2002 EU Directive on Environmental Noise, national road and railway authorities, and the City of Helsinki, started producing noise maps and noise action plans. *Municipalities* also started to integrate noise issues in their air pollution reduction, public transport and green procurement programmes. A noise abatement database is currently being established.

Even though large areas of Finland are still free from noise problems, *one sixth of the population* is exposed to daytime noise levels exceeding 55dB from motorways, railways and industry, and this share is likely to increase. The *increase of traffic volumes* has offset progress made in reducing exposure to excessive noise by noise abatement measures. Daytime noise levels of 65 dB are common in urban areas; noise levels up to 70 dB, with potential significant adverse effects on human health, are reached in the busiest urban areas. Noise maps and *noise abatement action plans*, as required by the European Union, are still to be drawn up for many municipalities. *Implementation of national land use objectives* is not sufficient, and land use planners should work to prevent the harmful effects of noise and to reduce annoyance and disruption of activities from noise. Efforts to *reduce noise at source* (e.g. low noise road pavements, low-noise equipment) have been limited; focus has been on (less cost-effective) noise mitigation through noise barriers. Noise thresholds are not binding and noise peak levels for industry are not sufficiently regulated. *Financial resources devoted to noise management* (including by the road administration and municipalities) are not commensurate with the quantitative objectives adopted. The *use of studded tyres* should be restricted to reduce both noise levels and small particulate emissions. An up-to-date and comprehensive information programme is to be developed to help monitor noise levels.



1. Institutional Framework

1.1 Legislation and objectives

Even though large areas of the country do not have noise problems, pressures, especially from transport and industrial operations, have led Finland to establish legislative, regulatory and planning frameworks for reducing exposure to environmental noise.¹ The *1988 Noise Abatement Act*, incorporated in the comprehensive 2000 Environmental Protection Act and the 2000 Land Use and Building Act, stressed the importance of integrating noise abatement in broader environmental protection efforts. In 1992, Guidelines on Noise Levels established non-binding noise level thresholds² (Table 3.1). The guidelines have been applied to land use planning, including the development of housing and transport infrastructure, and in environmental permitting. In 2004, Finland harmonised its regulatory framework with the *2002 EU Directive on Environmental Noise*³ through amendments of the Environmental Protection Act. The 2004 National Guidelines and

an Action Programme for Noise Abatement set down several measures for controlling noise at the source, establishing quiet areas and reducing harm from vibrations.

In 2005 the *Parliamentary Audit Committee* stated that: *i*) the implementation of noise regulations and policies had not been adequately funded; *ii*) some noise mitigation measures had neither been effective nor appropriate and *iii*) data on exposure to noise and its health effects had been insufficient. Key challenges identified included: improving regulatory measures, increasing the financing of noise reduction measures and increasing the understanding of noise impacts among land-use planners and decision-makers. The statement of the Audit Committee led to a *Government Resolution on Noise Abatement* in 2006, including challenging objectives for implementation by 2020: *i*) reducing by 20% the number of people living in areas where daytime equivalent noise levels exceed 55 dB (measured with $L_{Aeq\ 7-22}$) compared to 2003, *ii*) not exceeding *guideline values* set by government (55 dB daytime and 50 dB at night)⁴ in indoor spaces, in the vicinity of educational and healthcare institutions, and in recreational areas in and close to population centres. The resolution also called for the establishment of *quiet areas*.

Table 3.1 **Guidelines for environmental noise**

(dB)

	Day time ^a	Night time ^b
Areas (outdoor levels)		
Residential areas	55	50 ^d
Recreational areas in and close to populated centres	55	50 ^d
Areas of health care or educational institutions	55	50 ^d
Recreational areas, holiday settlements, camping sites ^c	45	40
Nature conservation areas	45	40
Buildings (indoor levels)		
Dwellings, sickrooms, guest rooms in accommodation businesses	35	30
Educational and conference facilities	35	
Business and office facilities	45	

a) Day time measured with level equivalent (L_{Aeq}) over the period 7h00-22h00.

b) Night time measured with level equivalent (L_{Aeq}) over the period 22h00-7h00.

c) Outside population centres.

d) 45 dB for new areas.

Source: MoE.

Noise abatement measures were initially to focus on residential areas in which the daytime noise levels exceed 65 dB, areas with large numbers of people exposed, recreational areas and areas with educational and healthcare institutions. An interim evaluation of progress is set for 2011.

1.2 Institutional setting

At *national level*, the Ministry of the Environment (MoE) is responsible for directing, supervising and promoting noise abatement measures. The Finnish Road Administration, Rail Administration and Finavia³ prepare noise abatement plans for their respective sectors, and carry necessary investment. Finnish defense forces implement noise abatement measures related to military activities.

Municipalities monitor exposure levels and implement noise policy through noise abatement action plans, spatial planning and infrastructure measures. The local measures are overseen by state agencies and Regional Environmental Centres.

2. Progress in Managing Noise Exposure

2.1 Trends and effects

In 2005, between 800 000 and 900 000 people (around 16% of the population) lived in areas where daytime noise levels exceeded 55 dB. Street and road traffic accounted for 90% of total population exposure (Table 3.2). The decrease in exposure since 1998 (by 100 000 people) is partly due to changes in classification and estimation methods, but also due to good progress in reducing *noise from civilian aviation at the Helsinki-Vantaa airport and from urban traffic*. In the Helsinki Metropolitan Area only around 7% of inhabitants are affected by daytime noise levels above 55 dB. However, daytime noise levels above 65 dB are common in urban areas.

In contrast, exposure to *noise from road and rail traffic* increased in the review period. Growing road traffic and urban development close to ring roads and arterial roads are the main factors.⁶ The increase of traffic volumes has offset progress made in reducing exposure by measures such as noise barriers, reduction of vehicle engine noise, use of low noise pavements and tyres. No progress has been achieved in reducing exposure to *industrial noise*.

A 2007 report (released by MoE) detailed *noise effects on human health: annoyance, as well as effects on sleep, cognitive performance (especially for children) speech and hearing impairment (for extreme exposure)*.⁷ The report states

that chronic exposure to noise increases the risk for cardiovascular disease and that individual noise sensitivities have not been sufficiently recognised earlier (Jauhiainen *et al.*, 2007).

The EU Green Paper on Future Noise Policy estimated that the *damage costs of noise* may reach between 0.2 and 2% of GDP annually (EC, 1996); applying the lower percentage to Finland suggests a damage of EUR 340 million annually. Another estimate places disturbance damage from noise from major sources at EUR 50 to 65 million in 2005 (MoE, 2006), excluding uncalculated human health effects. The study called for more reliable estimates of health, social and economic impacts of noise, and their comparison to the impacts of other environmental problems.

Table 3.2 **Inhabitants living in areas subject to day time noise,^a by source, 1998 and 2005**
(population exposed to noise)

Source of noise	2005			1998	
	> 55 dB	55-60 dB	60-65 dB	> 65 dB	> 55 dB
Streets	393 500-430 500	371 000	35 000	6 200	560 000
Roads	315 500-384 500	221 000	88 000	41 000	320 000
Railways	43 500-53 000	37 400	9 500	1 800	35 000
Air traffic, total	23 700-24 100	..	..	..	65 000
civilian	13 400-13 600	11 600	1 900	..	..
military	10 300-10 500	..	..	..	..
Industry	4 000-6 000	..	..	..	5 000
Shooting ranges ^b	2 000-4 000	..	..	..	7 000
Motor racing tracks	2 000-3 000	..	..	..	2 000
Waterborne traffic ^c	300	..	..	..	500
Total	784 300-905 600	..	..	..	994 500

a) Day time noise measured with level equivalent (LAeq) over period 6 h 00-22 h 00.

b) Data for civilian shooting ranges; no data available for military shooting ranges.

c) Including harbours.

Source: MoE.

2.2 Street traffic noise

The number of inhabitants living in areas exposed to *daytime noise from city traffic* above 55 dB has been reduced from 560 000 in 1998 to around 400 000 in 2005. This is partly due to changes in classification and estimation methods, and partly to the use of a mix of instruments by municipalities: lowering speed limit (down to 30 km/h in central areas), creating pedestrian zones in the city centres, carrying building noise insulation investment (mostly as part of energy efficiency efforts) and using low noise equipment. The City of Helsinki also contributed EUR 18 million to the construction of 16 km of noise barriers in the period of 2000-07. These noise abatement measures have benefited about two-thirds of the exposed inhabitants. Focus is now mostly on preventing noise in newly urbanised areas and integrating noise concerns in air pollution management, public transport and “green” procurement programmes. Noise was part of the criteria in recent public tenders for the selection of buses in the Helsinki Metropolitan Area, as were emissions of particulates, NO_x, and CO₂.

In 30% of municipalities, noise abatement programmes were drawn up in the 1990s, and then implemented slowly to the extent of being now partly out of date. Further to the 2002 EU Environmental Noise Directive, investigations on noise levels in large cities and busy traffic routes now serve as a basis for *action plans to prevent or reduce noise*.⁸ The first noise action plan was adopted in Helsinki in 2008 (Box 3.1).

Noise has become a standard topic for *communication activities of municipalities*. For example, the City of Helsinki holds press conferences and public meetings concerning noise mapping and noise abatement actions, and reports on the noise situation in its state of the environment reports (1998, 2003 and 2007). These reports are available online.

2.3 Road traffic noise

The number of inhabitants living in areas exposed to *daytime noise levels* above 55 dB along Finnish roads was estimated to 315 000 to 380 000 in 2005 (320 000 in 1998). A further growth of 0.7% per year is expected. Exposure to noise along arterial roads entering the main cities is the main problem.

The Finnish Road Administration has adopted *noise abatement programmes*, the most comprehensive of which applies to the Helsinki area.⁹ Noise assessments and abatement objectives are integrated in the *planning and design of new roads*. If this is not sufficient, *noise and vibration barriers* have been constructed, focusing on areas with the most severe annoyance caused by road noise (over 65 dB or where activities sensitive to noise are situated). However, due to lack of funds, noise barriers have not been built, even in a number of “hot spots”.¹⁰

Box 3.1 Noise Action Plan of the City of Helsinki

The City of Helsinki developed *noise maps* in 2007 and adopted a *Noise Action Plan* in 2008 in compliance with the EU Environmental Noise Directive. The noise action plan identifies 12 strategic issues and links noise abatement measures with other plans (e.g. Air Quality Action Plan, Climate Strategy 2030, Sustainable Development Action Plan for Helsinki 2002–10, the Plan for Helsinki’s ecological stability, Helsinki Metropolitan Area Transport System Plan).

Examples of *priority measures* include:

- Integration of noise in land use planning, traffic planning and public transport policy;
- increase in use of low-noise road surfacing and decrease in use of studded tyres;
- construction of noise barriers;
- improved sound insulation especially in downtown area;
- creation of a database on quiet areas and their planning;
- speed limit control.

The latter measure builds on the positive results of speed limits introduced in Helsinki in 2004. Although the primary objective of lowering the speed limits by 10 km/h (to 40 or 30 km/h) was the reduction of the number of fatal accidents, the measure had also positive side effects on air quality and noise emissions.

In 2005, the Ministry of Transport and Communications published its *Environmental Guidelines for the Transport Sector until 2010*, addressing noise (and vibration) abatement among other environmental issues. Targets for 2010 mirror those of the 2006 Government Resolution on Noise Abatement and are to be achieved by a variety of measures: constructing noise barriers, using low-noise road surfaces, managing the growth in traffic volumes, including noise in annual technical inspection of vehicles. However, doubts have been expressed about meeting these targets due to insufficient funding.

2.4 Railway noise

Noise emission limits for the rolling stock were introduced by the Finnish Rail Administration in 2000. Despite regulations, construction of 40 km of noise barriers along rail tracks, renewal of locomotives and tracks, the number of people exposed to *noise levels from railways* above 55 dB increased from 35 000 in 1998 to around 50 000 in 2005.¹¹ Given the expected annual increase of rail transport volume of 1%, the objective of reducing by 10 000 the number of people affected before 2020 is ambitious. However, financing has not yet been secured for related investments.

2.5 Air traffic noise

The number of inhabitants exposed to air traffic noise has been reduced by more than 40 000 (65%), between 1998 and 2005. This has been achieved through appropriate planning of the *Helsinki-Vantaa airport* extension directing the third runway (built in 2006) away from housing areas. Use of modern aircrafts, regulations and guidelines on takeoff and landing, and a night-time aircraft takeoff charge have also contributed to this progress (Chapter 6).

Still, noise exposure to civil aviation and military aviation affects, respectively, around 13 500 and 10 400 people. The expected doubling of air traffic volume at the Helsinki airport by 2020 will increase the number of people affected. *Monitoring of noise* by Finavia at the Helsinki-Vantaa airport is continuous and translates in quarterly reports to environmental authorities.

2.6 Industrial and construction noise

Population exposed to industrial noise above 55 dB has been stable at around 5 000 people. Industrial noise is regulated through land use and spatial planning: non-habitable zoning around industrial installations or locating industrial activities distant from residential areas limit the impacts of noise. In environmental permits *noise immission levels* are set according to the 1992 noise guidelines. However, the guidelines apply to new activities, and only to a limited extent to existing activities. Regulations and guidelines on *noise abatement in new construction projects* are described in the National Building Code of Finland and are subject to enforcement by municipalities and regional environmental authorities.

3. Financing Noise Abatement

Noise abatement is primarily financed by *national road, railway and aviation administrations* and to some extent by *municipalities*. There are no data concerning private sector funding. Better information about noise abatement expenditure is needed.

Nevertheless, since 2000, the Road Administration¹² has spent roughly EUR 2.2 million per year, the Rail Administration¹³ about EUR 3.3 million per year and Finavia¹⁴ up to EUR 0.6 million per year. Expenditures of municipalities for noise barriers for railways have been EUR 0.6 million per year on average. The corresponding total public expenditure of EUR 7.7 million is an underestimate of yearly expenditure, which is rather in the range of EUR 10 million per year. This represents about 1.3% of PAC public expenditure (Chapter 6).

A 2007 package of noise abatement measures¹⁵ was prepared to estimate financial support needed for noise abatement projects in public road (77 projects) and rail transport (9 projects) in Finland, including for noise “hot spots”. Costs were estimated at EUR 30 million a year over a period of 15 years. The package include: construction of noise walls, introduction of speed limits, façade insulation, use of porous low-noise surfaces, quiet vehicle procurement, as well as inspection and enforcement of noise emissions from vehicles. The package is expected to decrease exposure to noise to guidelines levels of over 25 000 inhabitants from road traffic and exposure to noise of over 6 000 inhabitants from rail traffic. No financial allocation has been made yet.

A 1999 abatement research assessment concluded research efforts on environmental noise were fragmented and insufficient. In recent years, more emphasis has been placed on integrating noise abatement into R&D activities. Research has been done to reduce the impacts (rolling noise and inhalable dust) of studded tyres on “low-noise” pavements. MoE is preparing a *strategy to strengthen R&D in noise abatement*. Finland should participate more actively in the European Technology Platforms (ETPs) which include addressing transport noise (“ERTRAC” for road traffic, “ERRAC” for rail traffic and “ACARE” for air traffic).

4. Future Developments

To meet the noise abatement objectives that Finland has set for itself, Finnish authorities wish to and should strengthen their efforts. In fact, progress was deferred by limited financial commitments and excessive focus on the construction of noise barriers which are not always most cost-effective. (Tervonen, Jylänki, 2006). The Parliamentary Audit Committee statement of 2006 stressed the need to *reduce noise at a source and diversify noise abatement measures*. Examples of such measures are: *i*) promoting quieter vehicles, procurement of low-noise equipment, *ii*) “silent” tyres (including the restriction on the use of studded tyres), low-noise pavements, noise insulation and better spatial planning and zoning.

A working group (established within the Finnish administration) made proposals for *noise abatement measures* to achieve the 2006 Government Resolution on Noise Abatement, requiring around EUR 288 million (including a total of EUR 92 million for the period 2008-12 or an average yearly spending of EUR 18 million). This represents about a doubling of funding compared to the previous period. This effort would be shared by the state budget, industry and municipalities.

Environmental authorities are currently preparing a *national database for noise abatement*, covering noise caused by various sources, noisy and quiet areas, exposure to noise, and noise reports. It should also cover economic analysis relating to noise.

Preservation of *quiet areas* should gain importance to promote residents' well being and tourism. A pilot study in the Satakunta region (Box 3.2) should provide the basis for regions to develop quiet areas, with appropriate public surveys, expert opinions, and noise mapping.

Box 3.2 Designating quiet areas

According to the 2003 *Government Resolution* on the development of recreation in natural areas and nature tourism, Regional Councils are to identify the most *significant quiet areas* for recreation and nature tourism, and to establish requirements for their maintenance.

The *first pilot study* was conducted in the Satakunta region in 2003, a coastal region in South-western Finland covered predominantly by forests and agriculture areas. The study identified “oases of quietness”, and also developed terminology and methodologies applicable to other regions. The Ministries of the Environment and of Transport and Communications funded the work, while the Regional Council of Satakunta performed the actual research.

For the purposes of the study, quiet areas have been categorised into *natural, rural, urban and special (most strict) quiet areas*. A significant indicator is the possibility of hearing the sounds of nature, and having noise levels from human activities below guideline values. Guideline values for such noise levels in quiet areas are similar to those for recreation and nature conservation areas (*i.e.* less than 45 dB for daytime and 40 dB for night time). These are further differentiated according to time distribution of noise (*e.g.* peaks, reoccurrence, frequency of noise as well as quiet period length). The boundaries of quiet areas were based on expert assessment, public queries, knowledge of land use, noise mapping and field surveys.

Thus, 26 *quiet areas of regional importance* were identified including 9 natural quiet areas, 13 rural quiet areas and 4 special quiet areas. The Joutsijärvi lake and forest area, which has wilderness features, was the largest. No urban quiet areas were identified due to lack of information.

The *national steering group* for the study included members from: Ministry of the Environment, Ministry of Transport and Communications, Ministry of Social Affairs and Health, Ministry of Defence, Ministry of Agriculture and Forestry, Road Administration, Civil Aviation Administration, Rail Administration, Central Union of Agricultural Producers and Forest Owners Association (MTK), Metsähallitus, Finnish Port Association and several non-governmental organisations (Finnish Association for Nature Conservation, the Central Association Suomen Kuulonhuoltoliitto, the Organisation Suomen Latu, the Association Suomen Akustisen Ekologian Seura and the Association Ekopsykologian yhdistys Metsänpeitto). Sharing information and co-operation with interest groups was important for the sustainability of the pilot study results.

The regulatory framework should be revised, to include additional requirements, since Finland applies *less strict guideline values* than a number of other countries for industrial noise, noise levels in areas of educational and healthcare institutions. Guideline values might also usefully be introduced for maximum (peak) noise levels, as the use of two different indicators (average and maximum) would better reflect adverse effects of noise.

Notes

1. Sources of environmental noise regulated and monitored by environmental authorities include: road/street, rail and waterborne transport, air traffic, industry and construction and maintenance works, street cleaning, motor-racing circuits, military activities, civilian shooting ranges, and leisure events such as outdoor concerts. Indoor noise is managed by the national health authorities. Noise in workplaces is controlled by the labour protection authorities.
2. Other government decisions established noise thresholds for shooting ranges.
3. The EU Directive on Environmental Noise (2002/49/EC) defines environmental noise as “an unwanted or harmful outdoor sound created by human activities to which humans are exposed in particular in built-up areas, in public parks or other quiet areas in an agglomeration, in quiet areas in open country, near schools, hospitals and other noise sensitive buildings and areas”.
4. In already built areas, 60 dB during the daytime or 55 dB at night.
5. Finavia is the managing body of 25 airports located in Finland.
6. Road traffic has grown by 2 to 3% per year; with the fastest increase in private cars use.
7. Exposure to daytime noise above 55 dB is considered annoying, unacceptable above 65 dB (e.g. noticeable physical impacts on people). Continuous noise over 85 dB may damage hearing permanently.
8. Noise mapping surveys and noise abatement action plans are to be drawn up for municipalities with more than 100 000 inhabitants, for main traffic routes and for large airports by the year 2012. Obligations regarding such investigations and action plans are contained in the Sections 25a and 25b of the Environmental Protection Act (459/2004) and in greater detail in the Government Decree on Noise Mapping and Action Plans for Noise Abatement Required by the EC (801/2004).
9. The Finnish Road Administration manages 78 168 km of roads, including 13 268 km of main roads and 653 km of motorways. The remaining 64 900 km are connecting roads supporting about one third of total traffic.
10. In Finland, there are “77 hot spots” according to the EU Environmental Noise Directive, including 40 in the Helsinki Metropolitan Area requiring noise barriers.
11. A characteristic feature of railroad noise is that often the number of people exposed during the night is equal to those exposed during the day (or even higher, as in the case of Northern Finland). This reflects the fact that heavy freight trains usually run at night.
12. The Road Administration has invested EUR 13.8 million on noise abatement projects between 2000 and 2005. These investment data only include noise abatement measures carried out as separate projects, but exclude noise abatement measures carried out as an integral part of road construction or improvement.
13. Noise barrier projects of EUR 23.5 million between 2000 and 2006, including EUR 13 million for projects in the Helsinki Metropolitan Area (in particular Kerava-Lahti railway).
14. Finavia has spent about EUR 1.45 million for noise abatement investment between 2000 and 2004, and EUR 300 000 per year of current expenditure (e.g. relating to noise for monitoring noise and aviation routes at the Helsinki-Vantaa airport, personnel expenditure).
15. Prepared by an *ad hoc* working group of the Ministry of Transport and Communications.

Selected Sources

The government documents, OECD documents and other documents used as sources for this chapter included the following. Also see list of websites at the end of this report.

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4

WASTE*

Features

- Policy framework
- Progress towards waste reduction targets
- Waste recovery
- Waste disposal and thermal treatment
- New initiatives for increasing material efficiency

* The present chapter reviews progress since the previous OECD Environmental Performance Review of 1997. It also reviews progress with respect to the objectives of the 2001 OECD Environmental Strategy.

Recommendations

The following recommendations are part of the overall conclusions and recommendations of the environmental performance review of Finland:

- ensure proper implementation of the new *National Waste Plan to 2016*; measure progress through improved waste statistics, at national, local and firm levels;
- fully use environmental permitting procedures to promote *waste prevention*, including better definitions of waste prevention measures and the development of guidelines for site inspections;
- promote *market mechanisms for waste sorting and recovery*; in particular, adjust the waste tax to respond to the National Waste Plan priorities; extend the tax to cover private industrial landfills;
- further reduce material intensity through “cradle to cradle” and 3R approaches, and systematically promote *Extended Producer Responsibility schemes* for separate waste collection and recovery;
- improve *waste management infrastructure*; in particular, develop the capacity for recovery of biowaste, carry out further studies and build consensus on waste incineration with combined heat and power recovery.

Conclusions

Waste generation from the *manufacturing industry* has been decoupled from economic growth, with waste minimisation targets being met by oil, chemical, and base metals industries. Waste recovery is high in pulp and paper, wood and food industries. *Municipal waste generation* has decreased more rapidly than planned under the National Waste Plan (NWP) and is low compared to OECD average. Recovery rates for glass, plastic, paper, fibreboard, metal and end-of-life vehicles exceed the targets set in Extended Producer Responsibility schemes. Progress has been supported by a number of laws adopted or amended during the review period, which promoted waste reduction and aligned Finland waste regulatory framework with that of the EU. Several instruments are now in place to curb waste generation and to stimulate waste recovery; these include a tax for waste landfilling, municipal waste charges, and Extended Producer Responsibility schemes for several waste streams. Municipal waste services have been reorganised at the regional level and are self-financed. Instruments and facilities have been developed for the management of *construction and hazardous waste* and to address land contamination. A new

National Waste Plan to 2016, adopted in 2008 after wide consultation with stakeholders, sets ambitious and innovative targets and promotes increased material efficiency in consumption and production.

However, the *1998 National Waste Plan (NWP)* objectives have only been partly achieved. Waste volumes have increased in *some manufacturing sectors*, in particular in pulp and paper, as waste prevention is not sufficiently integrated in environmental permitting. The total volume of waste generated by manufacturing industries per unit of GDP is still more than twice the OECD average. Waste recovery remains below targets in oil, chemical and base metal industries, as well as in the construction and energy sectors. *Hazardous waste* generation has increased, partly reflecting changes in waste classification and better reporting, and far exceeds the NWP target. Recovery targets have not been met and most hazardous waste is still landfilled. *Municipal waste recovery rate* is low; it represents only half of the set target. Sorting at source is insufficient to ensure proper recycling. Recovery of biowaste is particularly lagging, as alternatives to landfilling are underdeveloped and waste disposal in landfills remains prevalent. Even though several waste landfill sites were closed in 2007, one currently operating landfill does not fully comply with the 1999 EU Landfill Directive. Waste-related infrastructures and capacities are lacking to ensure adequate recovery of waste (sorting at source, combined heat and power recovery). *Waste monitoring* remains a concern. Specific waste streams (*e.g.* hazardous waste disposed of in private landfills, hazardous waste produced by households) are not adequately monitored.



1. Policy Framework

Following the promulgation of the Waste Act and Waste Decree in 1993, over twenty legislative pieces have been enacted in the review period *to keep pace with the EU waste regulatory developments*. This included, for example, the implementation of the EU Council Decision on the list of hazardous waste (1994), introduction of the requirements of the IPPC Directive (1996/61/EC) for including waste management activities under the integrated environmental permitting procedures, and the requirements for environmental permits to be applied to all waste recovery and disposal activities (2000). Producer Responsibility Schemes have been introduced for several waste streams.¹ The EU Waste Incineration Directive was implemented in Finland in 2003.² In 2002 waste classification in Finland was harmonised with the European Waste List, with minor national adaptations. Policy objectives for

biodegradable waste were set in the Finland's 2004 National Strategy for the Reduction of Biodegradable Waste Going to Landfill, as required by the EU Landfill Directive (1999/31/EC).

Regulations at the municipal level supplement the Waste Act provisions. They specify waste management requirements, such as waste collection points and equipment, transportation, recovery and treatment, for residential areas, public services and businesses.

The requirements of the EU Waste Directive (1991/156/EEC) for developing *waste management plans* were translated into regional plans adopted in 1996 (completed in 1998) and a National Waste Plan up to 2005 (NWP) adopted in 1998 (and revised in 2002). Targets of the NWP Plan included: *i*) reduction of the amount of waste generated, *ii*) increased recovery of materials and energy, *iii*) appropriate and safe waste disposal, *iv*) prevention of environmental and human health risks arising from waste, and repair of any damage, and *v*) reduction of transfrontier shipments of waste. The NWP contained quantified targets, by sectors and by waste streams, for waste reduction and the increase of recovery rates to be achieved by the year 2005. However, the targets were non-binding, considered as recommendations and indications for action by the general public, business and industry, and decision makers at the sub-national level.

Other plans and national strategies set additional waste-related objectives. The Consumer Policy Programme (2004-07) insisted on reducing environmental impacts of consumption and production and advocated responsible consumer habits. At a sectoral level, the Construction Policy Programme (2003), the National Programme for Improving Material and Energy Efficiency (2005) and the National Programme to Promote Sustainable Consumption and Production (2005) addressed waste issues, with a view to encouraging a better assessment and monitoring of waste impacts of processes and products and introducing life-cycle approach to policy making.

With implementation of the 2002 EC Waste Statistics Regulation (2150/2002) steps have been taken to improve the national *comparability and reliability of statistical information*. The respective duties of environmental administration and Statistics Finland have been clarified to avoid duplication in data collection and reporting: now Statistics Finland is responsible for the implementation of EC Waste Statistics Regulation and reporting of waste data while the RECs and municipalities are responsible for updating waste-related information in environmental compliance database VAHTI (Box 7.3).³ The Ministry of the Environment (MoE) established a national working group to define priority steps for improving the quality and the usability of data. The quality of statistics should improve with the application of more harmonised waste classification and more systematic collection of data.

This is especially important as collected data is used by environmental administration for national and regional waste planning and for monitoring its implementation.

2. Performance in Meeting Targets

2.1 Waste generation and progress towards reduction targets⁴

In 2004, 66 million tonnes of waste were generated in Finland, already complying with the NWP target for 2005 (Table 4.1). Waste is mainly generated by the mining and quarrying sector (36%), construction (32%) and manufacturing industry (24%). Waste generation by all economic sectors but construction has decreased and the volumes complied with the NWP targets for 2005. Hazardous waste generation has increased, partly reflecting changes in waste classification,⁵ and far exceeds the NWP target.

Table 4.1 Performance in meeting sectoral targets of the National Waste Plan,^a 2004

Economic sector	2005 target		2004	
	Waste generation (million tonnes)	Recovery ^b (%)	Waste generation (million tonnes)	Recovery ^b (%)
Mining	28	no target	24	16
Agriculture ^c	22	100	1	99 ^d
Industry ^e	29 ^f	70	16	60 ^d
Construction	12 ^g	70	21	27 ^d
Municipalities	3 ^h	70	2.4	38
Energy production	2	70	1.6	51 ^d
Sewage sludge	0.9	90	0.4	80
Total	97		66	
<i>of which:</i>				
hazardous waste	0.7 ⁱ	30	2.3	7

a) The National Waste Plan was released in 1998 and revised in 2002.

b) Recycling and energy recovery.

c) Refers only to livestock manure.

d) 2003 data.

e) Refers to total industry. Volume and recovery targets are further disaggregated by industrial sub-sectors.

f) 15% less than that predictable on the basis of the volume of waste in 1992 and growth in industrial production.

g) 15% less than that predictable on the basis of the volume of waste in 1995 and growth in the construction sector.

h) 15% less than that predictable on the basis of the volume of waste in 1994 and growth in GDP.

i) 15% less than that predictable on the basis of the volume of waste in 1992 and growth in GDP.

Source: Statistics Finland, OECD.

Most recent data showing lower than predicted total volumes of waste have to be treated with caution as a significant *change in waste statistical methods* was introduced in 2004 to comply with the EC Waste Statistics Regulation. The new definitions and accounting affected mostly statistics on waste from agriculture and forestry. For example, whereas 44 million tonnes of waste were recorded for these two industries in 2003, the respective volume in 2004 was no higher than 1.4 million tonnes as felling waste left in the forest, and manure spread on farmland are no longer included in the waste volumes. Some other categories of products, initially considered as waste, were also excluded from waste classification (*e.g.* soil and stone waste from construction and mining). The methodological change had no impact on accounting waste generated by industrial and municipal sectors.

Waste generated by the *manufacturing industry* was decoupled from economic growth; the volume decreased by 15% in absolute terms (from 18.4 million in 1997 to 15.7 million tonnes in 2004) while the GDP rose by around 30%. The 2005 target for reducing manufacturing waste volume was significantly surpassed (–55% *versus* planned –15%).⁶ However, calculated on per capita basis and per unit of GDP volume of waste generated by manufacturing industry (100 kg/USD 1 000) is still more than twice the OECD average. Four sectors were generating most of manufacturing waste: pulp, paper and paper products (30%), wood and wood products (27%), chemicals (17%) and basic metals (13%). Wood and bark from wood industry, gypsum from the chemical industry and slag from the basic metal industry accounted for the highest shares.

Waste volume reductions varied among *manufacturing sectors*: the oil and chemical industries and the base metal production generated slightly less waste, whereas in construction product manufacturing it dropped significantly, mostly due to changes in industry structure. In contrast, waste volumes increased in pulp and paper industry. Further progress has been hampered by increase in production volumes but also by inadequate consideration of waste prevention and minimisation measures in environmental permitting procedures, despite extensive supporting documentation and training provided to permit authorities and industry.

Waste reduction targets for *municipal waste* were surpassed (–28% *versus* planned –15%).⁷ With per capita volume of approximately 490 kg Finland is around 70 kg below the OECD average (Figure 4.1). However, the amount of municipal waste grew from 2.3 million in 1997 to 2.45 million tonnes in 2005⁸ (Figure 4.2). The increase was mostly due to rising household waste volumes (+33% between 1997 and 2005, from 0.9 to 1.2 million tonnes).⁹ Contrary to households, waste from services showed decreasing trends after the year 2000. The largest volumes of waste from services were generated in the wholesale trade and retail trade of non-durable

and other consumer goods, followed by health care and social services. As for the amount of *packaging and packaging waste*, it increased over the review period (Table 4.2).

Between 1997 and 2004 *hazardous waste* generation increased from 0.4 to 2.3 million tonnes, partly reflecting changes in waste classification (Table 4.3). An increase in recorded volumes of hazardous waste could also reflect better reporting and increased compliance with the regulations. Manufacturing generated 55% of the total hazardous volume, mining and quarrying 22.7%, construction 17.2%, services 4.3% and households 0.2%. Mineral waste makes up the largest share of hazardous waste (70%) which is generated during the processing of metals, construction and mining (metallic sludge, ore dressing). Other contributors include inorganic chemistry, contaminated soil, waste oils, solvents, and waste from thermal processes.

2.2 Waste recovery¹⁰

Finland's *progress in recovering waste is mixed*: good progress has been made in recovering industrial and agricultural waste, but challenges remain with municipal and construction waste recovery (Table 4.1).

With regard to *waste streams*, the recovery rates for glass, plastic, paper and cardboard, metal and end-of-life vehicles already met the 2005 NWP targets (Table 4.4). Recovery of sewage sludge and scrap tyres indicate positive trends, but only 64% of scrap tyres were recovered in 2003 (4-5% are retreated) against a target of 100%.¹¹

Industrial waste

The *recovery rate of industrial waste* has grown steadily to the level of around 60% in 2003 coming closer to the 70% target of the NWP. The pulp and paper industry, wood product, mechanical wood processing and food industries showed increasing levels of waste recovery, whereas only 13% of waste from the oil and chemical industries was recovered in 2003 and around 40% from the base metal industry, in comparison with the respective 50 and 70% targets. Recovery of *construction waste* increased from 20% in 1995 to 27% in 2003, but is still well below the target (70%). Similarly, waste recovery from the energy sector was showing only slow increase and did not reach the 2005 targets.

Waste recovery has been stimulated, in part, by a *tax on waste disposed in municipal landfills* introduced in 1996. The tax rate has doubled from approx. EUR 15 per tonne in 1996 to EUR 30 per tonne¹² in 2005, as envisaged in the NWP, generating revenue of EUR 56.2 million in 2007.¹³ The tax has proved to be an effective instrument to divert some waste streams from landfills (*e.g.* recoverable

Table 4.2 Treatment and disposal of packaging materials, 1997-2004

	1997				2004			
	Total amount (1 000 t)	Reuse	Recovery ^a (%)	Disposal	Total amount (1 000 t)	Reuse	Recovery ^a (%)	Disposal
Glass	379	87	7	6	309	78	13	9
Plastic	294	69	7	24	337	73	9	18
Paper and cardboard	257	5	69	26	253	3	74	23
Metal	239	86	1	13	426	90	5	5
Wood	..	..	..	..	928	78	17	5
Total	1 169	64	19 ^b	17	2 253	71	20 ^c	9

a) Recycling and energy recovery. The National Waste Plan set a target of 70% recovery of packaging waste by 2005.

b) Equivalent to 54% recovery of packaging waste.

c) Equivalent to 68% recovery of packaging waste.

Source: SYKE, Environmental Register of Packaging PYR Ltd.

Table 4.3 Production, movement, treatment and disposal of hazardous waste, 1997-2004

(1 000 tonnes)

	1997	2000	2001	2002	2004
Hazardous waste volume ^a	426	963	827	1 188	2 300
of which (%):					
Recovery ^b	14	14	23	17	7
Physico, chemical and biological treatment	15	–	–	–	–
Thermal treatment	14	4	9	6	11
Landfill ^c	55	82	68	77	79
Releases into water ^d	2	–	–	–	–
Other ^e	–	–	–	–	3

a) Amounts to be managed in the country (production + imports – exports).

b) Recycling and energy recovery.

c) Also includes land treatment, deep injection, surface impoundment and specially engineered landfill.

d) Includes inland and marine waters as well as sea-bed insertion.

e) Includes other treatment or disposal methods such as permanent storage.

Source: OECD Environmental Compendium.

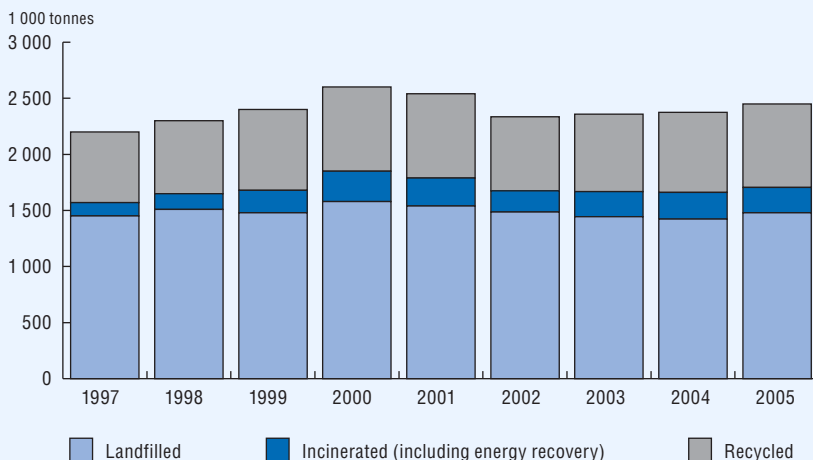
Figure 4.1 Municipal waste generation^a
State, 2006^b



- a) In interpreting national figures, it should be borne in mind that survey methods and definitions of municipal waste may vary from one country to another. According to the definition used by the OECD, municipal waste is waste collected by or for municipalities and includes household, bulky and commercial waste and similar waste handled at the same facilities.
- b) Or latest available year.

Source: OECD Environment Directorate.

Figure 4.2 Municipal waste generation and treatment, 1997-2005



Source: Statistics Finland.

industrial waste, construction waste) while SMEs and services (which initially could access municipal landfills) have been encouraged to consider alternative options for waste disposal. The bulk of industrial waste is not a subject to the waste landfill tax since private landfills are excluded from the tax scheme. Recently, a working group has been established to examine amendments of the waste tax.

Manufacturing waste recovery has been a subject to numerous *discussions between the business community and authorities*, especially in the context of working groups setting up recovery targets, reforming regulation and analysing their impacts on industry and competitiveness. As a result, several initiatives have been introduced, such as the use of reusable transportation containers by the retail stores. In the short term, greater emphasis should be placed on increasing material efficiency and information-based instruments, such as the inclusion of waste information in product specifications and environmental labelling. Better reflection of waste minimisation in environmental permitting should also stimulate business response.

Table 4.4 Performance in meeting the waste stream targets of the National Waste Plan, 2004

Waste streams	2005 target		2004			
	Recovery ^a	Waste collected and treated	Recycling	Energy recovery	Incineration	Landfill
	(%)	(1 000 t)			(%)	
Glass	75	171	96	–	–	4
Plastic	70	70	54	43	–	1
Paper and cardboard	80	514	82	12	0	5
Metal	95	1 119	99	–	–	1
Wood	no target	8 970	48	51	0	1
Chemical	no target	1 433	8	8	5	79
End-of-life vehicles	90	25	96	–	–	4
Discarded equipment	no target	50	32	–	–	68
Animal and vegetal	no target	492	80	–	–	20
Household mixed	no target	1 972	11	6	3	80
Sewage sludge	90	404	18	62	2	18
Mineral	no target	48 496	23	0	0	77
Other	no target	21	–	–	5	95
Total		63 736	28	8	0	63

a) Recycling and energy recovery.

Source: Statistics Finland.

Municipal waste

Recovery of municipal waste remains a major challenge. Even though the amounts of separately collected municipal waste has been growing, *e.g.* the recovery rates for glass, plastic, paper and cardboard, metal and wood are over 90% (Table 4.5), only around 38% of municipal waste volume is recovered, which is half of the NWP target (70%) (Table 4.1). This is mostly due to a large share of biowaste not being recovered (Table 4.4). The recovery rates in the Helsinki Metropolitan Region are higher, at the level of 55%, but still below the national target.

Over 70% of packaging materials is reused (Table 4.2). The rate of recovery of *packaging waste* increased from 54% in 1997 to 68% in 2004, nearly meeting the NWP target of 70% by 2005. The rate of disposal has decreased for all types of packaging waste but glass. The rate of paper recovery has been growing parallel to consumption and is one of the highest in Europe (approximately 70% in 2005) (Figure 4.3). The rates are lower for metal, glass, plastic and wood packaging (for which much of it is reused).

Table 4.5 Municipal waste treatment and disposal, 2005

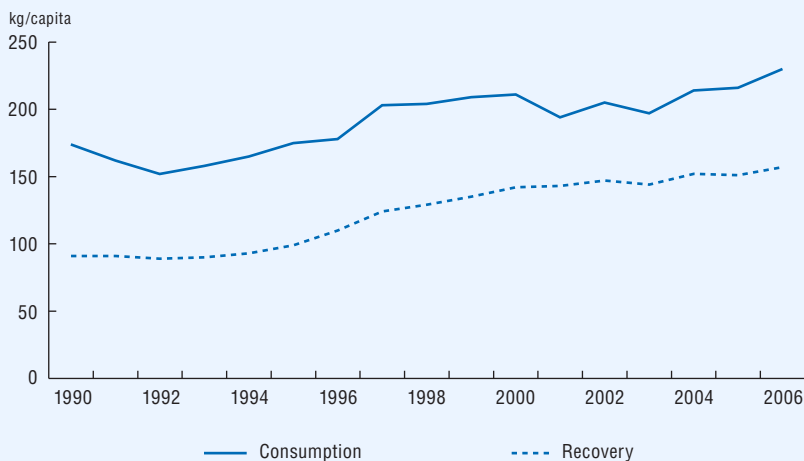
	Total amount (1 000 t)	Recycling	Incineration with energy recovery	Other treatment ^a	Landfill
Total	2 450	30	7	2	60
Mixed waste ^b	1 530	3	4	3	90
Separately collected waste	919	76	12	–	12
Glass	123	99	–	–	1
Plastic	14	7	93	–	–
Paper and cardboard	384	90	–	–	9
Metal	25	96	–	–	4
Wood	38	24	71	3	5
Organic waste	203	82	1	–	16
Oils and fats	12	25	8	–	67
Photographic chemicals	1	100	–	–	–
Paints, varnishes, print dyes, adhesives	1	–	–	100	–
Electrical and electronic	18	100	–	–	–
Street cleaning waste	10	20	–	–	–
Other	89	4	76	1	19

a) Including waste incineration without energy recovery.

b) Including biodegradable waste.

Source: Statistics Finland.

Figure 4.3 Consumption and recovery of paper and cardboard, 1990-2006



Source: Finnish Forest Industries Federation.

The recovery of *sludge from waste water treatment* is high (80%) though not yet fully in line with the 90% NWP target (Table 4.1).¹⁴ A significant share (18%) is still disposed of in landfills (Table 4.4). Sludge is used for soil improvement in public green area building and agriculture. However, low demand for composted sludge hinders sewage sludge recovery.

In spite of efforts, only around a third of *biowaste* contained in municipal waste is collected and reclaimed. Sorting of household biowaste has been made a priority with the adoption of the National Strategy for the Reduction of Biodegradable Waste in Landfills in 2004. The Strategy aims to reduce by a factor of three the volume of biowaste disposed of in landfills by 2016 using 1994 as a baseline. Measures taken to help reach this target include increased separation, the wider use of biological waste treatment methods such as composting, and the increased use of waste in energy production. Municipal waste management organisations have encouraged source separation of biowaste by publishing information in newspapers, leaflets and by organising awareness raising events. However, the processing capacity for biowaste, particularly the number of biogas plants, has not increased as planned and a demand for composted products has been low.

Finland has expanded the use of *economic instruments* to increase recovery and recycling of municipal waste. Tax on waste disposed in municipal landfills was introduced in 1996. Fees (based on the volume of waste produced) and waste charges (eco-charge) collected by municipalities for waste collection helped to recover the costs induced by households' waste collection and treatment.¹⁵ Charge structures vary widely and many municipalities set lower charges for sorted waste and for waste that can be recovered. The revenues increased from EUR 200 million in 1997 to roughly EUR 1 billion in 2008.¹⁶ Individual packaging-related surtaxes on non-refillable alcohol and soft drinks packaging have been in place since 1976, packaging for water was added to the system in 2008. Beverage packaging taxation has been complemented by a deposit-refund system for refillable and non-refillable containers: the majority of bottles (0.33 l, 0.5 l, 1.0 l, 1.5 litre) are part of the system, as are aluminium cans. Non-refillable plastic containers were added in 2008 (Chapter 6).¹⁷

The source separation of specific waste streams has also been enhanced by *Extended Producer Responsibility schemes* (EPR) which cover: *i*) electronic and electrical appliances, *ii*) tyres from motor vehicles, other vehicles and equipment, *iii*) cars, vans and comparable vehicles, *iv*) newspapers, magazines, copy paper, and other comparable paper products, *v*) packaging, and *vi*) batteries and accumulators, in line with the EU regulations. Several producers have organized waste collection and provided information to households. Municipalities have also promoted waste recovery and recycling through advisory services, information campaigns and publishing guidance material.

Stricter EU and national requirements have induced significant *changes in the municipal waste collection and treatment structures* to ensure appropriate collection, sorting and treatment of waste and reduce costs. Regional approach to waste management has been promoted through intercommunal contracts between municipal federations and regional waste management companies. In practice, over 90% of waste municipal management services are outsourced to private companies. Companies provide either total waste management services or handle the collection, recycling or treatment of waste. In 2006, around 300 Finnish municipalities were involved in 30 regional waste management companies which served 3.2 million people. For instance, in North Ostrobothnia, waste services are combined in six regional cooperation areas, which serve some 38 municipalities, grouping 378 000 inhabitants spread over the area of 35 000 km². In the Helsinki Metropolitan Region, which comprises five municipalities, Helsinki Metropolitan Area Council (YTV) administers waste management (Box 4.1). The 2007 amendment to the Waste Act limited the responsibility of municipalities to the management of household waste.¹⁸ This move has reduced the burden on municipalities as previously their responsibility included the management of waste from industrial and private services.

Box 4.1 Waste management in the Helsinki Metropolitan Area

With 1 million inhabitants and 50 000 enterprises over an area of 740 km² the Helsinki Metropolitan Area produces about 1.1 million tonnes of waste every year. Around 55% of all waste generated is recycled or reused. Waste management is performed by the *Helsinki Metropolitan Area Council* (YTV) which is a statutory, co-operative organisation among municipalities of Helsinki, Espoo, Vantaa, Kauniainen and Kirkkonummi.

The YTV prepares *regulations and plans* for managing waste from residential areas, public services and businesses. Regulations, which supplement the Waste Act, set waste management requirements, *e.g.* for collection points and equipment, transportation, recovery and disposal. Waste management plans set specific targets and cover: *i)* waste minimisation and in-creasing recycling through waste separation at a source, *ii)* safe and customer-oriented waste management services and *iii)* treatment and final disposal of waste. The YTV also provides advice and information to stakeholders on waste sorting, recycling and prevention.

Waste management for *residential buildings and public services* is organized by the YTV while the *private sector* arranges their own waste management using authorised waste management companies. The YTV provides a limited number of waste management services to business, usually collection and transport of mixed waste, biowaste, paper and cardboard. The YTV is also responsible for hazardous waste management of households and small and medium sized enterprises. A national hazardous waste processing plant (including an electricity and district heating generating municipal waste incinerator) operated by the private operator Ekokem Oy is located in Riihimäki.

The YTV and its partners from the Extended Producer Responsibility scheme maintain a dense network of *local collection points* (free of charge) for recyclable households waste, such as glass, batteries, metal, paper, clothes, and for hazardous waste. The system of local collection points is being extended by approximately 400 additional collection points in 2007-09. A network of larger local collection and recycling points (Sortti) is also being extended. These recycling stations receive (mostly free of charge) small loads of recyclable and mixed waste (wood, garden waste, recyclable paper, cardboard, carton, glass, metal, disposed electronic and electrical equipment, and hazardous waste). Motor vehicle-related hazardous waste can be disposed free of charge in about 80 containers located at petrol stations around the metropolitan area. Pharmacies collect unused medicines.

Property owners sign waste service contracts with the YTV, which collects *fees for waste services*. The fees are defined according to the size and location of waste containers and emptying frequency. The fee is directly proportional to the amount of waste generated by the property. The pricing system favours waste sorting. All expenses of the YTV related to the collection and treatment of waste, including hazardous, are covered by fees.

Box 4.1 Waste management in the Helsinki Metropolitan Area (cont.)

Waste collection is carried out in each of the 60 sub-areas of the metropolitan region by contractors selected by YTV via competitive tenders every five years. The Metropolitan area waste management regulations require separate collection of paper from premises comprising more than four dwellings and paper and cardboard from major users. Separate collection of biowaste started in 1993 and all compostable food and garden waste are collected every week. Mobile collection service is also available for household hazardous waste, scrap metal and electric and electronic waste. Nouto-Sortti is a service that collects, on request, large household items such as used home appliances and furniture. The quality of collection by contractors is closely monitored by the YTV. Challenging demands set forth in the collection contracts allowed to reduce collection costs and improve the quality and environmental impacts of the waste transport.

In 2006, over 0.8 million tonnes of waste, including 0.3 million tonnes of mixed household waste, was transported to the *YTV waste-handling centre in Ämmässuo*. The centre covers 190 hectares, including 20 hectares used by various waste treatment facilities (composting plant for biowaste and Sortti Recycling Centre) and a landfill site. The landfill, the largest in Finland and the only in the metropolitan area, covers 50 hectares. It is being extended by additional 60 hectares but not without an opposition from the local population due to mainly odour and water pollution problems and the perceived inadequate monitoring.

Waste deliveries to the Ämmässuo landfill are registered and controlled by YTV's inspectors. *Environmental impacts of the landfill* are reduced by collecting and treating leachate water and landfill gas. All leachate water in the landfill area is channelled through drains to balancing basins and then over 6 kilometres to Suomenoja sewage works in Espoo for treatment. A considerable amount of landfill gas is collected and utilized in the production of district heating (equivalent of heating requirement of about 10 000 individual houses).

Current YTV's priorities for improving waste management include: *i)* closing and covering the currently used landfill area, *ii)* establishing a treatment facility for mixed waste, *iii)* constructing the final disposal area for the pre-treated waste and *iv)* building a municipal waste incinerator with the annual capacity of 250 000 tonnes. The incineration plant would generate energy, *i.e.* heat, electricity or steam, from waste presently disposed of in the landfills. Environmental impact assessments have been carried for four possible locations. The new plant is expected to start operations in 2012.

Hazardous waste

A campaign launched in 1999 to raise awareness of households, farmers and SMEs about *hazardous waste recovery* fostered a 20% increase in separation of collected hazardous waste leading to 23% of hazardous waste being recovered in 2001. The project was carried out jointly by waste councillors, Ekokem's national hazardous waste facility,¹⁹ the MoE, the SYKE and the Finnish Solid Waste Association. The Association of Finnish Local and Regional Authorities and The Finnish Standards Association contributed to the project. Information material was published and distributed via radio, TV, newspapers, advertising in public transport and at internet, to the main target groups. However, efforts were not sustained after 2001: only 7% were recovered and 11% used for energy recovery in 2004, which is below the 30% target for 2005. Nearly 80% of hazardous waste is still disposed of in landfills (Table 4.3).

2.3 Waste disposal and thermal treatment

Out of 64 million tonnes of waste collected and treated in 2004 over 60% of waste (40 million tonnes) was *landfilled* (Table 4.4). Most of the landfilled waste was mineral (37 million tonnes) and consisted of waste stone from excavation and construction. High shares of chemical waste and discarded equipment were landfilled, 79% and 68% respectively.

A large amount of *municipal waste*, about 60%, is landfilled although the annual volumes are stable, around 1.4 million tonnes (Table 4.5, Figure 4.2). Following the 1997 Government's decision that introduced gradually tightening criteria for landfill structure and operations through an environmental permit the number of landfills has been reduced by a factor of three, and the quality of landfills has significantly improved. In 2006, 175 landfills were in operation, including landfills for hazardous waste, inert waste and non-hazardous waste owned by both municipalities and industry. The number of municipal landfills for non-hazardous waste was 75 in 2006, less than the NWP target of 80, and the number further decreased to 47 in 2007. At the end of 2007 all but one landfill in operation were in compliance with EU Landfill Directive.²⁰ From 2005, only pre-treated waste may be taken to landfills.

A significant volume of *hazardous waste*, nearly 80%, is landfilled and the amount increased from 234 000 in 1997 to 1.8 million tonnes in 2004, posing an increasing challenge to waste disposal capacities. In 2006, 18 landfills (nine of them municipal), accepted hazardous waste.²¹ Hazardous waste is subject to service charges at the average level of EUR 270 per tonne. A share of hazardous waste is

placed in nine private industrial landfills, not subjected to the charges, which are not adequately monitored. An unidentified amount is also kept by enterprises for long-term “storage”.

Waste incineration has not been developed in Finland until now. In 2005, 9% of the total municipal waste and 11% of hazardous waste were incinerated. Municipal waste was mainly incinerated in some 20 power plants that used waste as input together with other fuels (co-incineration). However, this was discontinued in some cases following the 2003 EU regulations on waste incineration. Only a fifth of the incinerated amount was treated in the dedicated municipal waste incineration plant in Turku. At the end of 2007, the second municipal waste incineration plant came into operation in Riihimäki. As the amount of incinerated municipal waste is likely to increase significantly in the future the third municipal waste incineration plant is under construction in Kotka bringing the total incineration capacity to 0.42 million tonnes a year (Table 4.6) Hazardous waste is incinerated in a dedicated high temperature hazardous waste incineration unit in Riihimäki while the second hazardous waste incineration plant in Kokkola incinerates only waste generated in company’s own processes. All existing plants fulfilled the criteria set for waste incineration by the end of 2005.

If all *newly planned waste incineration plants* are constructed the incineration capacity will reach 1.4 million tonnes per year (Table 4.6). However, the licensing processes for the new plants are still pending, primarily due to the opposition from

Table 4.6 **Waste incineration plants, 2008**

		Capacity (1 000 tonnes/year)
In use	Turku (municipal)	50
	Riihimäki (municipal/hazardous)	150 (70/80)
	Kokkola (hazardous)	20
Under construction	Kotka (municipal)	300
Planned	Helsinki Metropolitan Area	250
	Oulu	130
	Pohjanmaa	120
	Pirkanmaa	200
	Turku (additional capacity)	150

Source: MoE.

the public.²² Further in-depth analysis of environmental (including a study of health impacts), technical and economic options should assist in developing a consensus on further development of waste incineration.

2.4 Soil remediation

A national soil quality database that lists *contaminated sites* was finalized in 2008 with about 16 800 sites registered as potentially contaminated or contaminated.²³ Until now 3 500 sites have been remediated, and actions are taken on some 300 to 400 sites a year. The management of orphan sites²⁴ relies on the funding of EUR 3-4 million provided annually by the state budget. The Oil Pollution Compensation Fund allocates about EUR 2 million per year to the remediation of orphan sites polluted by oil. The SOILI programme, based on an agreement between the petroleum industry and public bodies in 1996, aims to remediate polluted decommissioned service stations. The application period for public funds ended in 2005. To date, remedial action has been taken at 380 sites and applications for 1400 sites have been submitted to the programme.

A 2007 decree on assessing the contamination of soil provides the basis for *risk-based remediation measures*. Remediation measures are mainly due to changes in land use and groundwater protection requirements. Approximately EUR 1.2 billion is expected to be spent during the next 20 years for remediation of contaminated soils. About two third of the costs will be covered by the private sector and one third by the public sector. Abandoned industrial and harbour areas are the main targets.

Table 4.7 **Waste management expenditure by the public sector, 1995-2005**

(EUR million)

	1995	2000	2002	2003	2004	2005
Operating expenditure	61	79	91	90	91	100
Investment expenditure	3	19	18	20	26	39
Budgetary transfers	3	3	1	1	4	2
Total expenditure	67	101	110	111	121	141
Total revenue	71	114	107	126	117	130

Source: Statistics Finland.

2.5 Waste management expenditure

Expenditure for waste management by the *public sector* increased from EUR 67 million in 1995 to EUR 141 million in 2005 (Table 4.7). Operating expenditure still account for 70% of the total but investment spending has increased dramatically, from around EUR 3 million in 1995 to EUR 39 million in 2005. Most of the expenses (in the Helsinki Metropolitan Region all expenses) related to the collection and treatment of waste, including hazardous, are covered by waste charges and taxes.

Waste management *investment expenditure by business* increased from EUR 29 million in 1997 to 41 million in 2005 with the average annual level of around EUR 30 million. Oil and coal products and wood processing industries accounted for the highest investment spending on waste prevention and soil protection in 2005, with EUR 8 million and EUR 7.6 million respectively, followed by pulp and paper and chemicals industries with EUR 6.6 million and EUR 4.3 million respectively.

3. Looking Forward

3.1 National Waste Plan to 2016

With the adoption in 2008 of a new *National Waste Plan to 2016*, Finland has established more ambitious objectives and targets. In addition to the goals of the previous NWP the 2008 plan calls for decreasing the contents of hazardous chemicals in waste, reducing harmful effects of waste management on the climate and developing and clarifying the institutional design of waste management. Plan's targets include the stabilisation of the volume of municipal waste and then the reduction to the 2000 levels by 2016, with 50% of municipal solid waste recycled, 30% used for energy recovery and only 20% going to landfills. For the first time, the national waste plan also includes a separate national waste prevention programme.

A distinctive feature of the new plan is a *shift towards increasing material efficiency* in production processes, construction and consumption, and making the enforcement of current legislation more effective. This is in recognition of the fact that the current Finnish waste policy applies advanced recovery and safe final disposal of waste, especially by industry, but still fails to support waste prevention. Planned actions aim to promote the use of increased material efficiency criteria in product standards, in eco-labels and in public procurement. Other instruments include material efficiency agreements between the authorities and individual industrial sectors, similar to the energy conservation agreements that have been in place in Finland between 1997 and 2007 (Chapter 2). Tax deductions to repair services are also studied to encourage their wider use by households. Some measures are already underway, including a project to better measure material flows and their

environmental impacts, and a service centre for material efficiency established in 2008. The new centre is connected with Motiva Oy which already provides expert services promoting energy-efficiency and the use of renewable energy.²⁵

The *implementation of the new NWP will be more effective* if targets are binding and if instruments allow measuring and regulating the content of waste. Monitoring will be made easier by the new statistical methods, the improvement of the waste register (which followed from the implementation of IPPC Directive) and the deployment of Extended Producer Responsibility schemes. Indicators-based interim reports on the plan's implementation are envisaged for 2010 and 2013.

The NWP should systematically harness the opportunities to *promote 3R (Reduce, Reuse, Recycle and "cradle to cradle" approaches* and to inform the various stakeholders of the waste impact of products and processes, as well as of the alternative, less material intensive, options. This would be in line with the EU Strategy on the sustainable use of resources and the Integrated Product Policy. This would also be in line with converging research in Finland which indicates that pressures from external stakeholders are the major incentives to enhance environmental performance, including waste reduction.

3.2 Reforms underway

A working group is preparing a *comprehensive reform of the 1993 Waste Act* to be finalised by 2010. This is an opportunity to consolidate the amendments that have followed EU legislation and to take better account of the principles for material efficiency and waste reduction. The reform is expected to focus on *i) designing instruments to minimize waste generation and promote recycling, ii) tightening sanctions for "free riders", iii) make waste minimisation an explicit and common feature of environmental permitting procedures; iv) defining responsibilities regarding municipal waste generators and packaging waste from households; v) monitor the performance of waste service providers, all along the waste cycle, including by encouraging self-assessment.*

Another working group, set up by the Ministry of Finance, is considering a *reform of the waste tax*. From an environmental policy perspective, it would be desirable to increase the tax rate and to make the private landfills for industrial waste subjected to the tax; this would prevent private operators from diverting waste streams to which higher tax rates apply. Moreover, the rate of the tax could be differentiated by waste streams and higher rates could be used to encourage recycling, and divert selected categories of waste away from landfills. This is important especially for biodegradable waste, which could be composted or incinerated instead of being landfilled. A higher rate for such waste streams could make sorting more competitive.

Notes

1. Producer responsibility for recovery and disposal of used tyres was introduced already in 1996. The EC Directive of Packaging and Packaging Waste has been integrated into the national legislation based on shared responsibility between packagers and municipalities, and came into force in 1997. A Government Decision on the collection and recovery of waste paper was adopted in 1998. The EC Directives on End-of-life Vehicles and Waste Electric and Electronic Equipment based on overall producer responsibility have been implemented in the national legislation in 2004. The system for the collection of batteries was introduced in 2008.
2. According to Section 27 of the Government Decree on Waste Incineration (362/2003), all existing plants had to fulfil the criteria set for waste incineration by end of 2005.
3. The database uses the classification of the EC Waste List (2000/532/EC).
4. Progress is assessed using the 2004 data, the most recent waste statistics available at the end of 2008.
5. Many waste streams earlier considered as non-hazardous were classified as hazardous in the new European Waste List (2000/532/EC and its subsequent amendments).
6. The –15% target assumed the reduction of the waste volume from manufacturing by 15% compared to the predictable increase in 1992 and growth in industrial production.
7. The –15% target assumed the reduction of the waste volume from the municipal sector by 15% compared to the predictable increase in 1994 and growth in GDP.
8. After a temporary decrease from a peak of 2.6 million tonnes in 2000 the volume started to grow again from 2002.
9. Household waste accounts for around 60% of municipal waste.
10. Recycling and energy recovery.
11. Nearly 100% of scrap tyres was collected by the Finnish Tyre Recycling Ltd, a company created by the country's major tyre manufacturers and importers, through the Extended Producer Responsibility scheme.
12. There are exemptions for some waste, such as contaminated soil, de-inking waste from waste paper cleaning, desulphurization waste and fly ash from power plants, as well as waste which is recovered or used in landfill structures.
13. EUR 57 million was budgeted for 2008 and 2009.
14. Pre-treatment and disposal of sewerage sludge requires a permit, according to the Environmental Protection Act. Reuse of sewerage sludge as a fertiliser is regulated by the Fertiliser Product Law (2006) and monitored by the Ministry of Agriculture and Forestry.
15. Including landfill closure and aftercare, but excluding waste streams covered by extended producer responsibility schemes.
16. Waste management in municipalities is largely based on direct contracts between housing communities (real estates) and private companies. In such cases charges (on average higher than charges for municipal service) are collected by the company concerned, and only the landfill charge revenues to municipal landfills would show up in municipal accounts.

17. Containers within the deposit-refund system are exempt from the tax.
18. This includes waste generated in connection with the provision of public sector services that are comparable in their quantity and quality to everyday household waste.
19. Ekokem Oy is a company that treats hazardous waste. It is jointly owned by the state, municipalities and industrial companies that treat hazardous waste.
20. A derogation from compliance was extended until the end of 2010.
21. The technical standards of the Landfill Directive for landfill base structures came into effect in Finland in 2007.
22. The Turku incinerator's environmental permit, which complies with the EU Directive, is not yet fully valid as complaints regarding the decision are being handled in Vaasa Administrative Court.
23. Potentially contaminated sites include "sites requiring assessment" (sites known to have been used for activities involving hazardous substances that can have entered the soil) and "operative sites" (sites where environmentally hazardous substances are handled or stored and will need to be examined as soon as the operations are concluded). Contaminated sites are those which must be investigated and remediated as necessary (in such sites waste or other substances are known to have reduced soil quality, creating potential health risks or damage to the environment).
24. These are sites where those responsible for the contamination have not been identified.
25. Motiva Oy is an agency of the Ministry of Employment and the Economy.

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5

NATURE AND BIODIVERSITY*

Features

- Species protection
- Nature reserves and wilderness areas
- Protection of water habitats
- Forest biodiversity
- Nature tourism
- International co-operation

* The present chapter reviews progress since the previous OECD Environmental Performance Review of 1997. It also reviews progress with respect to the objectives of the 2001 OECD Environmental Strategy.

Recommendations

The following recommendations are part of the overall conclusions and recommendations of the environmental performance review of Finland:

- set up long and short-term, quantitative and outcome-oriented, national and regional targets to guide implementation of the *National Biodiversity Strategy and Action Plan*; periodically assess achievements;
- set up a *national peatland strategy* to guide efforts for their conservation and management, including peatland exploitation for energy use; complete management plans for all Ramsar sites;
- enhance *protection of marine areas* in the Baltic Sea; finalise the ongoing inventory of marine biodiversity, develop EIA, and conduct risk assessments for ship routes in the Baltic Sea;
- enhance *protection of rare and threatened forest habitats*; link any support to private forest owners to otherwise unremunerated but beneficial public services;
- increase the *financial contribution of the tourism industry* towards nature conservation, for example through public private partnerships and user fees on recreation services.

Conclusions

A new National Biodiversity Strategy covers the period 2006-16. The integration of nature and biodiversity conservation concerns in national legislation has been strengthened. Finland has ratified most international agreements in the field of nature and biodiversity conservation. Concerning *species*, the third Red List of threatened species was published in 2000. There have been positive developments in the protection of species including for migratory species and aquatic wildlife. Management plans have been established for several game species. A national strategy on *invasive alien species* is under preparation to *prevent their spread*. Concerning *habitats*, the first Red List of habitat types in Finland was published in 2008. Nearly all Finnish *forests* are certified. Wood harvesting is below maximum sustainable removal. Some 300 000 hectares of private land have been protected for nature conservation purposes. The Forest Biodiversity Programme for Southern Finland for the period 2008-16 (METSU) was launched, including targets to extend protected forests. Site selection criteria to protect the most valuable forest sites were improved. Nature *tourism* accounts for a quarter of the overall tourism activity and is rapidly growing; an Action Programme for Developing Recreational Use of Nature and Nature Travel was adopted.

However, the National Biodiversity Strategy 2006-16 does not set quantitative targets. *Biodiversity* continues to decline; for instance, five new species of birds have become threatened since the previous Red List evaluation in the early 1990s. Little progress has been achieved in expanding the *protected areas* since the *OECD Environmental Performance Review of 1997*. There are gaps in the national protected areas network, particularly in regard to forests and shore habitats in the South, and ecological connectivity. Drafting a proposal for the Natura 2000 network proved to be a difficult task. Most of the Natura 2000 sites were already included in protected national areas or programmes. Many peatlands have been degraded over time; only 13% of remaining Finnish mires are protected. A national strategy on mires and peatlands is under preparation. Eutrophication remains a significant challenge in the Gulf of Finland and in the Archipelago Sea. Many rare Finnish *forest habitats* are threatened and not sufficiently protected. Support to private forest owners under the 1997 Act on Financing of Sustainable Forestry is based on expected timber sale revenues instead of environmental outcomes. Though increasing, government support to environmental management is a small part of total government support to private forestry. There is a need to streamline the institutional framework for nature and biodiversity conservation.



1. Objectives of Finnish Policy on Nature and Biodiversity

Following the National Action Plan for Biodiversity (1997-2005), the Finnish Government launched the *National Strategy and Action Plan for the Conservation and Sustainable Use of Biodiversity in Finland* (NBSAP 2006-16). It contains more than 100 measures for the preservation, management and sustainable use of biodiversity, the integration of biodiversity aspects into national, regional and local planning and decision making, and for the promotion of co-operation between different sectors (Box 5.1). Sectoral responsibilities are allocated and needs for resources defined. However, no quantitative, outcome-oriented targets have been set up that would allow an effective assessment of actual progress.

Several government programmes have set out objectives for the establishment of conservation areas, including national parks, strict nature reserves, mires, waterfowl wetlands, wooded eskers,¹ herb-rich forests, shorelines and old-growth forests. According to these programmes, *protected areas and wilderness areas should cover 3.6 million hectares by the end of 2009*. Implementation is on track with regard to protecting privately owned areas, but there is still a lot of work to be done to establish new protected areas on state-owned lands according to the Nature Conservation Act.²

Box 5.1 National Biodiversity Strategy and Action Plan for the conservation and sustainable use of biodiversity (2006-16)

Strategic goals

- Halt the decline in biodiversity in Finland by 2010.
- Establish favourable trends in the state of the natural environment in Finland over the period 2010-16.
- Prepare to face by 2016 global environmental changes that may threaten the natural environment in Finland, particularly climate change.

Strengthen Finland's influence in preserving biodiversity globally through international co-operation.

Strategic objectives and key means to achieve them

- *Objective 1: Improving the conservation and management of biodiversity* by improving the network of protected areas and the protection of species
- *Objective 2: Intensifying sectoral responsibility.* Conservation and sustainable use of biodiversity as an integral part of planning and activities in all sectors
- *Objective 3: Building up an improved knowledge base.* Research data to support activities and cost-effective policies towards conservation and sustainable use of biodiversity
- *Objective 4. Strengthening co-operation* between the ministries and other organisations working for the conservation and sustainable use of biodiversity
- *Objective 5: Improving Finland's international influence.* The preservation and sustainable use of biodiversity will be promoted globally through international co-operation.

The integration of nature and biodiversity conservation concerns into legislation was strengthened over the review period. The Penal Code, the 1981 Land Extraction Act and the 1995 Gene Technology Act and Decree were amended and new legislation was enacted, including the 1996 Nature Conservation Act and the 1996 Forest Act, as well as the 1999 Land Use and Building Act and the 2004 Act on the Management of Water Resources.

Ecosystem management performance can further be assessed against the recommendations of the 1997 *OECD Environmental Performance Review* of Finland:

- give high priority to the implementation of the 1996 Nature Conservation Act, finalise and implement the government strategy on biological diversity, and monitor progress towards explicit nature conservation targets (e.g. on protected areas);

- reconsider institutional arrangements for nature conservation to promote more focused, independent and transparent arrangements for delivering public nature conservation services; review the relationship between conservation and commercial functions;
- seek to carry out nature conservation more cost-effectively through partnerships involving, for instance, state bodies offering grants to meet some conservation costs incurred by owners, voluntary bodies or conservation trusts of interested parties and individuals acquiring land for conservation, and Finnish-based industries and conservation bodies sponsoring individual species and providing joint project funding;
- in co-operation with other Baltic Sea states and the European Commission, intensify the implementation and development of the Salmon Action Plan to increase the protection of the wild Baltic salmon and reconsider the case for imposing a moratorium on salmon fishing.

2. Institutional Framework

Finnish authorities are considering a reorganisation of the institutional framework for nature and biodiversity conservation, as it is currently rather complex and shared among many agencies. The *Ministry of the Environment* (MoE) has the prime competence for regulating nature and biodiversity conservation and protected areas. Nature conservation activities and programmes are implemented by the Finnish Environment Institute and 13 regional environmental centres, which are also responsible for the management of private protected areas.

The highest forest authority in Finland is the *Ministry of Agriculture and Forestry* (MAF), whose mandate is to create conditions for the sustainable and diversified use of renewable natural resources. MAF's Department of Forestry is charged with directing and developing forest policy in Finland. The 13 Forestry Centres monitor both compliance with forest legislation and state support to sustainable forest management. The Forest and Park Service (Metsähallitus) manages the natural resources and other property on state lands under its administration. It is required to work efficiently and to follow the principle of sustainability. Metsähallitus also has public administrative duties. Some 151 Forest Management Associations, funded and operated by the forest owners, provide expert assistance in silviculture, timber trade and forest planning.³ Reorganisation would consist of *decentralising implementation of nature and biodiversity policies and sharing tasks* between regional environmental centres (planning) and Metsähallitus (implementation). Metsähallitus is a state enterprise that administers more than 12 million hectares or

about one third of state-owned land and water areas in Finland.⁴ It is the only state enterprise in Finland that is steered by two ministries (MoE and MAF) and that takes care of both business activities and public administration duties. Public administration duties of Metsähallitus have been consolidated in a special unit, the Natural Heritage Services (NHS), and Metsähallitus has become increasingly involved in the development of a network of protected areas, particularly by planning processes related to Natura 2000 sites. In 2005 NHS activities were reorganised to improve capacity and productivity; the number of regional NHS units was reduced from six to three and more implementation powers were devoted to them. Trends towards expanding the tasks of Metsähallitus and decentralising implementation of nature and biodiversity policies should be accompanied by providing NHS with sufficient skilled staff and financing (NHS budget was EUR 54 million in 2006). Reporting of Metsähallitus to MoE should be improved, as it does not clearly link the use of NHS funds and implementation of objectives, or the reasons for disparities between objectives and outcomes (National Audit Office, 2008a).

3. Protection of Species

According to national independent experts *biodiversity is likely to decline in Finland until 2010*, although the rate of decline may be slowing down in some cases.⁵ Approximately 43 000 species of flora, fauna and fungi can be found in Finland (Table 5.1). About a third have been covered in the third Red List of threatened species, published in 2000 and which assessed the status of 15 000 species based on IUCN classification. A total of 1 505 animal and plant species were classified as threatened (Table 5.2). The number of threatened bird species has increased by five species since the previous Red List evaluation in the early 1990s (Rassi *et al.*, 2001). Out of the five reptile species found in Finland, two are threatened (Figure 5.1).

The *main factors threatening species in Finland* include habitat changes caused by forestry, expansion of open habitats no longer used by traditional farming methods, as well as fragmentation of habitats by building and infrastructure constructions (Table 5.2).

However, *pressures and threats to biodiversity vary in different parts of Finland*. In northern Finland reindeer herding impacts ecosystems, in particular by depleting lichen pasture, also in protected areas. In southern Finland commercial forestry, intensive agriculture and grazing (*e.g.* elk in herb rich forests) are dominant factors. In marine areas, eutrophication and oil spills are seen as the main threats. On the other hand, eutrophication of coastal waters has considerably increased the spread of cormorants, which are protected by law (nesting pairs increased from around 400 in 2000 to 5 700 in 2006).

There have been *positive developments with regard to species protection*, including for migratory species (Box 5.2). In 2004 the European Commission (EC) referred Finland to the European Court of Justice over shortcomings in its efforts to halt a decline in the flying squirrel population. This species is strictly protected under the EU's Habitats Directive and Finland is the only place (with Estonia) where it is found in the EU.⁶ In 2007 the Finnish government changed its law to protect the flying squirrel and paid out EUR 1 million to farmers and landowners who had had to curb their normal activities for the squirrels' safety. The EC has since dropped the threat of legal action against Finland.

Finland has strengthened implementation of the *Salmon Action Plan (SAP)*, adopted by the Baltic Sea states in 1997 in the framework of the International Baltic Sea Fisheries Commission to avoid a collapse in wild salmon rivers in the Baltic Sea. The SAP is in force till the end of 2010. It has led to an increase of the Tornio river wild salmon population. Since 2008 drift netting is prohibited in the Baltic, which is expected to have further positive effects on the stocks of salmon. A moratorium on salmon fishing, as recommended in the OECD Environmental Performance Review of 1997, is therefore not considered necessary by Finnish authorities. Escaped salmon

Table 5.1 **Known and threatened species, 2000**

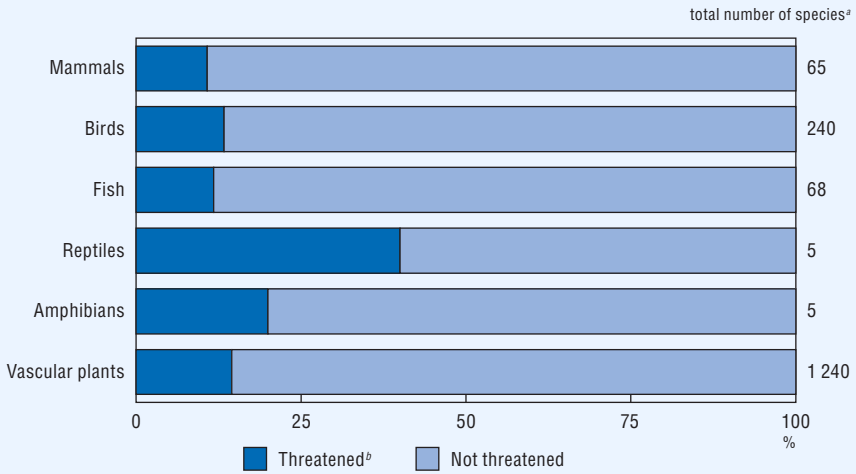
	Number of species known	Threatened species ^a (%)
Vertebrates	383	
<i>of which:</i>		
mammals	65	10.8
fish	68	11.8
birds	240	13.3
Invertebrates	26 600	2.9
Plants	16 000	
<i>of which:</i>		
vascular plants	3 200	5.6
non-vascular plants	12 800	4.0
All species	42 983	3.5

a) Refers to critically endangered, endangered and vulnerable species as % of species known. Except for vertebrates, the 2000 Red List of Finnish species did not assess all the known species, e.g. 1 240 vascular plant species have been assessed, 180 of which (or 15 %) were classified as threatened.

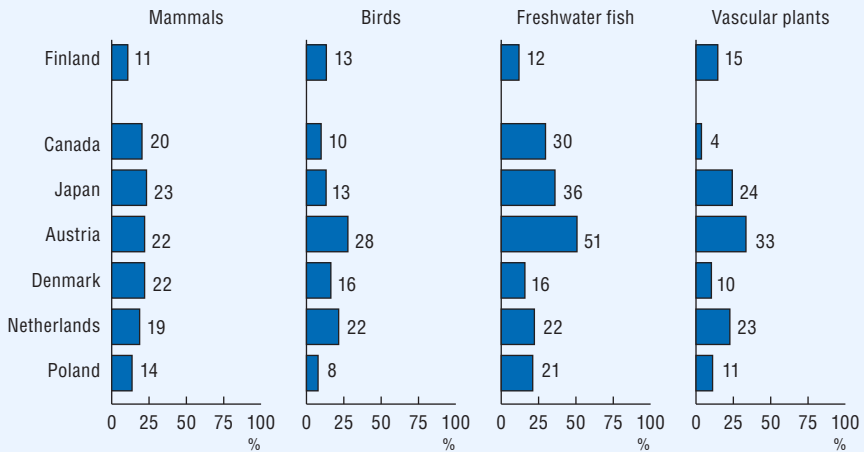
Source: Finnish Environment Institute.

Figure 5.1 **Fauna and flora**

State in Finland, early 2000s



Threatened species^b



a) Mammals, birds, vascular plants: of which 58, 236, 920 indigenous species.

b) IUCN categories "critically endangered", "endangered" and "vulnerable" in % of known species.

Source: OECD Environment Directorate.

Table 5.2 **Threatened species**, by primary threat factor

	Vertebrates	Invertebrates	Vascular plants	Cryptogams	Mushrooms	Total
Trapping, hunting, fishing ^a	16	7	1	5	18	47
Construction and mining	2	109	19	20	40	190
Changes in arable land	1	10	3	0	0	14
Overgrowth of open habitats	5	300	61	7	41	414
Changes in Forestry	4	202	24	27	199	456
Peatland drainage, harvesting	1	11	21	15	5	53
Construction of waterways	3	26	10	17	2	58
Chemical disturbances	3	39	8	9	1	60
Other factors	14	38	33	42	68	195
Unknown factors	1	17	0	0	0	18
Total	50	759	180	142	374	1 505

a) As well as gathering, disturbance and wear.

Source: The 2000 Red List of Finnish species. Ministry of the Environment, Finnish Environment Institute.

Box 5.2 Implementation of the Bonn Convention

Finland has been a party to the 1979 *Convention on Migratory Species of Wild Animals* (the Bonn Convention) since 1989. Finland is a range state for four migratory bird species that are threatened with extinction (listed on *Appendix I*) (Convention on Migratory Species, 2008). Initiated in 1982, the Bird Wetlands Conservation Programme aims to protect all species found in Finnish wetlands. Monitoring will be strengthened for the white-tailed eagle and the greater spotted eagle while Natura 2000 sites are considered for the Steller's eider. A *national protection programme was put in place for the lesser white-fronted goose* that also benefited of an EU Life project in 2005-08. In May 2008 together with Germany, Norway and Sweden, Finland established the "Committee for Captive Breeding, Reintroduction and Supplementation of Lesser White-fronted Geese in Fennoscandia" to guide future releases of captive-bred birds in Fennoscandia and Europe. Overall guidance will be provided by the International Single Species Action Plan for the Conservation of the Lesser White-fronted Goose. The draft Plan has been revised under the auspices of the Agreement on the Conservation of African-Eurasian Migratory Waterbirds (AEWA) and is currently being considered by the 22 Principal Range States to the species. It was submitted for adoption by the 4th Meeting of the Parties to AEWA in September 2008. Finland is one of the (only) six AEWA Range States that have banned the use of lead shot in wetlands.*

Box 5.2 Implementation of the Bonn Convention (*cont.*)

Under the *Agreement on the Conservation of Small cetaceans in the Baltic and North Seas* (ASCOBANS), the so-called Jastarnia Plan (*i.e.* the Recovery Plan for the Baltic Harbour Porpoise) was endorsed by the ASCOBANS Parties in 2003. It takes into account the critical conservation status of the only cetacean species native in the Baltic Sea, despite strict protection, and recommends measures to reduce by-catch, research and monitoring activities, establishment of Marine Protected areas and public awareness activities. No by-catches of small cetaceans by Finnish fisheries have been reported in 2006 and 2007, and Finland is implementing research (static acoustic monitoring) and a harbour porpoise sighting campaign.

Regarding the *Agreement on the Conservation of Populations of European Bats* (EUROBATS), eleven species of bats have been observed in Finland. One of them is rare and five have a restricted distribution. Threats against nursery colonies and roosts include forest management (felling of hollow trees, monoculture and evenly aged forests) and rebuilding and repairing of houses. Threats against hibernating sites consist mainly of disturbance by people (*e.g.* making fire in caves). The abandoning of traditional pastures and meadows may have affected the feeding habitats of some species of bats but this topic has not yet been researched. All bats in Finland have been protected by law since 1923. Recently the first important area for bats has been identified and marked down in a town plan. This area is located in the municipality of Tampere. Heikkilä cave in Turku, south-western Finland, has been locked shut so that only bat workers can visit the cave to count the bats. Measures have been taken to improve research (*e.g.* radio tracking, ringing of bats) and public awareness (*e.g.* European Bat Night). However, no systematic large-scale monitoring has been implemented in Finland where the knowledge of hibernating bats is rather scanty. More research on bats using forest habitats and co-operation between bat workers and forest managers is needed.

* Millions of waterbirds die annually due to the ingestion of spent lead shot pellets.

from Norwegian fish farms in the North Atlantic Ocean are being caught throughout the more than 250 km long mainstream and major tributaries of the river Teno (Vähä, 2007). Genetic analysis indicates that the share of hybrids in the wild populations of salmon is 0.75%.⁷ The river basins shared with Russia will continue to be covered by the bilateral agreement on transboundary waters.⁸

Specific management plans have been established for several game species, such as wolf, bear, lynx, Finish seal and wild forest reindeer. These plans should not only help regulate hunting but also settle conflicts with landowners and the general public.

Over the past few years the wolf population of Finland has extended its territory from its traditional areas in the eastern parts of Finland (Kainuu and North Karelia regions) to the central and western areas of the country. Wolves, which are estimated to number between 250 and 300 in Finland, are strictly protected under the Habitats Directive. Following a European Court of Justice ruling in June 2007,⁹ Finland adopted legislation which clarifies the rules on the granting of permits to hunt wolves, and in April 2008 the EC closed the wolf hunting case against Finland.

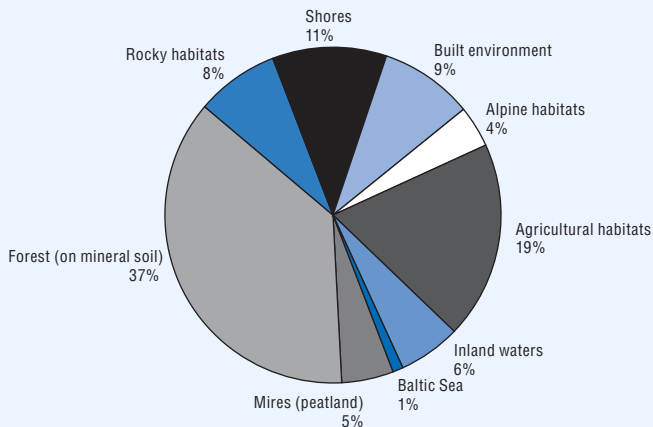
Measures are being taken to *prevent the spread of alien species*, for example of Canadian beavers into areas occupied by the native European beaver. Projects have been carried out to encourage hunting and trapping of American mink and raccoon dog, which are raiding birds' nests. Finland has not yet ratified the 2004 Convention for the Control and Management of Ships' Ballast Water and Sediments (BWM), which seeks to eliminate alien species in ballast water. A draft Bill to ratify the Convention should be presented to Parliament by 2010.¹⁰ Pending development of the technology for treatment of ballast water on board, the Convention requires that the renewal of ballast water takes place in the open sea. Unfortunately, the Baltic Sea lacks such open sea areas. If transatlantic ships coming to the Baltic Sea can renew their ballast water in open sea areas of the North Sea, this is not the case of ships coming from the east (*e.g.* the Caspian Sea). To facilitate ratification of the Convention in the Baltic Sea States, co-operation is sought within the 1992 Paris Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR), which entered into force in 1998, to designate ballast water renewal areas in the North Sea. Other measures are being prepared within HELCOM, such as carrying out risk assessments for ship routes in the Baltic Sea as well as an alarm system for invasive alien species. Since more alien species are likely to spread into Finland, naturally (*e.g.* climate change) or due to human activities, a national strategy to prevent and control their spread is being prepared, in collaboration between MoE and the Ministry of Transport and Communications. The strategy should be finalised by the end of 2010.

4. Habitat Protection

Around 37% of *threatened species are associated with forests*, in particular old-growth forests in southern Finland (Figure 5.2). About 19% of the species typically live in traditional farmland habitats, a share which has risen considerably since the early 1990s. 11% of threatened species are associated with shore habitats.

The *first Red List of habitat types in Finland* was published in June 2008. Changes that have occurred in the last fifty years were used as a starting point for the

Figure 5.2 Threatened species, by habitat type, 2000

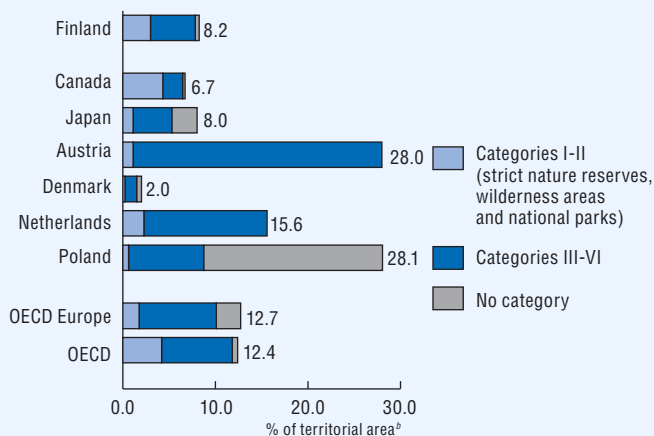


Source: SYKE.

assessment. Considerable information was collected on the Baltic Sea and its coast, on inland waters and shores, on mires, forests, rocky habitats, traditional rural biotopes and the fell area.¹¹ Almost 400 habitat types were assessed, and 52 of them belong to the critically endangered category. More than half of them were traditional rural biotopes, such as meadows or wooded pastures. A by-product of the Red List is the *first list of habitats for which Finland has a particular international responsibility*: maintaining these habitat types in Europe depends largely on the measures taken in Finland. The list contains 35 habitat types. All main groups of habitat types are represented in the list, but there is an emphasis on mire habitats, and the coastal habitats along the Baltic Sea. The proportion of mires in Finland is one of the highest in the world, and the Baltic Sea is a unique brackish water ecosystem. *Climate change* will particularly threaten the habitats of the fell area, especially those for which snow or ground frost is an essential factor.

4.1 Network of protected areas

Little progress has been made in expanding protected areas since the OECD Environmental Performance Review of 1997. *Protected areas cover 8.2% of Finland*, which is low by OECD standards (Figure 5.3). However, the share of protected areas that corresponds to the IUCN categories I and II (strict nature reserves, wilderness

Figure 5.3 Protected areas, 2007^a

a) Designated terrestrial and marine areas. IUCN management categories I-VI and protected areas without IUCN category assignment. National classifications may differ.

b) Surface area, inland waters and territorial waters out to 12 nautical miles.

Source: UICN/UNEP-WCMC (December 2007), World Database on Protected Areas; Global Maritime Boundaries Database (August 2007).

Table 5.3 Protected and wilderness areas, 2008

	Number	Area (ha)	Water (%)
Total nature reserves	6 172	1 872 243	13.0
National parks	35	885 253	9.7
Nature parks	19	153 584	1.7
Protected peatland areas	171	460 362	2.5
Deciduous woodland areas	52	1 236	1
Old growth forests	91	93 891	0.2
Seal protection areas	7	18 817	100
Protected areas established by Metsähallitus	24	807	5.3
Nature conservation areas on private land	5 734	209 166	56
Other protected areas	39	49 127	14.4
Wilderness areas	12	1 489 000	7.4
Total protected areas	6 184	3 361 243	10.5

Source: Ministry of the Environment, Finnish Forest and Park Service (Metsähallitus).

areas and national parks) is higher than the OECD Europe average. Protected areas consist of nature reserves and wilderness areas (Table 5.3). Conservation areas on private land are high in number, but they are generally very small in size. Gaps in the protection of habitats include forest and shore habitats in the south, freshwater and marine habitats, and rural/agricultural habitats.

The majority of protected areas are *concentrated in northern Finland*, in sparsely settled and mostly state owned Lapland. Unsettled disputes over land tenure or user rights with the Sámi people have hampered local communities support towards habitat conservation objectives.¹² In the south the situation differs due to dense settlement, private land ownership, intense commercial forestry, and fragmentation of forest protected areas.

Drafting a proposal for the *Natura 2000 network* proved to be a difficult task in Finland (National Audit Office, 2007b). Disagreements arose between MoE and MAF in evaluating areas of environmental significance. Conflicts occurred between private forest owners and national environmental authorities during the Natura 2000 designation process, resulting in almost 15 000 letters of complaint (OECD, 2008). For example, four landowners in Karvia, a small community in south-west Finland, went on hunger strike in protest against the proposed Natura 2000 network. This got much public attention and ultimately nearly half the areas were withdrawn from the Natura 2000 proposal. A local survey showed that the landowners wanted to take an active part in the planning process from the beginning, rather than only reacting to proposals. Information gaps also delayed preparation of the network: the electronic real-estate register was incomplete and could not be used to identify landowners; problems were also encountered in the mapping of Natura sites. On the positive side, information on Finland's conservation assets has improved and has been made more systematic. Natura 2000 created a culture of communication in the nature conservation administration, even though the network remains to date a sensitive subject in Finland. Ultimately a list of proposed sites was submitted to the EC, which was approved in its almost entirety. The approved network consists of 1 860 sites on 4.9 million hectares (*i.e.* 14.5% of Finland). Paying compensation to landowners and land purchasing by the state have been going on since 1998 in Finland. Only 14% of Natura 2000 sites, which had not been included earlier in national conservation programmes, were still not covered at the beginning of 2008. Further expansion of the network to marine waters is linked to the EU process on the marine Natura 2000 network, which is still going on.

Management plans have been established for most protected areas, but not yet for some 200 state-owned areas (10 national parks in the south, marine protected areas, some Natura 2000 sites). According to an assessment on the effectiveness of the management of

Finland's protected areas, carried out by international evaluators in 1994 and 2004, the larger state-owned protected areas are generally well managed and meet conservation objectives but further conservation efforts are needed on privately-owned and small protected areas (e.g. by limiting allowed activities in such areas).

Although Finnish authorities do not see *hunting and fishing* inside protected areas as problematic for biodiversity protection (Box 5.3), illegal poaching (e.g. of wolverines) deserves closer monitoring and control, including through expanding hunting and fishing free areas, as well as reindeer grazing free areas.

Box 5.3 Hunting, fishing and reindeer herding

In Finland *hunting and fishing rights* belong to landowners. On state land, hunting and fishing rights are administered by Metsähallitus. The Nature Conservation Act prohibits certain activities in protected areas (e.g. permanent settlements, logging, trapping, killing or harassment of wild vertebrates). However, the law also lists several activities that can be carried out in protected areas on the basis of granted permits, for example construction of facilities (e.g. for tourism), hunting and trapping of wild animals, fishing, mineral prospecting, building of roads. The Hunting Act allows hunting activities in national parks and wilderness reserves in northern Finland, where traditional local livelihoods (like reindeer husbandry, hunting, fishing) are important income sources for local people. Fishing is usually allowed in national parks, but access is limited in strict nature reserves. The state takes an annual tax in the form of hunting and fishing licence fees.

Reindeer herding is practiced inside and outside protected areas, and mostly on natural grazing areas. According to the Association of Reindeer Herding Cooperation, the total number of counted reindeers has increased from 286 000 in 1997/98 to 324 000 in 2005/06. The Ministry of Agriculture and Forestry has introduced pasture rotation and limits to the number of reindeers to reduce the pressure of grazing on vegetation, in particular lichens.

Recreational fishing is very popular in Finland (it involves 1.9 million Finns). Nearly 90% of the total inland catch and about 50% of marine catch other than Baltic herring take place in recreational fisheries. Total recreational catch accounts for some 40 000 tonnes a year (equivalent to EUR 50 million). A fisheries management fee has to be paid for participating in fishing activities other than angling and ice fishing which are subject to public right of access. Revenues from licenses for recreational fishing (EUR 3 million a year) are refunded to private water owners. Revenues from the more than 300 000 "ordinary" fishing licences (EUR 6 million a year) are used to finance the management of fishery organisations, of fish stocks and for scientific research.

4.2 Protection of water habitats

Almost 10% of Finland's territory is covered by water (around 190 000 lakes in total) and *protected waters account for 10% of the total protected area* (or 343 000 hectares) (Table 5.3). Most protected waters are found in protected areas established by Metsähallitus, wilderness areas and national parks. About 13% of waters in the South coast region are protected; the share is 73% in Northern Lapland. Around one fifth of Finland's lakes are included in Natura 2000 sites.

According to recent findings of the Finnish Environment Institute (SYKE) and regional environment centres, *most of Finland's surface waters (rivers, lakes and coastal waters) are classified as having an excellent or good ecological status*. However, 17% of total river length, 3% of the surface area of lakes and 12% of the surface area of coastal waters are in bad or poor ecological status. Northern Finland's rivers are generally in an excellent or good ecological state; rivers whose status is classified as being only moderate or poor are more numerous in coastal regions of southern, western, and south-western Finland; in such rivers aquatic ecosystems are affected by various factors including high nutrient loads from farmland and hydrological engineering.¹³ Almost a third of Finland's small or medium-sized lakes are in a state poorer than good; such lakes are often affected by algal blooms and other problems associated with eutrophication, especially in agricultural regions. The worst affected coastal waters are around the archipelagoes of Tammisaari and Inkoo in the Gulf of Finland west of Helsinki.

The *EU Water Framework Directive*¹⁴ and related new Finnish legislation have led to changes in the classification of the ecological status of water bodies, which are now assessed from the perspective of entire aquatic ecosystems. A target has been set: waters in Finland (and throughout the EU) should have a good ecological status by 2015, and the status of waters already classified as excellent or good should not worsen. Finland's regional environment centres have recently drawn up official river basin management plans, which have been made available for public consultation over a six-month period from the end of September 2008. These plans contain measures designed to achieve or preserve a good or excellent ecological status for all water bodies. This is all the more necessary as the 2008 Red List of habitat types revealed that considerable proportions of the number of habitat types were threatened (vulnerable, endangered or critically endangered) in mires, marine and coastal areas, and in inland waters (close to 60%, 50% and 40%, respectively).

Eutrophication is the greatest change affecting *Finnish wetlands*. All 49 Finnish Ramsar sites are part of the Natura 2000 network, but so far management plans have been completed for only 32 of them. The 1982 Bird Wetlands Conservation Programme also aims to protect wetland habitats. It currently covers 289 sites.

However, nearly 60% of the sites are in need of restoration and 40% of privately owned sites are not yet protected. A national wetland strategy is yet to be approved (it is being drawn up by the MAF and should also deal with game management). Finland is working towards the launching of a Nordic-Baltic Wetlands Initiative (Box 5.4).

With peatlands still covering 8.5 million hectares (*i.e.* nearly a quarter of its territory), Finland is one of the most important peatland countries in the world. However, *many peatlands have been degraded*: only 3.2 million hectares have been kept as mire (peat-accumulating) ecosystems (IMCG/IPS, 2002).¹⁵ During a field visit in Finland in 2006 the International Mire Conservation Group (IMCG), a non-governmental worldwide organisation, “did not experience pristine mire landscapes – not even in National Parks, where traces of former (and persisting) drainage are evident”. Only 13% of remaining Finnish mires are protected (Ramsar, 2008). The degradation of peatland has been much higher in Finland than in Norway and Sweden (though much lower than in Ireland, Poland and the United Kingdom). This has been largely due to drainage for forestry since the 1950s¹⁶ (some 5.9 million hectares), and to a lesser extent, agriculture (about 1.2 million hectares) and peat extraction for energy generation (100 000 hectares).¹⁷ This is the world’s most extensive programme of mire draining,

Box 5.4 Implementation of the Ramsar Convention

Finland is a contracting party to the 1971 *Ramsar Convention on Wetlands of International Importance*, which it ratified as early as 1975. In 2004–07, Finland shared common problems, strategies and solutions for wetland management with neighbouring countries around the Baltic Sea (Estonia, Latvia, Lithuania, Germany and Sweden), within the frame of rural development, as part of an EU Interreg III Project, developing the use of “Wetlands, Nature Reserves and Cultural Landscapes for Rural Development” (known after the acronym BIRD). BIRD had a budget of EUR 4 million (including national co-financing) over the three years.

Nordic-Baltic Wetlands Initiative (NorBalWet), with Denmark, Estonia, Finland, Iceland, Latvia, Lithuania, Norway, Sweden and the regions around the Baltic Sea of the Russian Federation, was launched in 2005. Acceptance as a regional Ramsar initiative will be considered by the Ramsar Convention at the 40th meeting of its Standing Committee in May 2009. Four NorBalWet conferences have been organised so far (2006 in Sweden on restoration of mires and wet forests; 2006 in Norway on restoration of wetlands in the Nordic and Baltic countries, with special focus on the restoration of deltas, lakes and rivers; 2007 in Estonia on the monitoring of wetlands, 2008 in Finland). Financing comes from the National Ramsar Management Authorities, the Nordic Council of Ministers and EU Interreg III (Baltic Sea Region).

most active in the 1970s when almost 3 000 km² of mires were drained annually. Draining of pristine mires has almost ceased, and most activities are concentrated on the maintaining of ditches in peatland forests. Finland has undertaken to rehabilitate degraded peatland.¹⁸ In doing so, attention should be paid to *i*) restoring or recreating habitats, *ii*) the effects on the carbon balance, and *iii*) the effects on local hydrology. Preparation of a nationwide strategy on the sustainable and diversified use of Finnish mires and peatlands has started, under the lead of MAF and in co-operation with MoE and the Ministry of Employment and the Economy.

Although only around 10% of the threatened aquatic species in Finland live in the *Baltic Sea*, measures to combat the deterioration of the Baltic Sea ecosystems caused by eutrophication, hazardous substances, and commercial over-fishing need to be set to improve the ecological status of the sensitive Baltic marine areas. In 2005, Finland launched an Action Plan for the Protection of the Baltic Sea. The action plan identifies eutrophication as the most significant environmental challenge, particularly in the Gulf of Finland. Nutrient pollution from Finland to the Baltic Sea originates mainly from agriculture and municipal waste water. The performance of municipal treatment plants has been improved, but a 2008 government audit found that in spite of objectives and measures, nutrient emissions from agriculture have not been reduced, thus requiring refocusing agricultural support (National Audit Office, 2008b). Finland (as all nine Baltic Sea states but Germany) scored a failing grade on its work for protecting marine areas in the Baltic Sea (WWF, 2008).

A government audit found that recreational fishermen's share of the salmon catch should be increased in steps to help professional fishermen gain access to private waters that are under-fished (National Audit Office, 2007a). This may go against property rights and the *market-based instruments that regulate the access to fisheries*. Finland differs from most other countries in that part of its territorial waters is privately owned. This is of great importance for the management of fisheries. Fishing in the areas owned by individual persons (*i.e.* parcelled water areas) are governed by territorial use rights in fisheries (TURFs) (OECD, 2006). The water areas jointly owned by groups or private real estate holders (*i.e.* registered village's common waters) are subject to Community based catch quotas (CQs). The system is further complicated for shareholders that are not organised, for which statutory mechanisms between TURFs and CQs apply. Finally, water areas outside village boundaries (and in the middle of the largest lakes) are state-owned. The transferability of both TURFs and CQs is high; for CQs transfers may take place within or between communities.

The many holiday cottages built along the shores of Finland exert pressures on coastal habitats. The *Shoreline Protection Programme*, launched in 1990, covers only 2.5% of the coastline and 5% of lakeshores. The granting of (exceptional) building

permits on the shoreline has decreased in recent years. However, implementing provisions of the 2000 Land Use and Building Act on shoreline zoning will be key to preventing further environmental damages in these important areas for nature conservation.

5. Sectoral Integration: Forestry and Tourism

5.1 Forests: a key role in preserving nature and biodiversity

Some 74% of Finland's land area (23 million hectares) are covered by forests.¹⁹ Nearly all Finnish forests (96% or 22 million hectares) are certified under the *Finnish Forest Certification System* (FFCS),²⁰ which is part of the Programme for the Endorsement of Forest Certification schemes (PEFC) (formerly known as the Pan-European Forest Certification Council). Another 10 000 hectares have been certified under the Forest Stewardship Council (FSC). A Finnish FSC (Forest Stewardship Council) Standard is being prepared for international accreditation. The annual removal of roundwood in recent years has been about 78% of the calculated *maximum sustainable removal* (the level to which fellings could rise without prejudicing the size of future removals).²¹

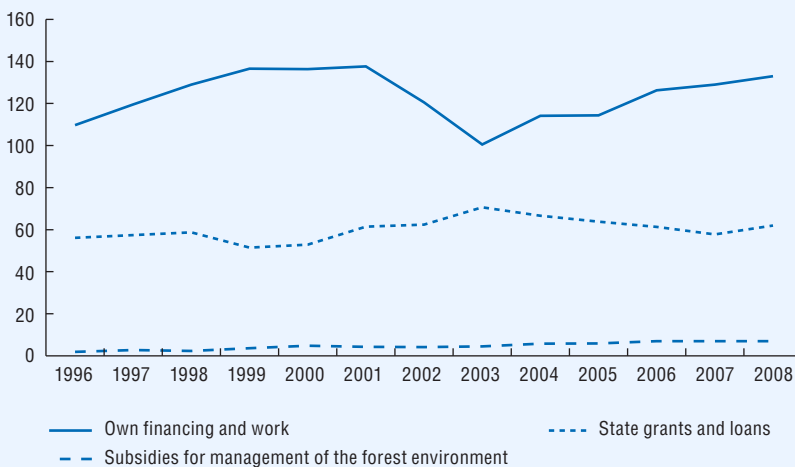
However, the 2008 Red List of habitat types revealed that nearly half of the area of Finnish forests (nearly 70% of the number of forest habitat types) were threatened (vulnerable, endangered or critically endangered), mainly reflecting an increase in the share of young and middle-aged forests with reduced ecological integrity and quality of the habitats (*e.g.* characteristics of living and dead trees), which in turn results from increasingly intensive forestry practices. Many of the threatened habitat types are typically small in size. The 1996 Forest Act defines particularly significant habitats in commercial forests where management has to be carried out in a way that retains certification characteristics. But *only 8.2% of Finland's forests are protected*, 4.5% under strict protection schemes that prohibit logging (8.3% in northern Finland, only 1.5% in southern Finland).

The National Forest Programme 2015 (NFP 2015) sets *very ambitious targets to improve the economic viability of Finland's forestry*.²² The aim is to reverse the trend of decreasing profits in the sector. This is particularly true now as, due to the economic downturn, weakening demand for forest products in western Europe has led to markedly decreased sawn wood prices in 2008. No major improvements in paper prices can be expected in the near future either (UNECE Timber Committee, 2008). However, wood, energy, labour and other input costs have increased. In the light of weakening profitability and oversupply situation in western Europe, the Finnish forest industry has reacted with plans to cut capacity.²³ An additional concern is wood availability after the expected rise of Russian roundwood export tariffs in 2009, which

would impact on markets not only in Finland, but also in the rest of the world (Box 5.5). Japan and China are large importers of Russian wood and will have to find other sources of raw material supply for their forest industry. Sawlog prices will probably rise globally and the rising Asian demand for sawnwood and plywood will push up prices in these product groups in Europe.

The *private family forests* are of crucial importance for the industry's roundwood procurement, as about 80% of the domestic roundwood (and 60% of all roundwood, both domestic and imported) consumed by the forest industry is from such forests.²⁴ Over the last decade non-industrial private forest owners have invested some EUR 120 million a year for managing their forests, for the most part for forest regeneration work, representing 12-13% of their revenues (gross stumpage earnings).²⁵ In addition, in 1996-2008 government support to non-industrial private forest owners has been over EUR 60 million a year for "traditional" forest management²⁶ plus EUR 1.7 million a year for managing the forest environment (Figure 5.4). The government support to environmental management is thus a small part of total *government support to private forestry*, though it is increasing. It was EUR 7 million in 2007 (or 10% of total support) and is planned to rise to

Figure 5.4 State and forest-owners of funding of investments in non-industrial private forestry, 1996-2008^a



a) at 2006 prices.

Source: Finnish forest research institute.

EUR 13 million from 2010. About EUR 4 million (out of the EUR 7 million) is for paying environmental support under section 19 of the Act on the Financing of Sustainable Forestry. Almost one third of this sum has gone to forest owners in areas covered by the Lapland and Northern Ostrobothnia regional forestry centres. When landowners can demonstrate that environmental measures reduce the yield substantially they may ask for compensation. Losses exceeding 4% of the logging value or EUR 7 000 are compensated. Funding is granted for measures that maintain and promote biodiversity beyond the obligations set forth in the Forest Act. The amount of support is based on expected timber sale revenues. Landowners need to enter a 10 years commitment with the Forestry Centre to preserve biodiversity and refrain from forest practices in the commitment area. The remaining EUR 3 million is spent on larger projects that promote nature values.

Box 5.5 Importing wood from Russia

Imports from Russia have risen, and imported roundwood now accounts for 25% of the total roundwood supply.^a The price of Russian sawlogs is *below the stumpage price of sawlogs* procured domestically in Finland (including after the addition of the Russian export duties of EUR 10/m² in 2007). Even after the increase in roundwood export duties to a minimum of EUR 15/m² in April 2008, roundwood importers are not expected to reduce their imported volumes significantly.

However, if *Russian planned export duties* (at a minimum of EUR 50/m² in 2009) are implemented, imports of softwood pulpwood and sawlogs from Russia will sharply decline from 2009 onwards due to their unprofitability, and total roundwood imports from Russia would probably fall to less than half of their 2006 level.

The *forest industry is adapting to the difficulties of obtaining imported wood* by making production capacity changes. The UPM company, for example, will start producing mechanical pulp from pine in early 2008. This is a significant development because until now it was technically possible to produce mechanical pulp only from spruce.^b A proportion of pulpwood imports will also be replaced with higher imports of pulp (e.g. from Brazil's Veracel pulp mill, 50% owned by Stora Enso, or from the newly built Metsä-Botnia's pulp mill in Uruguay).

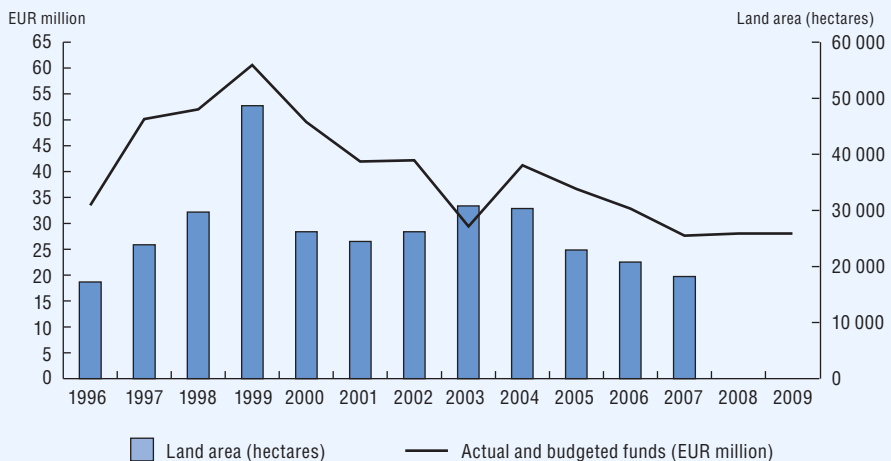
a) The reduced level of imports in 2007 is attributable to the exceptional roundwood harvesting conditions.

b) Domestic spruce resources are being used to the full. The proportion of domestic birch resources harvested is not very high, as only 9% of Finnish forests are birch-dominant. Pine has the best potential for quickly meeting an increase in the demand for roundwood, both as sawlogs and pulpwood.

Purchases of forest land by the State concern mainly old forests, the most important biotopes from an international perspective. The share of old forests in total forest land has decreased dramatically during the last century and now accounts for about 2-3% in the south and up to about 20% in some areas in the north. Since 1997, 300 000 hectares of private land has been purchased for nature conservation purposes (Figure 5.5). Since then some EUR 500 million have been spent for such purchases, and most were dedicated to the acquisition of old-growth forests. At the beginning of 2008, only about 1 % of the total surface area of old growth conservation programme in private ownership was still waiting for state purchasing or paying compensations to landowners.

The *Forest Biodiversity Programme for Southern Finland (METSO)* for the period 2008-16, approved by the Government in March 2008, will continue to promote voluntary conservation schemes with similarities to those tested in the programme's pilot phase over the years 2002-07. The pilot showed that the most effective way to preserve biodiversity in the mainly privately-owned forests of southern Finland is to get forest owners committed to conservation on a voluntary basis. The METSO Programme will start with the protection of 10 000 hectares of state-owned forests in southern Finland by 2010. The main focus of the new programme will nevertheless be in private forests, where new schemes will be

Figure 5.5 Implementation of land acquisition programmes, 1996-2009



Source: Ministry of the Environment.

increasingly adopted from 2010 onwards, following the completion of earlier conservation programmes. The METSO schemes in commercially managed forests will mainly start in 2010 on the basis of preparatory work that is already under way. Revision of ecological site selection criteria, which should ensure that the conservation of the most valuable sites is duly prioritised, was completed in June 2008. Funding decisions have so far guaranteed EUR 182 million of financing for the programme until 2012. During the years 2008-09 previous nature conservation programmes will be completed at a cost of some EUR 80 million, extending Finland's network of protected areas by some 45 000 hectares.

The METSO Programme is expected to *extend southern Finland's current network of protected forests* by some 88 000 hectares additional nature reserves. Another 8 000 hectares may additionally be designated for temporary protection, meaning that the total area under protection or conservation will expand by almost 96 000 hectares in addition to the 10 000 hectares to be protected within State forests by 2010. Metsähallitus is also now drawing up forest management plans that prioritise biodiversity in areas of importance for the coherence and interconnectivity of Finland's network of protected areas. The METSO Programme aims to halt the ongoing decline in the biodiversity of forest habitats and species, and establish favourable trends in southern Finland's forest ecosystems by 2016, in line with internationally defined biodiversity targets. The METSO Programme was launched at the same time as Finland's new National Forest Programme for 2008-15. The coordinated preparation and launch of the two programmes intend to illustrate that the commercial use of Finland's forests can be harmonised with the conservation of their biodiversity. During this period, the programme will be evaluated three times, with the first evaluation of future needs conducted in 2012.

5.2 *Nature tourism: a rapidly growing sector*

Nature tourism accounts for about 25% of the overall tourism activity in Finland and is rapidly growing, particularly in Lapland. *National parks and wilderness areas have become very important for tourism* (the number of visitors increased from 358 000 in 1992 to 1 410 000 in 2005) and provide income and work opportunities for local people, thus contributing substantially to the regional and local economy. It was estimated in 2003 that recreation and nature tourism in the most popular protected areas benefited EUR 230 million to local economies and will benefit about EUR 310 million by 2010.²⁷ In 2003 the Council of State adopted an Action Programme for Developing Recreational Use of Nature and Nature Travel (VILMAT), aimed at doubling the number of jobs in the tourism sector by 2010 to a total of 64 000.

Measures have been taken to regulate tourism in state-owned protected areas, notably through Metsähallitus, by obtaining prior commitments to guiding principles from local tourism companies willing to develop their activities in protected areas. Given the rapid growth of nature tourism it is important to continue *developing sound policy guidance* to avoid negative impacts of tourism on conservation objectives²⁸ and to support mutual benefits, including through indicators and monitoring schemes to assess the ecological, social and economic impacts of tourism on protected areas. Efforts should also be made to enhance the financial contribution of the tourism industry towards nature conservation, for example through public private partnerships or by setting fees for enterprises which rely on protected areas for a major part of their activity. This includes some big and many small tourism operators that organise guided tours in protected areas.

6. International Co-operation

Finland has ratified all relevant international agreements and conventions in the field of nature and biodiversity conservation. They also provide an important framework for Finland's nature policy. This includes, in particular, the Convention on Biological Diversity (CBD), the Convention on Wetlands of International Importance (Ramsar Convention), the Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention), as well as conventions covering the Baltic Sea (HELCOM, OSPAR) (Boxes 5.1, 5.2 and 5.4).

7. Financing Nature and Biodiversity Conservation

Government support for nature and biodiversity conservation ranged over the review period *between EUR 60 to EU 70 million a year* (Table 5.4). Most of it was allocated to land acquisition (by Metsähallitus) for the state, the management of protected areas, and compensation to landowners. The budget for land purchase has decreased as land acquisition programmes are coming to an end (Figure 5.5).²⁹ At the same time funding of Metsähallitus/NHS management work for state land protected areas has increased, reflecting efforts to establish and implement new management plans. Compensation payments have remained virtually unchanged. They cover both the loss of farm/forest income due to conservation easement, and damages due to attacks on domesticated animals (*e.g.* between 1998 and 2004 compensation for damages to reindeer populations by the golden eagle came to a total of EUR 2.3 million).

MoE has allocated EUR 0.2-0.5 million a year for the *management and protection of threatened species* on private land. By comparison, Metsähallitus spends annually EUR 0.5-1 million for biodiversity protection on state-owned land, excluding funding for restoration and management of natural habitats. The Red List of threatened species 2000 estimates at EUR 4 million per year the additional resources needed for the protection, monitoring and management of threatened species over the next ten years.

Table 5.4 Public funding of nature conservation programmes

(EUR million)

	2001	2002	2003	2004	2005	2006	2007 ^a
Land acquisition	32	23	22	29	26	24	20
– Purchases of private land	17	13	6	14	26	24	20
– Land exchanges	15	10	15	15	–	–	–
Protected area management	14	16	24	21	25	26	26
Conservation compensation	12	16	9	16	17	15	14
LIFE Natura	2	2	2	2	1	1	1
Employment funds (Ministry of Labour)	3	2	1	1	1	1	1
Total	63	59	58	69	70	67	62

a) Budget proposal.

Source: Statistics Finland.

Notes

1. A long narrow ridge of coarse gravel deposited by a stream flowing in or under a decaying glacial ice sheet. Finnish eskers can range in size up to several hundred kilometers.
2. Even though the sites are, in most cases, already effectively protected by administrative decisions.
3. The associations are organised geographically into ten Unions of Forest Management Associations, which in turn are members of the Central Union of Agricultural Producers and Forest Owners (MTK).
4. Among Finland's state enterprises Metsähallitus has long been the largest and most steadily profitable, contributing about EUR 40-60 million a year (largely financed by the sale of timber) to the central budget over the last decade.
5. As different IUCN categories have been used in earlier assessments of threatened species, comparisons to establish general trends are difficult.
6. The species has disappeared from Latvia and Lithuania, countries in which it once thrived. The first comprehensive survey conducted in 2006 in Finland estimated at 143 000 the number of nesting females, a big reduction since half a century ago, due to reduction of the squirrel's preferred habitat (mixed forests with spruce trees).
7. There is no indication of accumulation of non-native gene combinations over time, thus implying that introgression past the second generation has not been significant.
8. The joint commission with Russia is functioning well (*e.g.* it prepares rules for the different uses of water).
9. The European Court of Justice ruled that Finland had breached the Habitats Directive by granting permits for the hunting of wolves, which failed to specify the conditions under which they could be hunted.
10. According to HELCOM's Baltic Sea Action Plan, the HELCOM states should ratify the Convention preferably by 2010, but not later than 2013.
11. A fell (*tunturi*) is distinguished from a mountain (*vuori*) in that true mountains have permanent glaciers. Erosion has also given fells a gentler shape, whereas the younger mountains have a rugged shape.
12. About 70% of the Sámi homeland region consists of protected areas. The Sámi Parliament has not supported the decision-making process on land tenure by NHS.
13. Water levels are regulated on about a third of Finland's surface waters; almost all large rivers have been developed to produce hydropower.
14. Transposed in Finland through the 2004 Act on Water Resources Management.
15. A "mire" is a peatland where peat is being formed and accumulating. All mires are peatlands. Sites no longer accumulating peat would not be considered mires anymore. About 80 mire site types have been described in Finland.
16. Most original mires in Finland are wooded, often sparsely (with poor timber production), sometimes with a true forest cover (with fairly good timber production). The rest are open mires.

17. Peat is used – mixed with 2.6% wood – to produce heat and electricity and provides approx. 6.2% of Finland’s annual energy production. About 662 000 hectares have been reserved for future peat mining.
18. In Finland (and Sweden) mires and peatlands are owned by landowners, who lease them to forestry developers or extraction companies and who naturally expect a say in what happens to their property.
19. Pine accounts for 50% of this, spruce for 30%, birch for 16% and other broad-leaved species for 4% only.
20. Expenses for certification are tax-deductible.
21. It is less than 60% of annual increment. Some 1.9 million hectares of forest, mainly in northern Finland, is excluded from commercial roundwood production.
22. Increase the output of the forest and wood processing industry by 20%; increase annual fellings of round wood to 65-70 million m³ (average 2002-06 was 44 million m³); increase income of private forestry at least to EUR 127/ha (2002-06 average was EUR98/ha) and the average size of private forest holdings to 50 hectares by 2050 (2006 average was 24 hectares); increase forest chip production to 8-12 million m³ a year (2006 production was 3.4 million m³).
23. In September 2008 Stora Enso, the world’s largest pulp and paper manufacturer in terms of production capacity, with the Finnish State as its biggest shareholder, and UPM-Kymmene Oyj, a major Finnish pulp, paper and timber manufacturer, both announced capacity cuts in paper and pulp industry. Sawnwood production volumes have markedly decreased during 2008 and closures of production units are also planned in sawnwood industry.
24. Some 61% of Finland’s commercial forests are in the possession of non-industrial private owners, 24% are owned by the state, 9% by companies and 6% by other groups of owners. The state’s forest ownership is concentrated in northern Finland.
25. Gross stumpage earnings of private forest owners in 2007 for the first time exceeded EUR 2 billion. Most of this huge increase is attributable to the almost 40% rise in spruce and pine sawlog stumpage prices.
26. The new National Forest Programme 2015, aims to influence long-term felling volumes by expanding the support for silvicultural and forest improvement works to an annual EUR 86 million.
27. More generally, the NFP 2015 sets the target to increase the turnover of tourism and recreational services in rural areas by 25% from the level in 2004 (EUR 510 million).
28. For example, the increase of nature tourism has resulted in conflicts with reindeer herders because of spreading tourism infrastructure limiting movements of reindeers.
29. In 2006 some 90 000 hectares of private land were still awaiting acquisition by the state (especially in southern and eastern Finland), for which a budget provision of EUR 39 million has been made available (to be spent until 2009).

Selected Sources

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6

ENVIRONMENT – ECONOMY INTERFACE*

Features

- Sustainable development and institutional integration
- Environment-related taxes and subsidies
- National environmental planning
- Environmental permitting and compliance assurance
- Economic instruments
- Private sector initiatives
- Land use planning

* The present chapter reviews progress since the previous OECD Environmental Performance Review of 1997. It also reviews progress with respect to the objectives of the 2001 OECD Environmental Strategy. It takes into account the latest Economic Surveys of Finland and the latest IEA Energy review of Finland.

Recommendations

The following recommendations are part of the overall conclusions and recommendations of the environmental performance review of Finland:

- undertake an “*ecological tax reform*”, as indicated in the government 2003-07 policy documents, to review and revise prices, taxes and subsidies in the relevant sectors (*e.g.* energy, transport, agriculture, industry);
- continue to aim at internalising externalities and implementing the *polluter pays and user pays principles* to integrate further environmental concerns into energy, agriculture, industry and transport policies;
- give special attention to the use of specific *economic instruments* (*e.g.* green certificates to promote renewable energy, tax on NO_x emissions, road pricing);
- strengthen *energy efficiency efforts* with particular emphasis on the building sector, and capture the *multiple related benefits*;
- strengthen environmental efforts (*e.g.* investments, technological innovation), in the context of Finland’s efforts to stimulate its economy;
- review the linkages and possible synergies among environmental policy programmes, including time-bound targets and objectives, within the framework of Finland’s sustainable development strategy;
- pursue the reform of environmental permitting to streamline and simplify procedures while enhancing the consistency and effectiveness of enforcement actions;
- review the use of economic instruments to increase their environmental effectiveness and economic efficiency;
- further promote eco-innovation through green procurement, environmental labelling and the active involvement of businesses and other stakeholders, and consider how environmental policy instruments could be designed to better promote innovation;
- extend the scope of energy efficiency agreements to include material efficiency;
- strengthen coordination of land use planning between municipalities and state authorities; ensure effective enforcement of land use plans in coastal areas.

Conclusions

Integrating environmental concerns into economic decisions

Finland made progress over the review period in *decoupling* environmental pressures from economic growth for some conventional pollutants (*e.g.* SO_x and NO_x emissions) and for water abstractions. *Sustainable development* has been brought into

mainstream policies with the Finnish National Commission on Sustainable Development working continuously since 1993 and led by the Prime Minister for 14 years, now presided over by the Minister of Labour in the Ministry of Employment and the Economy. National sustainable development strategies have been developed and followed up with evaluation and monitoring procedures; links have been established with the regional level. In the field of taxation, the *restructuring of the car registration tax and annual circulation tax* on the basis of CO₂ emissions is a very positive step. SEA has been introduced and implemented in sectoral strategies.

However, there is still a need to *decouple* CO₂ emissions from energy production and consumption, and pesticide use has increased. Finland should redouble efforts to reduce its *high energy and material intensity indicators*, in line with its domestic and international general policy orientations. The lack of *quantitative targets* in the Finnish national strategy for sustainable development, together with the search for a consensual approach among all stakeholders, makes the delivery of concrete or tangible results uncertain. There is a need to *further integrate environmental concerns and sustainable development principles* into sectoral policies and practices (e.g. industry, energy, agriculture, transport), particularly at the implementation level. There is scope to eliminate *environmentally harmful subsidies* (e.g. various energy tax exemptions, tax exemptions for industrial landfills). Although *energy intensity* (total primary energy supply per unit of GDP) has declined over the review period, it remains quite high in comparison with other European and OECD countries. Improvements in energy efficiency (e.g. in the building, transport and industry sectors) should bring multiple benefits (in economic efficiency, security of supply, GHG emissions, and air pollution and related health costs). This is appropriate in the context of Finland's efforts to stimulate its economy. Energy and transport taxes, prices and related subsidies may usefully be reviewed.

Strengthening the implementation of environmental policies

Environmental legislation has been significantly enhanced over the review period: the 2000 Land Use and Building Act, the 2000 Environmental Protection Act, including subsequent amendments, and media specific legislation are consistent with the EU acquis. Introduced in 2000 and covering a larger number of installations than required by the EU IPPC Directive, *integrated permitting* has resulted in increased compliance rates. Better *compliance monitoring*, through regular inspections, advanced information database (Hertta) and inspection database (Vahti), has helped to swiftly prosecute non-compliance cases. A wide range of *economic instruments*, introduced over the review period, have provided incentives to industry and

consumers to reduce environmental impacts. The *PPP and UPP* have been implemented further and cost recovery of waste and waste water services has increased. Industry has entered into *energy efficiency agreements* and increasingly relies on environmental management certification. Finland has set up an efficient financing scheme for *eco-innovation*. Active involvement of *municipalities* (staff arrangements, funding, policy instruments) has strengthened the implementation of environmental policies. The 1995 National environmental policy programme (with the 2005 horizon) established consensus-based targets and stimulated the preparation of various environmental policies and programmes.

However, nationally established environmental targets have often a guiding nature and are not sufficiently taken into account in *sectoral programming* (e.g. transport, agriculture) and at the municipal level to balance short-term economic considerations. *Cost-effectiveness* of plans and policy instruments is rarely assessed. Integrated permitting has not been accompanied by sufficient efforts to ensure *consistency of enforcement across the country*. There is a need to streamline environmental permitting and reduce related administrative burden, further using *notifications and General Binding Rules* for regulating industrial operations. The institutional reform of the permitting system should be accompanied by a strengthened *enforcement capacity*. Meeting environmental objectives in *land use planning* is hampered by lax enforcement of construction permits. This has led to an increasing urban sprawl that raises energy consumption and generates various forms of pollution. Reducing *material intensities* should require more attention from industry and public authorities and be part of public procurement policies. Overall, environmental expenditure have decreased as a share of GDP over the review period from some 1.2% to less than 0.9%.



1. Sustainable Development

1.1 Decoupling environmental pressures from economic growth

During the period 1998-2006, Finland's economy grew by 30% while the Finnish population increased by 2% (Table 6.1). Over that period, industrial production increased by 42%, agricultural production by 11%, total primary energy supply by 14% and final consumption of energy by 11%; passenger car traffic increased by 17% while road freight traffic remained stable. This continuous economic growth at 3.6% average annual rate extends the economic growth initiated in the mid 1990s, but contrasts with the deep recession of the early 1990s (Figure 6.1) (Box 6.1).

Pollution intensities

While SO_x and NO_x emissions have decreased, respectively by 10% and 14%, their emissions per unit of GDP remain similar to or higher than the EU15 average. Such relatively high emissions are partly due to the high energy intensity of the Finnish economy.

Box 6.1 The economic context

The Finnish economy, based on abundant forest resources and advanced technology, has progressed considerably since the severe recession of the early 1990s.^a Over the 1997-2007 period, Finland continued the economic growth initiated in the mid-1990s, with an *average annual GDP growth of 3.6%* (against 2.5% and 2.2% for the OECD and Euro area averages).^b In 2007 GDP was USD 187 billion using current purchasing power parities (PPPs), accounting for 0.5% of the OECD GDP.^c In 2007 GDP per capita was USD 35 300 using current PPPs (against USD 32 300 for the OECD average), up from USD 24 000 in 1997.

The *structure of the economy* has changed only slightly over the last decade: services now account for 65% (64%), industry 32% (32%) and agriculture 3% (4%). The largest industries are electronics, machinery, vehicles and other engineered metal products, forest industry and chemicals. The low-tech segment of industry remains sizeable although a number of pulp and paper plants have closed. Because of the northern climate, agriculture is limited to maintaining self-sufficiency. Farms tend to be small, but farmers own sizable timber stands that provide supplementary income in winter. EU accession on 1 January 1995 has accelerated the process of restructuring the agricultural sector. Finland has kept focus on *innovation*, with special emphasis on information technology. Gross domestic expenditure on R-D is 3.5% of GDP (against an OECD average of 2.3%). Nokia, the telecommunications company, has been a major driver of GDP growth since the mid-1990s.^d

Finland has joined the Euro zone^e and has *solid public finance*, with the general government budget recording a net saving of 5.7% of GDP in 2007, driven by strong revenue growth (though revenues include social security contributions, unlike most other OECD countries). Total tax receipts represent 44% of GDP, a share that has remained unchanged over the last decade. Income tax is levied both by the central Government and by municipalities. Municipal income tax, levied as a uniform percentage of income, is the main source of revenue for the municipalities; its rate is 15 to 20%, depending on the municipality.

Finland has a relatively open economy, with exports and imports in 2007 accounting for 46% and 41% of GDP, respectively. Forestry (pulp and paper, sawmill, and finished wood product industries) represents over a third of its exports.

Box 6.1 The economic context (*cont.*)

Except for timber and several minerals, Finland depends on imports of raw materials, energy and some components for manufactured goods. The EU is Finland's largest trading partner (particularly Germany, the United Kingdom and Sweden), accounting for more than half of all exports. Follows Russia with 10%, then the United States with 6% and China with 3%. Major suppliers are the EU (55%), Russia (14%), China (7%) and the United States (4%).

- a) As a consequence of economic overheating, depressed foreign markets and the dismantling of the barter system between Finland and the former Soviet Union in the early 1990s, the economy sank into deep recession. GDP contracted by 11.5% between 1990 and 1993. With economic recovery, growth resumed, reaching 4.5% in 1994 and 4.3% in 1995, when GDP had almost regained its 1990 level.
- b) Lower growth in 2001-2003 reflected the global downturn of 2000.
- c) USD 245 billion using current exchange rates.
- d) Other notable companies include: Stora Enso and UPM-Kymmene, respectively the largest and the third largest paper manufacturers in the world; Kemira, which is the world's largest producer of pulp and paper chemicals; Neste Oil, an oil refining and marketing company; and Aker Finnyards, the manufacturer of the world's largest cruise ships.
- e) Finland was one of the eleven countries joining the Economic and Monetary Union (EMU) on 1 January 1999. The Finnish markka (FIM) was replaced by the euro (EUR) at the beginning of 2002. Finland is the only Nordic country to have adopted the euro.

CO₂ emissions (from energy use) per unit of GDP have decreased since 1990, but are still higher than the OECD-Europe averages (Figure 8.2). Annual variability of *CO₂ emissions* is significant because electricity imports into Finland from the Nordic countries market depend upon the availability of hydropower in Sweden and Norway.

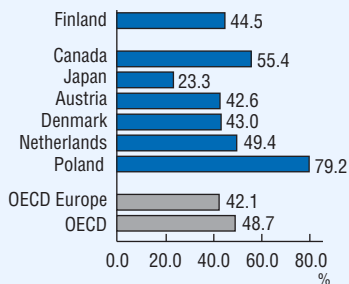
Energy intensity and efficiency

During the period 1998-2006, *total final consumption of energy and total primary energy supply* (TPES) increased at a lower rate (respectively 11% and 14%) than industrial production (42%). TPES per unit of GDP decreased by 13% but remains higher than the EU15 and OECD averages (Figure 6.2). Finland's high energy intensity is partly due to energy intensive industries (*e.g.* pulp and paper and basic metals). The decreasing trend in energy intensity is mainly due to the rapid growth of the electronics industry.

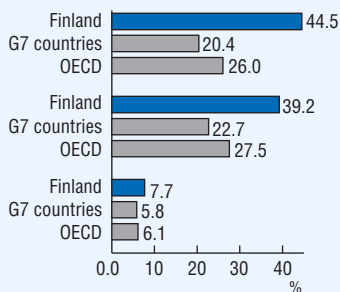
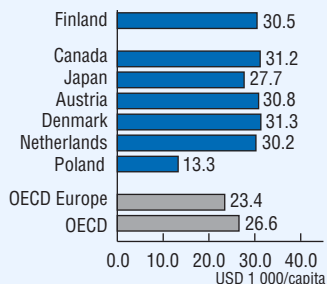
Figure 6.1 Economic structure and trends



GDP^b growth, 1990-2006



GDP^b per capita, 2006



Exports as % of GDP, 2006

Imports as % of GDP, 2006

Standardised unemployment rates, ^c 2006

a) GDP at 2000 prices.
 b) GDP at 2000 prices and purchasing power parities.
 c) % of civilian labour force.
 Source: OECD (2007), *OECD Economic Outlook No. 82*.

Table 6.1 **Economic trends and environmental pressures**
(% change)

	1990-2006	1998-2006
Selected economic trends		
GDP ^a	44	30
Population	6	2
Agricultural production	-8	11
Industrial production ^b	98	42
Road freight traffic ^c	0	0
Passenger car traffic volume ^d	33	17
Selected environmental pressures		
Pollution intensities		
CO ₂ emissions from energy use ^e	22	17
SO _x emissions	-66	-10
NO _x emissions	-35	-14
Energy intensities		
Total primary energy supply	30	14
Total final consumption of energy	20	11
Resource intensities		
Water abstractions	-1 ^g	..
Nitrogenous fertiliser use	-23 ^f	-10 ^f
Municipal waste	..	-1 ^h
Pesticide use	-17	41

a) At 2000 prices and PPPs.

b) Mining and quarrying, manufacturing, and production of electricity, gas and water.

c) Based on values expressed in tonne-kilometres. National and international transport.

d) Based on values expressed in vehicle-kilometres.

e) Sectoral approach; excluding marine and aviation bunkers.

f) To 2005.

g) To 2001.

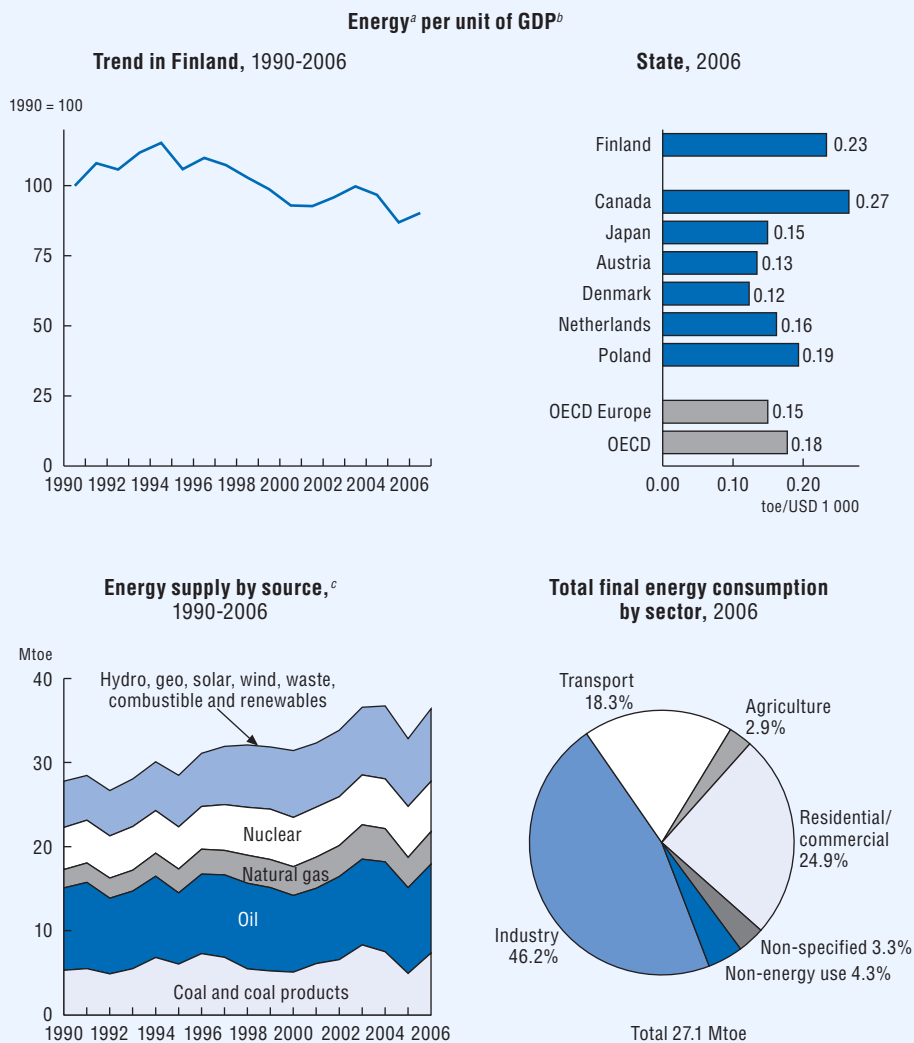
h) From 2000.

Source: OECD Environment Directorate; IEA-OECD.

Resource intensities

Water withdrawals have decreased and the intensity of water use is low (2.1%) by OECD standards. The decrease is primarily due to the introduction of closed systems in the manufacturing industry, which accounts for two thirds of water withdrawals. Water withdrawals from the municipal sector remained virtually unchanged.

Figure 6.2 Energy structure and intensity



a) Total primary energy supply.
 b) GDP at 2000 prices and purchasing power parities.
 c) Breakdown excludes electricity trade.
 Source: OECD-IEA (2008), *Energy Balances of OECD Countries*; OECD (2007), *OECD Economic Outlook No. 82*.

The *use of nitrogenous fertilisers* decreased by 10% over the review period, but Finland's consumption of nitrogenous fertilisers per km² of agricultural land is still higher than the OECD-Europe average. In contrast, the *consumption of pesticides* has grown steadily (by 41%). However, the use of pesticides is lower than the OECD-Europe average (0.06 tonne/km² of agricultural land *versus* 0.17).

Municipal waste generation has remained stable since 2000. It is lower per capita (490 kg) than in neighbouring countries (Figure 4.1). However, the amount of municipal waste disposed of in landfills is about the same as in the late 1990s, in spite of an increased waste sorting by households.

In 2005, Finland's *material intensity*, as measured by domestic material consumption (DMC)¹ per unit of GDP, was still twice the OECD average (Figure 6.3). This is mainly due to *i*) a high mineral intensity, reflecting Finland's high use of material for infrastructure and buildings (Mäenpää *et al.*, 2002; Weisz *et al.*, 2005); *ii*) a high "food, feed and wood" intensity reflecting the strong wood-base of its economy (*e.g.* pulp and paper, and wood biomass).² The relatively low metal intensity (by OECD standards) reflects reliance on imports of metal concentrates,³ advanced technologies in the metal industry, and the weight of the electronics sector (with high value added per tonne of metal used).

Assessment

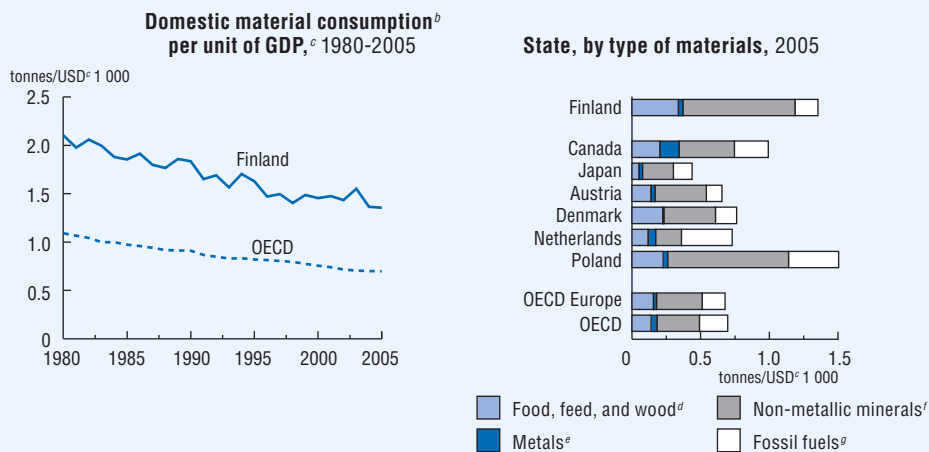
Over the review period, *Finland achieved some successes in decoupling environmental pressures from economic growth*. For some conventional pollutants (*e.g.* SO_x, NO_x) and for water abstraction strong decoupling was achieved. There was no increase of municipal waste. Although energy and material intensities decreased during the review period, they still remain high. Passenger car traffic has increased, although at a smaller rate than GDP. The high level of CO₂ emissions and the increase in pesticide use (no decoupling at all) remain of concern. Overall, Finland should redouble its efforts to further reduce pollution, energy and resource intensities. This is all the more necessary in the context of world prices trends concerning energy and material.

1.2 Sustainable development and institutional integration

The National Commission on Sustainable Development

Since the late 1980s, Finland has striven to enhance the role of sustainable development in mainstream politics and has strengthened mechanisms to encourage better integration of sectoral policies. The Finnish National Commission on Sustainable Development (FNCSO) has been working continuously since 1993. *Led by the Prime Minister* for 14 years, the FNCSO has involved business and civil society stakeholders

Figure 6.3 **Material intensity^a**



- a) The material intensity of an economy can be measured as unit of domestic material consumption (DMC) per unit of GDP. A decline in material intensity is equivalent to a rise in material productivity (i.e. GDP/DMC).
 - b) Domestic material consumption is the sum of domestic (raw materials) extraction used by an economy and its physical trade balance (imports minus exports of raw materials and manufactured products).
 - c) GDP at 2000 prices and purchasing power parities.
 - d) Domestic production from agriculture, forestry and fisheries, plus trade of raw and processed products from these sectors (e.g. cereals, live animals foodstuff, feedstuff, pulp and paper, processed wood, fuel wood, biofuel).
 - e) Domestic extraction of metal ores, plus trade of metal ores (e.g. bauxite) metal concentrates (e.g. nickel matte), refined metals (e.g. steel, aluminium, copper), products mainly made of metals (e.g. vehicles, machinery, electronics and electrical equipments), and scrap.
 - f) Domestic extraction and trade of minerals used in industry (e.g. salts, potash, phosphate rocks) and construction (e.g. sand, gravel, stones), plus trade of derived processed products (e.g. cement, glass).
 - g) Coal, crude oil, natural gas, peat and traded derived products (e.g. plastic and rubber).
- Source: OECD (2008), OECD Pilot MF Database.

as well as a number of government officials. The mandate of the FNCSD expired at the end of 2007 and a new Commission has been appointed for the period 2008-12, chaired by the Minister of Employment and the Economy. The Commission, which meets four times a year, serves as a *discussion forum* that facilitates broad debates on sustainable development issues between the government and the different interest groups, aiming at consensus among all commission members.

The FNCSD is supported by a *permanent Secretariat*. The core secretariat consists of five staff members from the Ministry of the Environment and is the national focal point and operational driver for sustainable development issues in Finland in general. It is complemented by the “network secretariat”, i.e. 15 desk

officers from different ministries who are responsible for sustainable development issues. The network secretariat is mainly responsible for horizontally coordinating and integrating sustainable development issues into relevant sectoral policies. Sub-committees of the FNCSD are initiated and established by the core Secretariat on demand. Four national policy documents for sustainable development have been prepared, implemented and assessed over the years.

The National Strategy for Sustainable Development

A broad-based Strategy Group was established under the FNCSD in 2005 to prepare the 2006 Finnish strategy for sustainable development. The Under-Secretary of State of the Ministry of Finance acted as Chairman of the Strategy Group. Representatives from all sectors of the society were selected for the Strategy Group: administration, industry and commerce, municipal and regional levels, labour market and producer organisations, and environmental development youth organisations. The national strategy “Towards sustainable choices, a nationally and globally sustainable Finland” has been approved in June 2006 by the FNCSD. Subsequently, the Government passed a “*decision in principle*” on the strategy in December 2006 (Prime Minister’s Office, 2006). The decision in principle obliges the administration to implement the guidelines of the strategy.

The strategy recognises three key *national development challenges*: the effects on the Finnish economy of climate change, globalisation and limited growth of the Finnish population, and *global challenges*, including climate change, global poverty and inequality, as well as population growth (Ministry of the Environment, 2007). According to the strategy, sustainable resolution of the national and global challenges requires simultaneous and mutually supportive short and long-term policy actions at the Finnish, EU and global levels. The *COP policy themes* are: balance between use and protection of natural resources, sustainable communities in sustainable regional structure, well-being, the economy as a safeguard for sustainable development, and Finland as a global actor and bearer of responsibility. Selected *issues* have been dealt with, climate change, sustainability of the transport system, social exclusion, and challenges generated by globalisation for the welfare society and development policy. Key *means* to achieve sustainable development include: education and training to promote sustainable development; research and development, expertise and innovations, economic policy instruments and good governance.

Implementation and monitoring

Finland has linked the *assessment* of its national strategy for sustainable development (every two years from now on) with the assessment process and time schedule of the EU sustainable development strategy. Finland has developed *national*

indicators for sustainable development since 2000; 34 key indicators monitor the implementation of the strategy's key policy guidelines. This set of indicators has been completed in 2006, together with the National Strategy for Sustainable Development.

A sub-committee on *regional and local sustainable development* was established in June 2007 (with a term to continue until end 2012). The sub-committee is chaired by the State Secretary of the Ministry of Employment and the Economy. It consists of 35 members from the ministries, regional organisations and municipalities, associations of local authorities, employers and trade federations, labour union, local NGOs and church. The Committee will focus on: promotion of sustainable climate and energy policies, eco-efficient land use and transport systems, sustainable community structures.

Assessment

Overall, Finland has been a *leading country* in promoting sustainable development at EU and world levels. The Finnish national sustainable development approach is characterised by a *wide-reaching participation* of various societal actors and parties, both in the definition and the implementation of the measures (Berger and Steurer, 2006). It has fostered *horizontal policy integration*, particularly through the network Secretariat. Consequently, agreed guidelines on sustainable development have been included in the strategies and action programmes of various sectors of the administration, such as agriculture or energy.

However, the strategy identifies only broad objectives and *lacks quantitative targets*. Actors and responsibilities could also be identified more clearly. These results from the approach itself since consensus among stakeholders translate into less concrete proposals.

Sustainable consumption and production

Finland recognises that it still faces serious challenges related to sustainability, especially concerning the need to reduce CO₂ emissions, the consumption of natural resources, and the amounts of waste generated. In this regard, the inter-ministerial committee on sustainable production and consumption has put forward a proposed *programme to promote sustainable consumption and production* (SCP) (KULTU Committee, 2005). Its key objectives are to increase efficiency in the use of materials and energy through all stages of product life cycles, to promote environmental education, to develop and adopt environmental technologies. According to the programme, Finland must also play an active role in promoting these principles internationally. There are 73 proposals. Implementation of this SCP programme

should bring multiples benefits (environmental, economic and supply security). Gains in material and energy efficiency in buildings, transport, and in industry, must be seen as a priority.

1.3 Sustainable development in practice: market-based integration

Subsidies

Since Finland joined the EU in 1995, the Common Agricultural Policy (CAP) has governed the financing of Finland's agricultural sector (Box 6.1). The Single Payment Scheme (SPS), adopted in the context of the 2003 CAP reform, was introduced in Finland in 2006. It aims at moving away from a policy of market price support to a policy of farmer income support. As a general rule, no particular form of production is required to receive payment. Most (93%) of CAP payments are granted through the SPS in Finland (OECD, 2007). The SPS is implemented on the basis of a hybrid model consisting of a regional flat-rate payment and farm-specific top-up payments based on farmers' historical entitlement. These farm-level top-up payments (that apply to dairy cows, male bovines and starch potato) will stay at the same level until 2010 and then gradually decrease and be incorporated into the flat rate regional payments by 2016. Gradually decreasing farm-level top-up is also paid to sugar beet growers until 2019. *Cross-compliance conditions attached to CAP support* (first pillar of the CAP) have been introduced gradually between 2005 and 2007. In addition to EU cross compliance requirements, Finland has decided nationally that if a farmer sets aside more than the mandatory area, the unused arable area must be under grass (perennial green fallow) to be eligible for CAP support. Between 2006 and 2012, direct payments are to be reduced each year ("modulation"): by 4% in 2006 and then 5% annually. At EU level, the sums saved in accordance with this "modulation" are to be divided among the member states and allocated to rural development measures. In Finland, the funds released through the modulation of direct payments have been allocated to agri-environmental support.

Compensation to less-favoured areas (LFAs) and *agri-environmental support* represent most of rural development policy expenditure (second pillar of the CAP). They accounted respectively for EUR 543 million and EUR 348 million in 2005, including both EU and national support.⁴ The rural development funding has been cut in the context of the new EU financial frameworks for 2007-13 and this has led to a reduction in rural development funding of about EUR 100 million per year. The agri-environmental support has been decreased to some EUR 300 million per year. The efficiency of agri-environmental schemes for the period 1995-2006 has been evaluated.⁵ Because the criteria for granting subsidies are not very strict, environmental subsidies have predominantly ended up being income subsidies to farmers. The agri-environmental scheme did not notably improve the water quality in

water bodies under heavy pressure from agriculture. The total phosphorus load from agriculture to water bodies only decreased slightly during the period 1995-2006. Special subsidies (e.g. subsidies for traditional cultural biotopes), have been more efficient, but as a whole the agri-environmental scheme has not stopped the decline in biodiversity in agricultural areas.

Concerning *forestry*, the 1997 Act on the Financing of Sustainable Forestry⁶ recognises that *forest owners are eligible to “environmental support”* provided they go beyond legal requirements in terms of maintaining forest biological diversity, mapping and protecting key natural habitats and/or using forests for purposes other than timber production.⁷ As a prerequisite, forest owners must conclude an agreement with a Forestry Centre to commit to preserving biological diversity in specified forest areas, and not to practice any forestry activities without permission from the Forestry Centre. These agreements are valid for ten years and remain in force even if an area is transferred to a new owner. The number of such agreements has increased since 1997 and the environmental support currently accounts for 10% of total government support to private forest owners (i.e. EUR 7 million out of EUR 60 million per year).

Concerning *fisheries*, Finland is eligible to the EU’s Financial Instrument for Fisheries Guidance (FIFG) to *co-finance restructuring of its fisheries sector*. Nominal support to the fisheries sector, as measured by government financial transfers (GFT), has decreased from around EUR 25 million in the mid-1990s to around EUR 15 million in recent years, with the EU supplying about half of the total. When expressed as a proportion of the value of landings, however, GFT support has increased⁸ and remains much higher than the average of the 24 OECD countries with access to the sea. Finland is the only OECD country that provides GFT equal to the value of landings (the OECD average is 20%) (OECD, 2006). Most of GFT have been used to support investments by fish factories and wholesalers. According to a recent government audit, some of the firms that have received aid are quite profitable, and projects would have been probably carried out without government support (National Audit Office, 2007a). Fish factories now have overcapacity and some that have received aids had to close as a result of changes in the market situation. The audit found that aid measures did not play a key role in developing fisheries and recommended instead to shift support towards fishermen. This would also help ensure jobs in fish factories.

Regional development is given high policy attention in Finland. The EU Structural Funds have co-financed Finland’s *regional development policy* (Box 6.2). A small part of the European Regional Development Fund (i.e. EUR 43 million out of EUR 260 million per year, over the period 2007-13) is devoted to “enhancing the operational environment”, part of which includes activities to enhance natural and cultural habitats (some EUR 10 million a year).⁹

Box 6.2 UE support mechanisms of regional and agricultural policy in Finland

EU structural funds

Since 1995, the EU Structural Funds have co-financed Finland's implementation of *regional and structural policy*, with a view to reducing the disparities between regions and people's employment prospects. Finland received EUR 2.3 billion in the 2nd structural fund period (2000-06) and will receive EUR 1.7 billion in the 3rd programming period (2007-13), *i.e.* a decrease by about 25% in line with the new EU financial framework. In addition to EU funding, EUR 2 billion of national public financing are committed to EU programmes in 2007-13; this sum will come from the central budget (75%) and the municipalities (25%).

Support from the EU Structural Funds is implemented in Finland mostly through programmes co-financed from two European funds: the European Regional Development Fund (ERDF) and the European Social Fund (ESF). They contribute to the EU's Regional Competitiveness and Employment (RCE) objective. The ERDF assists the regions whose development is lagging behind (objective 1 regions), which receive more aid because of their sparse population,^a and those facing the need for economic diversification (objective 2 regions); the ESF promotes employment. In 2007-13, EU funding in Finland will be EUR 974 million for the ERDF and EUR 615 million for the ESF^b. The ratio of structural funds to national public funds will be 50/50 in the ERDF operational programmes for the east and north of Finland and 40/60 in the ERDF operational programmes for the south and west of Finland.

EU Common Agriculture Policy

Previously financed by the European Agricultural Guidance and Guarantee Fund (EAGGF), as of 1 January 2007 the *Common Agricultural Policy* (CAP) is financed by two funds, the European Agricultural Guarantee Fund (EAGF) (first pillar of the CAP) and the European Agricultural Fund for Rural Development (EAFRD) (second pillar). The EAGF finances marketing and export promotion, intervention measures to regulate agricultural markets, and direct payments to farmers under the CAP. The EAFRD finances measures to improve the competitiveness of agriculture, promote the diversification of rural activities, keep population in the countryside and strengthen the rural environment, landscapes and heritage. Since 1995 (when Finland joined the EU) and until 2006, the EAGGF supported modernisation of agricultural holdings, processing and marketing of agricultural products, the setting up of young farmers and early retirement, compensation for less-favoured areas, agri-environmental measures, development and optimal use of forests, development of rural areas through the provision of services, support for the local economy, and encouragement for tourism and craft activities. Here also Objective 1 regions have received more EU support than other regions.

a) In Finland, objective 1 regions are located in Northern and Eastern Finland.

b) The remainder of EU Structural funds (EUR 100 million in 2007-13) will be allocated to the European Regional Co-operation objective and the European Neighbourhood and Partnership Instrument (ENPI).

Concerning *energy*, Finland uses considerable *subsidies to promote renewable energy sources* (some EUR 85 million a year notwithstanding support for electricity production from renewable (Box 6.3). In 2007 a feed-in tariff was introduced for

Box 6.3 Support to renewable energy sources

Such support takes a variety of forms:

- implementation of the *EU directives*, including on renewable electricity, renewable for transport, renewable in CHP and others (EUR 15 million);
- *research and development* of new renewable energy technologies (EUR 15 million);
- subsidies for *investments* in energy production in combined heat and power (CHP) plants, wind power plants, and in the heating sector. Investments in new technology are prioritised. Subsidies go primarily to biomass (EUR 25 million);
- legislation on biofuels for transport, which gives an obligation to oil companies to have minimum share of biofuels in their sales of transport fuels. These minimum shares are 2% in 2008, 4% in 2009 and 5.75% in 2010, in line with the EU directive on biofuels; *development programmes for second-generation biofuels* to finance pilot and demonstration plants using, for example, wood biomass as a raw material (EUR 4-5 million).
- subsidies for renewable energy heating systems for *residential buildings* to encourage investments to change from high shares of existing electric heating and oil heating to district heating, wood pellets, heat pumps or other forms of renewable energy (EUR 4-5 million);
- support for energy investment in the *agricultural sector*, mainly for biogas plants and wood-based heating plants (EUR 5 million);
- support for energy wood harvesting and chipping to encourage *forest owners* to supply wood residues to energy markets (EUR 6 million);
- support for *renewable electricity* production funded from the electricity tax on consumers (EUR 10 million);
- 6.9 per MWh *tax support for electricity* produced from forest chips and wind; EUR 2.5 per MWh tax support for electricity produced from recycled fuels; EUR 4.2 per MWh tax support for electricity produced from biogas or small hydro ;
- *information* activities to increase motivation, primarily of small-scale consumers such as single family house owners, to select options such as wood pellets or heat pumps for their heating source (EUR 1-2 million).

Source: IEA.

electricity produced from *large peat-fired (conventional) power plants* aimed at enhancing energy security.¹⁰ The interim support measure (till the end of 2010) consists of paying the power plants a premium above the market price for electricity, the size of which depends on the price of coal and on the price of CO₂ permits under the EU Emission Trading Scheme (EU-ETS) that started operating in 2005.¹¹

The high quality of public transport in the Helsinki metropolitan area (reliable and frequent services), as well as its high market share (around 70% of peak hour trips), reflect very competitive public transport fares, particularly for monthly or annual tickets. This would not have been possible without *subsidies to public transport in urban areas*. In Helsinki the public subsidy is nearly 50%, in other metropolitan municipalities over 50%. In inter-municipal public transport the subsidy is about 30%. In the Helsinki metropolitan area, however, the share of the operating costs of public transport financed by ticket revenues is higher than in most European cities (MTC, 2007). Since 1981 a *regional transport subsidy* (EUR 4 million per year in recent years) has partially compensated small and medium-sized enterprises established in low-population density areas for the additional transport costs due to long-distance transport (Chapter 2). No subsidy was granted to cover the cost of transporting primary commodities, raw materials or intermediate products from the place of their production to the place of final processing, thereby complying with requirements of the EC Common Market.

Tax concessions

Unlike most EU countries, Finland does not currently have a feed-in tariff scheme in place to promote electricity production from renewables. Instead, *renewable electricity production is granted CO₂ tax refunds*. Before 2003, the refund was calculated as a share of the CO₂ tax on electricity; specific rates have since been set. There are also *tax incentives to diversify the energy mix*. By derogation from the EU energy tax directive,¹² which imposes minimum levels of taxation on energy products and electricity; natural gas (used as fuel) has a 50% rebate on the CO₂ tax rate. Since 2005, *peat has been CO₂ tax exempt*, even though CO₂ emissions from peat burning are greater than from other fuels. Methane and LPG (used as fuel or for heating) are also tax exempt.

Tax concessions are granted to *industry* to enhance competitiveness. Since 1997¹³ industry has paid a lower tax on electricity consumption than households and the service sector. Since 1998 tax refunds have applied to some energy-intensive firms (those for which the energy tax burden exceeds 3.7% of their value added).¹⁴ Industrial landfills are exempt from the landfill tax.

Farmers are granted a tax rebate on light and heavy fuel oil as well as electricity used in agriculture. The tax rebate was introduced in 2006, reaching, on average, EUR 21.5 million a year for the period 2006-08.¹⁵ A 2007 government audit questions the efficiency and effectiveness of such scheme (National Audit Office, 2007b).

Environment-related taxes

Revenues from environment-related taxes have increased by 25% since 1998. But their share in GDP has decreased to less than 3% (Table 6.2). As often in OECD countries, most revenues originate from energy taxes and vehicle taxes. Other taxes relate to chemicals and waste management. Between 1988 and 2006 a pesticide fee (levied on the pesticide industry) was used to finance the administrative costs of registering new pesticides (EUR 2 million a year); the fee was repealed in 2007. Since 1976 (with a reform in 2005), a tax on disposable beverage containers has supplemented a deposit-refund scheme which applies to glass bottles (1950), metal cans (1996) and plastic bottles including non-refillables (2008), as an incentive to

Table 6.2 **Revenues from environment-related taxes, 1998-2005**

(EUR million)

	1998	2000	2002	2004	2005	2007
Energy taxes (fuels and electricity) ^a	2 574	2 596	2 756	2 901	2 885	2 938
Registration tax	885	1 059	1 023	1 235	1 277	1 217
Annual circulation tax	202	220	233	642	536	612
Annual circulation tax for diesel vehicles ^b	175	181	218	–	–	–
Landfill tax	31	33	32	42	53	56
Tax on disposable beverage containers	–	–	–	–	22	41
Alcoholic beverage surtax ^c	10	12	20	20	–	–
Soft drink surtax ^c	2	1	2	2	–	–
Oil damage duty	6	5	6	10	8	8
Waste oil duty	3	3	4	3	3	4
Pesticide fee ^d	2	2	2	2	2	–
Total	3 890	4 112	4 296	4 857	4 786	4 876
Share of total revenues in GDP (%)	3.34	3.1	3.0	3.2	3.0	2.7

a) Excluding strategic stockpile fee (about EUR 50 million annually).

b) Regrouped in 2004 with the annual circulation tax.

c) Both surtaxes were regrouped in 2005 to create the tax on disposable beverage containers.

d) Repealed in 2007.

Source: Statistics Finland.

reuse, recycle and minimise waste (Chapter 4). Since 1996, a landfill tax has been levied on landfill operators to make recycling and more advanced waste treatment technologies more attractive. Since 1987, a duty on waste oils (lubricating oils) has financed their collection and treatment, as well as the clean-up of contaminated soils. Since 1972 the oil damage duty has financed the National Oil Damage Fund to prevent and clean-up oil accidents;¹⁶ in 1990 the rate was doubled for tankers without double hull; the duty is levied on crude oil and oil products imported to or transported through Finland.

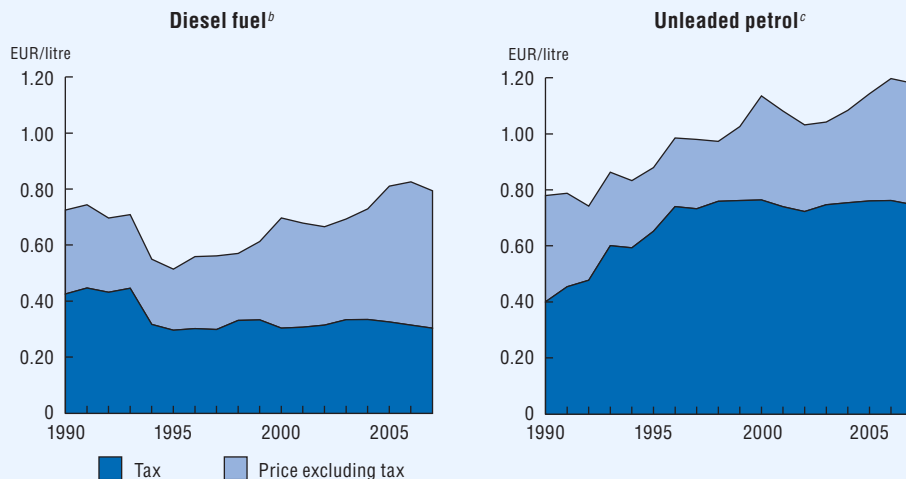
Regarding *energy taxes and prices* (excluding road fuels), the structure of energy taxation has, with some exceptions, remained unaltered since 1997 (IEA, 2008). A *basic tax and surtax*, along with a security of supply fee (strategic stockpiling fee), form the basis for energy taxation in Finland (Table 6.3). The basic tax (“energy tax”) is levied on mineral oil products and the surtax (introduced in 1990) is levied on energy products, including fossil fuels and electricity. The surtax is based on the fuel’s CO₂ emissions, at a rate of EUR 20 per tonne of CO₂ (the rate was EUR 11.77/tonne in 1997). The surtax (“CO₂ tax”) is the main tax on coal, natural gas and electricity consumption in Finland. Finland’s *energy prices* for electricity, fuel oil (excluding transport fuel prices) and natural gas paid by Finnish households, and for electricity and natural gas paid by Finnish industries, tend to be lower than the OECD-Europe average (Table 6.4).

Regarding *taxation of road fuels*, tax rates in real terms have remained virtually unchanged since 1997, following a decrease for diesel and an increase for gasoline in the first half of the 1990s (Figure 6.4). Overall, tax rates for *diesel* have remained much lower than those for *gasoline*. The higher CO₂ tax for diesel does not compensate for the much lower energy tax as well as a lower security of supply fee (Table 6.3). Differentiated taxation according to environmental criteria other than CO₂ was introduced in 1986 (lead in gasoline) and in 1993 (sulphur content for diesel, lead, oxygen and benzene content for gasoline). Since the beginning of 2008, the energy tax, CO₂ tax and security of supply fee have been applied to *kerosene and aviation petrol used for private pleasure flying (commercial use is exempt)*.

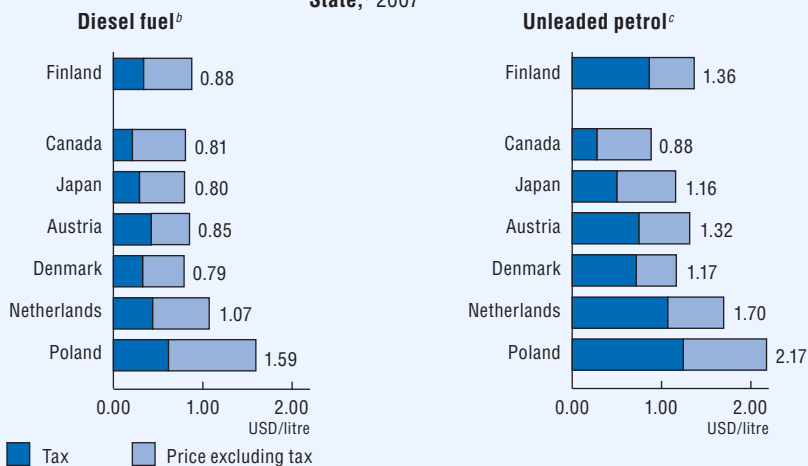
Regarding *vehicle taxation*, motor vehicles in Finland are subject to a one-time registration tax and an annual circulation tax. Up to 2007, the *registration tax* was 28% of the vehicle’s taxable value (*i.e.* the ordinary retail value on the Finnish market, including taxes). The tax was reduced by EUR 450 for diesel-powered vehicles and by EUR 650 if fuels other than diesel powered the vehicle. Delivery vans were charged with a lower rate. Passenger cars imported from a non-EU country were charged with an additional 10% toll. A new differentiation scheme was introduced on 1 January 2008

Figure 6.4 Road fuel prices and taxes

Trends in Finland, ^a 1990-2007



State, ^d 2007



a) At constant 2000 prices.

b) Automotive diesel for commercial use.

c) Unleaded premium (RON 95); Japan: unleaded regular.

d) In USD at current prices and purchasing power parities.

Source: IEA-OECD (2008), database of end-use prices.

for passenger cars. The new registration tax is still *ad valorem* but the tax percentage now varies according to CO₂ emissions (grammes per kilometre) within a range of 10-40% of the taxable value: 10% is levied on cars emitting 60 g/km or less and 40% is levied on cars emitting 360 g/km or more.¹⁷ Similar CO₂ differentiation for vans will come into force on 1 April 2009.

In 2004, the *annual circulation tax* (or motor vehicle tax) was made more transparent by regrouping the vehicle tax and the diesel tax. Since 2004, passenger cars and delivery vans below 3 500 kg have been subject to a basic tax of EUR 0.35 per day or EUR 127.75 per year.¹⁸ Diesel powered vehicles are now charged with an additional EUR 0.067 per 100 kg per day (*e.g.* EUR 245 a year for a passenger car weighting one tonne). Heavy goods vehicles (HGV) are also charged per 100 kg per day but with lower rates (*e.g.* EUR 0.023/100 kg/day or EUR 1 679/year for a HGV weighting 20 tonnes). A differentiation scheme (similar to the one in place for the registration tax) could be introduced in 2010. The new basic tax will be based on CO₂ emissions so that the annual level of taxation will vary between EUR 20 and EUR 605. The minimum rate will apply to cars emitting 66 g/km or less and the maximum rate to cars emitting 400 g/km or more. Between these two extremes, the rate will raise gradually, according to increases in CO₂ emissions/km.

Assessment

Finland has been *the first country in the world to introduce a carbon-based tax on energy consumption* in 1990. From 2013 on, (when the EU-wide cap on GHG emission allowances is scheduled to start), this “surtax” should be progressively abolished for facilities included in the EU-ETS (as they will become subject to auction or an implicit “carbon tax”), but it should be extended to all facilities and sectors outside the EU-ETS and its rate should be based on the price for emission rights in the EU-ETS (currently around EUR 30/tonne). To ensure the efficiency of economic instruments like carbon taxes or auctioning emission permits, it is important to allow their effects to be fully reflected in the user cost of all products; any existing direct or indirect energy subsidies (*e.g.* peat) should therefore be eliminated.

The shift to *vehicle taxation on the basis of CO₂ emissions* in Finland is a very positive step. It will likely become a *model* for other OECD countries: it creates additional incentives for car producers and customers to invest in more fuel efficient vehicles,¹⁹ speeds up the renewal of the fleet with models incorporating the latest technologies, and helps improving air quality (*e.g.* reduced emissions of nitrous oxides and particulates). However, differentiated taxation (basic tax) of fuels between diesel and unleaded gasoline has encouraged the sales of diesel-fuelled vehicles, while their CO₂ emissions per litre are higher than those for gasoline (as reflected in

Table 6.3 Environment-related taxes, 2008

	Unit	Rate			Revenue in 2006 (EUR million)
		Excise duty		Security of supply fee ^c	
		Basic tax (energy tax) ^d	Surtax (CO ₂ tax) ^b		
ENERGY^d					
Fossil fuels^e					
Coal	EUR/tonne	–	49.32	1.18	55
Natural gas	EUR/MWh	–	2.016 ^f	0.084	34
Electricity ^g					461
Rate I	Eurocent/kWh	–	0.87	0.013	
Rate II	Eurocent/kWh	–	0.25	0.013	
Mineral oil products					
Gasoline					1 451
Normal grade	Eurocent/litre	59.89	4.78	0.68	
Reformulated and very low sulphur	Eurocent/litre	57.24	4.78	0.68	
Diesel					762
Normal grade	Eurocent/litre	33.32	5.38	0.35	
Reformulated and very low sulphur	Eurocent/litre	30.67	5.38	0.35	
Light fuel oil	Eurocent/litre	2.94	5.41	0.35	156
Heavy fuel oil	Eurocent/kg	–	6.42	0.28	48
Pine oil	Eurocent/kg	6.7	–	–	0
Kerosene	Eurocent/litre	33.32	5.38	0.35	– ^h
Aviation petrol	Eurocent/litre	37.54	4.78	0.68	– ^h
MOTOR VEHICLES					
Registration tax	% taxable value	4 + CO ₂ emissions (g/km)/10 for passenger cars 28% for other vehicles – less 650 EUR for gasoline – powered vehicles – less 450 EUR for diesel – powered vehicles			1 304
Annual circulation tax	EUR/day	0.35 for all passenger cars + 0.067/100 kg for diesel cars			567
WASTE AND CHEMICALS					
Landfill tax	EUR/tonne		30		55
Oil damage duty	EUR/tonne	0.50; 1.00 for tankers without double hull			8
Waste oil duty	EUR/kg		0.0575		3
Tax on disposable beverage containers	EUR/litre		0.51 ⁱ		31
Deposit on bottles ^j and cans	EUR/bottle	0.1 to 0.4 depending on bottle size; 0.15 for cans			
Pesticide registration fee					2 ^k

a) Since 1974.

b) Since 1990.

c) Since 1974. In 1997 this “strategic stockpiling fee” was extended to coal, natural gas and electricity.

d) Peat is tax exempt.

e) Fossil fuels used for electricity production are tax exempt.

f) Natural gas has a 50% rebate on the unit CO₂ tax rate.

g) Rate I applies to households, services and agriculture. Rate II applies to industry.

h) Kerosene and aviation petrol were tax exempt until 1.1.2008.

i) The tax rate of 0.51 EUR/litre entered into force on 1.1.2005.

j) Extended to non-refillable plastic bottles on 1.1.2008.

k) Fee repealed on 1.1.2007.

Source: Ministry of Employment and the Economy; Ministry of the Environment.

Table 6.4 Energy prices in selected OECD countries, 2006

	Electricity		Oil		Natural gas	
	Industry (USD¢/kWh)	Households (USD¢/kWh)	Industry ^a (USD¢/tonne)	Households ^b (USD ^d /1 000 l)	Industry (USD¢/10 ⁷ kcal)	Households (USD ^d /10 ⁷ kcal)
Finland	0.070 ^d	0.107	441.9	672.3	248.1	293.5
Canada	0.055 ^d	0.073 ^d	..	667.4	272.1	444.2
Japan	0.117	0.166	564.0	639.1	435.3	1 157.8
Austria	0.109	0.162	419.1	798.0	..	729.2
Denmark	0.096 ^f	0.229	434.8	901.6	c	901.8 ^d
Netherlands	c	0.237	412.6	1 016.4	..	827.0
Poland	0.073	0.223	369.4	1 404.1	294.3	934.9
OECD Europe	0.106	0.172	437.0	750.5	..	..
OECD	0.088	0.134	..	722.4	335.4	627.9
FIN/OECD Europe (%)	77 ^e	62	101	90	..	..
FIN/OECD (%)	89 ^e	80	..	93	74	47

.. : not applicable; c: confidential.

a) Low-sulphur oil; prices for high-sulphur oil not available in Finland.

b) Light fuel oil.

c) At current exchange rates.

d) At current PPPs.

e) 2005.

f) 2004.

Source: IEA-OECD.

the surtax). The taxation based on CO₂ emissions (registration tax and annual circulation tax) applies *only to passenger cars*, as only emissions for cars have been standardised so far. In the course of 2009 vans will be included in the system. The government is also planning to introduce a new, more informative, *eco-labelling* scheme for passenger cars, based on the ABCDEF model (widely used for eco-labelling of household appliances).

Efforts are underway to decouple *agricultural policy support* from the production of agricultural commodities, in line with the CAP reform. The complementary national direct payments (“top-up payments”) have the potential to distort commodity production and thereby incite farmers to make decisions regarding production, based on criteria other than market and environmental criteria. Finland should design its top-up payments to maintain flexibility in the production choices of farmers. Since its inception in 1995, the agri-environmental programme has been highly attractive to farmers, to the extent that 90% of active farms participate and 96% of the arable area is covered. However, *agri-environmental measures should be*

better targeted at specific environmental outcomes (e.g. protection of environmentally valuable permanent grassland).

The amount of *environmental support to forest owners* compensates for the expected loss in timber sale revenues due to the environmental effort, as provided for in EU legislation.²⁰ To increase economic efficiency and environmental effectiveness, the support should be based on unremunerated but beneficial “public” services (e.g. protection of environmentally valuable forest ecosystems).

Government support to fisheries should primarily aim at stock assessment and monitoring and enforcement (i.e. general services), and, as appropriate, at supporting the income of fishermen whatever their fisheries activity (i.e. decoupling income support from fish catches) so as not to divert fishermen from sustainable fisheries management. Direct payments that increase nominal fishing efforts can be deleterious to the long-term sustainability of fisheries (OECD, 2006).

Reviews of *environmentally harmful subsidies*, undertaken by the Ministry of Finance in 2004 and by the Ministry of the Environment in 2006, point out areas where subsidies and tax concessions can have detrimental effects on the environment. No action has been taken to remove such subsidies, or to launch an ecological tax reform.

1.4 Environmental expenditure and financing

Pollution abatement and control (PAC) expenditure (public and private) decreased from close to 1.1% of GDP in 1997 to 0.8% of GDP in 2005²¹ (Table 6.5). When expressed as a share of Finland’s gross fixed capital formation, PAC investment expenditure (public and private) decreased from about 2.5% to 0.9%. The share of private PAC investment in total fixed investment by industry decreased from more than 5% to 3.6% (Table 6.5).

The share of the *public sector*²² in total PAC expenditure (i.e. net expenditure concerning investment and operation) remained stable at about 52-53% over the review period. The share of the *private sector* (at about 47%) evolved with decreasing investment expenditure and increasing operating expenditure, the later reflecting the accumulation of the “environment-related fixed capital stock” over time. Public PAC expenditure has remained equally shared among central and local governments over the decade and is largely devoted to waste water management, and to a lesser extent, waste management. As waste and waste water charges cover some 90% of the corresponding costs, the *polluter pays principle* is well implemented for households and industry (Table 6.6).

Table 6.5 **Environmental expenditure**,^a 1995-2005

(EUR million at current prices)

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Total	1 034	1 167	1 206	1 177	1 106	1 297	1 294	1 339	1 318	1 397	1 353
Investment	390	479	463	389	289	413	355	397	340	353	260
Operating expenditure ^b	645	688	743	788	816	885	939	942	978	1 044	1 094
Public sector											
Investment	131	191	228	201	149	188	147	187	206	196	111
Operating expenditure ^b	390	411	430	452	471	505	538	556	589	602	635
Industry ^c											
Investment	259	288	235	188	140	225	209	210	134	157	149
Operating expenditure ^b	255	278	313	336	345	379	401	385	389	442	459
GDP	96 000	99 100	107 600	117 100	122 700	132 400	139 800	143 900	146 000	152 100	157 200
Fixed investments ^d	3 983	4 368	4 675	4 487	3 928	4 133	5 027	4 229	3 659	4 133	4 089
Gross fixed capital formation ^e	15 890	16 957	19 714	22 252	23 300	25 604	27 233	25 833	26 432	27 772	29 779
Environmental expenditure as a share of GDP (%)	1.08	1.18	1.12	1.00	0.90	0.98	0.93	0.93	0.90	0.92	0.86
Environmental investment/ total fixed investment ^d (%)	6.6	6.6	5.0	4.2	3.6	5.5	4.2	5.0	3.7	3.8	3.6
Environmental investment/ gross fixed capital formation ^e (%)	2.5	2.8	2.4	1.7	1.2	1.6	1.3	1.5	1.3	1.3	0.9

a) Including pollution abatement and control (PAC) expenditure and nature protection expenditure. Excluding water supply expenditure. Excluding research and development.

b) Excluding depreciations and interests paid.

c) Including mining and quarrying, manufacturing industry, and energy and water supply.

d) For industry.

e) For the Finnish economy.

Source: Statistics Finland; OECD.

Table 6.6 Public environmental expenditure,^a 1997-2005

(EUR million at current prices)

	1997	1998	1999	2000	2001	2002	2003	2004	2005
Waste water management									
Operating expenditure ^b	149.5	154.2	158.6	179.4	187.4	198.5	208.6	210.9	221.3
Depreciation	100.2	103.4	103.4	110.0	109.6	111.5	113.4	113.1	116.2
Revenue	303.2	305.4	314.7	317.4	323.1	339.4	345.9	355.4	366.2
Investment	129.8	117.2	112.7	141.4	103.0	144.6	158.7	147.6	51.2
Investment grants given	46.2	43.4	36.0	33.4	32.4	32.9	32.8	33.3	32.6
Investment grants received	11.9	14.1	14.2	4.2	4.1	3.6	0.3	3.9	3.8
Other transfers given	64.1	67.1	67.3	99.9	103.7	103.8	105.9	107.5	106.4
Total expenditure ^c	389.7	382.0	374.6	454.1	426.5	479.8	506.0	499.4	411.6
Total income ^c	315.2	319.6	328.9	321.6	327.2	343.0	346.2	359.2	369.9
Waste management									
Operating expenditure ^b	64.1	69.8	74.3	79.2	91.3	90.8	90.4	91.3	100.6
Depreciation	4.7	5.9	6.2	7.5	9.7	9.1	8.5	8.8	11.5
Revenue	92.7	103.9	106.5	113.7	121.0	106.5	122.4	116.4	130.1
Investment	15.1	14.5	13.5	19.0	13.5	18.4	20.3	26.0	38.8
Investment grants given	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Investment grants received	0.8	1.9	1.3	0.2	0.5	0.1	4.0	0.1	0.1
Other transfers given	2.4	2.4	1.9	3.0	0.8	1.0	0.6	3.5	1.7
Total expenditure ^c	81.6	86.6	89.6	101.2	105.6	110.2	111.2	120.8	141.1
Total income ^c	93.5	105.8	107.8	113.9	121.6	106.6	126.3	116.5	130.3
Nature protection									
Operating expenditure ^b	14.6	15.1	16.0	16.6	17.8	19.2	25.4	24.4	29.0
Revenue	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Investment	15.3	13.1	11.8	11.3	12.3	9.7	13.2	10.0	7.1
Investment grants given	4.7	8.2	11.8	24.5	11.3	15.6	15.7	13.0	24.7
Investment grants received	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other transfers given	27.1	28.8	30.1	21.9	24.5	23.7	26.9	27.6	28.3
Total expenditure	61.7	65.3	69.6	74.3	65.8	68.2	81.3	74.9	89.1
Total income	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Research and development									
Total (estimate)	128.5	134.4	144.5	158.9	156.0	175.0	176.0	188.0	197.0
Administration, other environmental protection									
Operating expenditure ^b	185.2	195.9	205.0	230.3	241.0	247.9	264.5	275.5	284.2
Depreciation	0.7	1.0	1.0	1.0	1.1	1.5	1.3	1.1	1.0
Revenue	20.4	22.0	19.3	34.2	34.4	36.5	41.0	44.6	47.0
current transfers	6.2	8.2	2.1	4.2	3.5	4.6	4.0	4.5	3.6
fees and other	14.1	13.8	17.2	30.0	30.9	31.8	37.0	40.1	43.3
Investment	67.4	55.7	10.1	15.7	18.1	14.4	13.3	11.9	13.5
Investment grants given	4.5	11.6	6.6	11.1	11.0	10.7	10.5	13.4	11.1
Investment grants received	3.4	0.8	0.2	1.0	0.4	0.3	0.2	0.1	0.0
Other transfers given	138.1	134.9	128.1	98.7	103.4	100.5	102.2	102.6	103.2

Table 6.6 **Public environmental expenditure**,^a 1997-2005 (*cont.*)

(EUR million at current prices)

	1997	1998	1999	2000	2001	2002	2003	2004	2005
Total expenditure	395.2	398.1	349.8	355.8	373.6	373.5	390.6	403.5	412.0
Total income	23.7	22.9	19.5	35.1	34.8	36.8	41.2	44.7	47.0

a) Excludes water supply expenditure. Includes expenditure directly made or supervised by national and territorial authorities.

b) Excludes depreciation and interests paid.

c) Total expenditure are largely covered by total income, as user charges are paid for the waste water and waste services provided.

Source: Statistics Finland.

2. Implementing Environmental Policy

2.1 Planning and objective setting

The 1995 National Environmental Policy Programme provided initial guidance for specific government programmes but *no overall assessment of their implementation has been carried out*. A review of linkages and possible synergies among various environmental programmes could be beneficial in the context of implementing Finland's sustainable development strategy. Sectoral programmes would also profit from explicit and objective *ex post* evaluations that would allow identify key obstacles to successful implementation. The economic analysis of programmes and policies should become a standard practice, especially at the sub-national level, as in too many cases political considerations guide policy making, restricting the scope of applying cost-benefit analyses and limiting the choice to a predetermined set of measures.

Building on the *National Environmental Policy Programme to 2005*, adopted in 1995, the Ministry of the Environment's strategic planning stimulated the preparation of intersectoral programmes to address priority issues. These included, for instance, the National Waste Plan (1998, revised in 2002, a new plan adopted in 2008), the National Forest Programme (1999, revised in 2008), the National Programme for the Protection of the Baltic Sea and Inland Waters (2002, and related 2005 Action Plan), the Air Pollution Control Programme (2002, extended to 2010), the National Energy and Climate Strategy (2005, a new climate and energy strategy adopted in 2008) and the National Programme on Dangerous Chemicals (2006). Most programmes presented explicit and ambitious objectives and

quantitative targets developed through a broad consultation with stakeholders at the national, regional and local level. Regions and municipalities have followed the national efforts with specific plans and programmes concerning waste management, reduction of air pollution and noise, and water basin management for Finland's seven river basins.

2.2 *Legal and institutional framework*

Legal framework

Even though most of Finland's environmental legislation had been harmonised with EU legislation before Finland joined the European Union in 1995, the review period witnessed its extensive consolidation and updating as well as promulgation of new acts (Table 6.7). In particular, *two fundamental legal acts* adopted in 2000 unified existing pieces of legislation on pollution prevention and control and on land use planning. These aimed at increasing the effectiveness of environmental policies and to harmonise Finnish requirements with those of the EU. The *2000 Environmental Protection Act* established principles of an integrated environmental protection, in particular responding to the provisions of the EU IPPC Directive. The Acts also clarified responsibilities of different administrative levels, enhanced citizens' participation in environmental decision making and strengthened the appeal procedures. Since then, the Act has been amended several times to take account of subsequent new legislation.²³ The *2000 Land Use and Building Act* provided municipalities with a higher degree of autonomy in local land use planning, enhanced participation of stakeholders in various planning phases and introduced provisions to prevent pollution and protect cultural heritage and nature.

Institutional set-up at the national level

At the national level, the structure of the environmental administration did not undergo major changes over the review period. The *Ministry of the Environment* (MoE) (around 300 staff) is responsible for environmental management (including water quality protection), biodiversity and nature conservation, land use planning, building and housing.²⁴ In early 2008, the MoE underwent a limited restructuring as part of the government-wide institutional reform aimed at increasing productivity of the public sector.²⁵ The Finnish Environment Institute (SYKE), created in 1995 from the National Board of Waters and the Environment, continues to serve as a centre for multidisciplinary research and development on priority environmental issues for the central administration, local authorities and industries. It also co-ordinates environmental monitoring and information services.

The *Ministry of Agriculture and Forestry (MAF)* plays a particular role in managing and protecting forestry and water. The MAF's Department of Forestry coordinates sustainable management and use of forests through a state Forest and Park Service (Metsähallitus), the Finnish Forest Research Institute, the Forestry Development Centre Tapio and the 13 Regional Forestry Centres. The biodiversity activities of Metsähallitus' Natural Heritage Services (NHS)²⁶ and other institutions are supervised by both the MAF and the MoE (Chapter 5). The MAF is also in charge of managing water resources, including the regulations of water supply, sewerage and waste water treatment,

Table 6.7 **Selected environment-related legislation**

1993	Waste Act
1994	Environmental Impact Assessment Procedure Act Car Tax Act Liquid Fuel Tax Act
1996	Forest Act (revised in 2004) Waste Tax Act Electricity and Fuels Tax Act
1997	Nature Conservation Act
1998	Forest Management Association Act (amended in 2003)
1999	Environmental Damage Insurance Act
2000	Land Use and Building Act Environmental Protection Act
2001	Water Services Act
2 002	Motor Vehicle Act
2003	Vehicle Tax Act
2004	Emissions Trading Act Water Resources Management Act Decree on River Basin Districts Forest and Parks Service Act Nuclear Energy Act Act on Expropriation Permits Required by Certain Projects with Environmental Impacts Beverage Container Tax Act
2005	Act on Assessment of the Impacts of the Authorities' Plans, Programmes and Policies on the Environment Act on Industrial Handling and Storage of Dangerous Chemicals and Explosives Act on Strategic Impact Assessment
2006	Decree on the Organisation of River Basin Management
2007	Financing of Sustainable Forestry Act Decree on the Assessment of Soil Contamination and Remediation Needs
2008	Act on Promotion of Biofuels in the Transport Sector

Source: OECD/MoE.

flood control, drainage and irrigation.²⁷ *Other ministries* and agencies have been involved in implementing environmental policies.²⁸ Even though co-ordination of policies and their implementation is ensured through the Council of State and the National Commission for Sustainable Development more frequent interactions between the MoE and other agencies, especially the MAF, in a form of task forces and working groups, could stimulate better response to environmental challenges.

Thirteen *Regional Environment Centres* (RECs) co-ordinate the implementation of national environmental policies at the regional level. With a total staff of 1 900 (an increase from 1 500 in 1997), the RECs are responsible for environmental protection, construction and land use planning, nature conservation, protection of the cultural environment and management of water resources and water infrastructure in their jurisdiction. Over 400 permitting and compliance monitoring staff manages environmental permits of around 4 000 installations. The RECs monitor and compile information on the state and use of the environment at the regional level, both for their own purposes and as part of nationwide monitoring, research, planning and environmental awareness raising. In 2000, three *Environmental Permit Offices* (western, eastern and northern EPOs) were established to decide on environmental permits for about 2 000 large industrial plants (including 880 IPPC installations).²⁹ With a combined staff of about 90, EPOs have enforcement powers with respect to installations that receive permits from them. The EPOs also deal with water pollution compensation claims.

As part of the *public sector's downsizing effort* plans are being elaborated to incorporate the permitting responsibilities of the RECs to EPOs as of 2009. This may lead to significant staff reductions: around 25-30 permitting positions in the EPOs and RECs are expected to be cut in the near future. Even though a swift realisation of the reform plans will streamline the permitting system and create a unified, one-level system of permitting authorities every effort should be made that the capacity of enforcement institutions is not compromised.

Institutional set-up at the local level

Finland's 416 *municipalities* promote and supervise environmental protection and land use planning in their jurisdictions. They are also tasked with the provision of water and sewerage services in accordance with the national legislation, issuing environmental permits for small installations, and providing opinions on permits prepared by the EPOs and the RECs. Municipalities also carry monitoring of local air pollution. There is usually a local environmental committee comprised of representatives of political parties in each municipality.

As small municipalities often do not have any assigned environmental staff, *joint municipal boards* are established to organize specific functions such as providing

educational, environmental, social or health care services. In the Oulu area, ten municipalities have created, and pooled resources for a joint environmental committee which carries out both permitting and compliance monitoring functions, significantly improving the efficiency and effectiveness of their environmental activities. The Act on Restructuring Local Government and Services, which came into effect in March 2007, launched a municipal restructuring process, which is due to be completed by 2012. The current plans to reduce the number of municipalities (to about 350 in 2009 after the mergers) should increase their capacities, especially in less populated areas.

Box 6.4 Prevention of major industrial accidents

There are 128 *chemicals plants* in Finland, whose operations entail major accident hazards. The requirements of the EU Seveso II Directive concerning the prevention of accident hazards were transposed in 1999 through a Decree on the Industrial Handling and Storage of Dangerous Chemicals and further amended by the 2005 Act on the Safety of the Handling of Dangerous Chemicals and Explosives. There is also special legislation for handling LPG, natural gas and explosives.

The level of safety and reliability in the sector has improved as the *Safety Technology Authority of Finland* (TUKES) supervises the large scale industrial handling and storage of dangerous chemicals. TUKES was founded in 1995 replacing the Technical Inspection Centre and the Electrical Inspectorate. With an average of 120 people, and a yearly budget of about EUR 10 million, TUKES monitors industrial handling and storage of dangerous chemicals, hazardous substances in electrical and electronic equipment, transport tanks and packages for dangerous goods, explosives and mining. It grants licenses for such establishments, carries out inspections and examines safety reports. TUKES operates within the Ministry of Employment and the Economy working in co-operation with the MoE.

Installations required to prepare “*safety reports*” (according to the Article 9 of the Seveso II Directive) are inspected by TUKES inspectors once a year. Establishments required to prepare a major accident prevention policy document (MAPP) are inspected every three years, all other establishments are inspected every five years. The municipal authorities of chief fire and chemicals supervisory offices monitor small-scale handling and storage of chemicals.

TUKES also handles notifications of *accidents* and investigates larger scale accidents (Table 6.8). Accidents are reported in detail in TUKES’ accident statistics publication issued on yearly basis and summarized in the Accident Review. The frequency of inspection at sites receiving good evaluations has been reduced. The interval between inspections has been lengthened by some 20% in facilities subject to safety reporting, where periodic inspections are only carried out every other year.

2.3 Regulatory instruments

Integrated environmental permitting

With the adoption of the 2000 Environmental Protection Act pollution permitting has been transformed from separate permits for waste, water, air, soil and noise into *integrated pollution prevention and control*. This reform was in line with the recommendation of the 1997 Environmental Performance Review of Finland and the EU Directive on Integrated Pollution Prevention and Control (IPPC). The 2000 Act did not aim at significant changes in the stringency of former laws. However, the range of activities specified in the Act for which an integrated permit is required is very broad and covers even minor installations. This makes the system comprehensive, but rather cumbersome (Hildén *et al.*, 2002).

While state environmental authorities (EPOs and RECs) issue *permits* to over 6 000 installations municipalities regulate over 17 000 small facilities located in their jurisdictions.³⁰ The Safety Technology Authority (TUKES) supervises the large-scale industrial handling and storage of dangerous chemicals by granting licenses for such establishments, carrying out inspections and examining safety reports (Box 6.4). The SYKE issues permits for international shipment of waste and use of certain chemicals.

Environmental permitting is guided by the *Best Available Techniques (BATs) and, more recently, by General Binding Rules (GBRs)* for low-risk installations (Box 6.5). In preparing permits, authorities and operators engage in detailed consensus building process aimed at working out a common view on the level of environmental protection. Such consultations can increase compliance. In some cases, they may also result in

Table 6.8 **Accidents reported to the Safety Technology Authority, 2000-06**

Accident category	2000	2001	2002	2003	2004	2005	2006
Hazardous chemicals (sites monitored by TUKES)	35	32	35	43	29	18	33
Hazardous chemicals (other sites)	31	114	120	102	86	64	116
Mines	85	59	46	45	37	51	..
Pressure equipment	13	15	19	26	19	26	14
Liquefied petroleum gas	9	6	12	13	10	10	16
Transport of dangerous goods	2	9	5	10	12	5	7

Source: TUKES.

Box 6.5 Best Available Techniques (BAT) and General Binding Rules (GBRs) in industrial operations

BAT

The EU Integrated Pollution Prevention and Control (IPPC) Directive has been implemented in Finland as part of the 2000 Environmental Protection Act. Since then, environmental permitting has been guided by the *Best Available Techniques reference documents* (BREFs) developed under the IPPC Directive.

The SYKE acts as the *national focal point in the exchange of BAT information* between the EU member governments and industry. SYKE co-ordinates contributions from Finland including draft BREFs, and publicises general information on BATs through the National BAT Steering Group, which consist of representatives from the MoE, the Ministry of Employment and the Economy, the National Technology Agency (TEKES), Regional Environment Centres, Environmental Permitting Offices, the Confederation of Finnish Industries, and the Finnish Association for Nature Conservation.

The actual preparation work for BREFs is carried out by *National Technical Working Groups* (TWGs), with one group representing each of the 33 BREF categories. Half of the cost of national BAT studies is covered by public funding and other half by industry. The TWGs are composed of representatives from industry and the permit authorities, with the group chair always acting as the Finnish member in the corresponding EU system of working groups. The TWGs comment on draft BREFs prepared by the European IPPC Bureau and other documents, as well as prepare Finnish BAT technology reports. The National TWG forum has allowed all parties to gain a deeper common understanding of how BAT principles can be applied, and there is clearly a need for these groups to continue working even after all the currently planned BREF documents are completed.

Notifications and GBRs

The 2000 Environmental Protection Act allows *notifications* instead of permitting at the municipal level. The notification can be issued for temporary activities causing noise and vibration, experimental activities of short duration, and restoration of polluted soil. An operator can start a business activity immediately after submitting a notification to the authorities without receiving an approval (permit). However, the municipal authorities may issue regulations and guidelines for operations subjected to notification procedures and, in some cases, even prohibit certain activities.

With a trend to expand the use of notifications a draft amendment is being prepared to the 2000 Environmental Protection Act whereby for installations in low-risk sectors customised environmental permits would be replaced by *General Binding Rules* (GBRs), *i.e.* a set of necessary environmental requirements for specific types of operations issued by the government. The permitting procedure would then be limited to the verification of conformance with the norms. No public hearing would be held on the application, and no appeal to the Supreme Court would be allowed. In the future, it is envisaged to cover 10-15% of all permitted installations by GBR, especially those with minor environmental impact, large numbers and stable technologies.

growing discrepancies in permit requirements, and their enforcement, between different regions. As a result, concerns have been raised by business that such practices affect the level playing field. The publication of a series of Environmental Administration Guidelines, launched by the MoE in 2006 and containing regulations, instructions and recommendations for environmental authorities, was a positive step to ensure consistency in the permitting procedures across the country.

Disputes that arise between state authorities and municipalities over environmental permitting often affect the decision-making process as there are no standard mechanisms to settle them given the independence of the parties. The REC Ostrobothnia offers a positive example of stakeholder cooperation: it has established a stakeholder committee which meets twice a year to discuss current issues and includes representatives of the REC, the Northern Permitting Office, municipalities, and industry. An affected party or certain registered NGOs can launch a complaint against a permit decision and/or permit conditions to the Administrative Courts, then to the Supreme Administrative Court.³¹ According to the SYKE, 17% of permitting decisions of the state environmental administration were appealed against in 2006 (for EPOs, this number was 39%).³² If a permit is granted to an operator but is appealed against, the operator may proceed with the activity after depositing a bank guarantee for decommissioning in case the permit is cancelled by the court.³³

Permit processing fees, levied by the EPOs and RECs at the time of issuing a permit, vary between EUR 300 and 35 000 per installation.³⁴ The rates are based on the permitting authority's labour costs defined by the MoE regulations for different categories of permitted activities. The total amount of fees collected by the EPOs in 2006 was EUR 1.9 million and EUR 2.7 million by the RECs. Revenues from the fees can be used by the EPOs and RECs at their discretion (*e.g.* to hire additional staff). Municipalities also charge permit fees, assessed in accordance with the same principle and revenues are allocated to the general municipal budget. Operators with certified environmental management systems often receive a slight reduction in their permit fees.

To improve the efficiency of using its resources, the MoE is currently undertaking *three initiatives on streamlining the environmental permitting system*: *i)* to improve the institutional setup of the permitting system (by creating a co-ordinated, one-level network of permit offices); *ii)* to make the permitting process more effective and to expand the use of information technology in permitting (*e.g.* by introducing electronic permit applications), and *iii)* to reduce the overall number of environmental permits by introducing other simpler administrative procedures (*i.e.* notifications according to General Binding Rules). These initiatives should be vigorously pursued with appropriate safeguards, especially working with the local population and NGOs, to reduce the likelihood of non-compliance.

The *Environmental Damage Insurance Act*, which came into force in 1999, guarantees full compensation for environmental damage in cases where those liable for compensation are insolvent or the liable party cannot be identified. All parties holding an environmental permit, including holders of a permit to handle or store hazardous chemicals, are obliged to take out liability insurance. The harmonisation of the national legislation with the 2004 EU Directive on Environmental Liability resulted in minor changes to the Environmental Protection Act as the existing legislation is stricter.

Enforcement and fostering compliance

Compliance monitoring is co-ordinated by annual plans prepared by the RECs that schedule inspections, negotiations with operators and review of self-monitoring reports.³⁵ Self-monitoring has been a principal source of information required as part of permit conditions.³⁶ In 2005, the MoE issued compliance monitoring guidance to the RECs which sets risk-based criteria for four classes of installations and determined minimum inspection frequencies for each class.³⁷ Permitting and inspection staffs are usually part of the same unit.³⁸ Sometimes the same person may do both permitting and inspection but the two functions are never combined for the same installation. This ensures the objectivity and independence of the procedures. Larger municipalities have their own inspection programmes using the risk-based approach to determine the inspection frequency per installation and the estimated duration of an inspection. For example, the Uusimaa (Helsinki area) REC annually inspects about 30% of all installations. The inspection plans are publicly available online.

Since 2005, a *joint enforcement website of the state environmental authorities* contains, among others, the lists of all permitted installations, their control class, the names of responsible inspectors; the number of inspections in a given year, the reasons for each inspection, and its key results. The information is based on inspection reports and is updated every day. This system makes the RECs transparent in their activities. It has also contributed to a significant improvement in the quality of compliance monitoring.

With a trend toward reducing the number of site inspections *compliance promotion* has become an integral part of the Finnish permitting and compliance monitoring system. In 2008, RECs have launched a practice of sending each IPPC installation its compliance record (including timeliness of reporting, complaints received) to focus their management's attention on the environmental performance. Meetings between inspectors and operators that do not involve site visits are on the rise and are considered crucial for maintaining compliance. These meetings may occur several times a year and cover planned changes in operations, potential or recent incidents, implementation of particular permit conditions, etc. There are also

national-level negotiations with representatives of entire industrial sectors. Small and medium-sized enterprises (SMEs) benefit from direct technical assistance by inspectors who may help operators to develop their environmental management plans to better comply with regulatory requirements.

The total *budget funding for all compliance assurance activities* by the state environmental administration amounted to EUR 21.4 million in 2006. Although this represents a significant increase from EUR 14.6 million in 2002, the budget has been growing very slowly in real terms. Budget resources represent about 80% of the total funding for the state administration's environmental compliance assurance activities (its share decreased from 84% in 2002 to 78% in 2006). The balance is covered by permit processing fees.

Response in case of non-compliance

If a violation is discovered, the operator is allowed (sometimes during the inspection itself) to present a *plan of corrective actions* (around one sixth of the cases) to return to compliance.³⁹ In practice, compliance notices are used very rarely: in 2006, corrective actions were agreed as a result of 17% of all REC inspections, and compliance notices were issued in slightly over 3% of the cases. Even when a compliance notice is used, it is regarded as a sanction in itself (as it is disclosed to the public) and rarely imposes penalties. The number of notifications and agreed measures decreased between 2005 and 2007. Only few non-compliance cases are brought to courts each year.

Suspected criminal activities are handled by the Police after receiving a signal from a patrolling Police officer, from an environmental inspector, or from a third party. The Police forces have specialised personnel focusing on environmental issues. After the conclusion of the pre-trial investigation,⁴⁰ the case is forwarded to a local prosecutor or one of prosecutors specialised in environmental offences for consideration of charges. If the case is prosecuted, it is tried in a local District Court, with appeals possible to the Court of Appeal and further to the Supreme Court. The Office of the Prosecutor General and the SYKE provide training on environmental issues for other prosecutors and the police forces. Co-operative projects are increasing in number and size: the prosecutors and the Police are working together, in particular to deal with illegal waste dumping. Prosecutors collaborate with the customs office, particularly on nature protection offences. They also work with border guards on issues such as pollutions from ships, as well as with stakeholders, for example in forestry and agriculture, on various issues.

Criminal offences are rare in Finland, and prosecution cases are rather exceptional. However, the number of environmental offences reported to the Police

increased by 40% over the review period (Table 6.9). Only one-tenth of the reports lead into prosecution, occurring less than once a year in most jurisdictions, and a minor part of the cases prosecuted result in sanctions.⁴¹ Over the review period, a few severe cases have led to imprisonment; and the amount of fines imposed increased slightly. In 2004, the SYKE published a report on best practices in administrative enforcement of environmental violations in Finland, but there is no MoE guidance on this matter. Even though efforts are being made to better link the fines to the benefits gained from the offence, the system of sanctions needs further improvement in order to be effective in preventing environmental offences.

Table 6.9 **Reports of environmental offences to the Police, 1997-2007**

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Environmental offences covered by the Penal Code	192	230	251	260	257	380	414	454	401	357	414
Natural resources offences covered by the Penal Code ^a	239	266	271	242	288	306	349	295	235	289	211
Offences covered by the Water Act	20	16	15	14	10	8	7	3	7	7	11
Other offences ^b	281	245	401	382	411	563	575	408	446	384	402
Total	732	757	938	898	966	1 257	1 345	1 160	1 089	1 037	1 038

a) Mainly hunting offences.

b) Mainly waste delicts as defined in the Waste Act, and, to a smaller extent, nature protection delicts as defined in the Penal Code.

Source: Ministry of the Interior.

2.4 Economic instruments

In addition to an extensive use of environmental and environment-related taxes Finland has for years relied on a number of other economic instruments: user charges and fees, deposit-refund systems, product charges, and subsidies have been applied in water, waste, air, noise, and nature protection management (Box 6.6). In line with the recommendation of the 1997 OECD Environmental Performance Review, Finland has *increased the rates of several charges* to give appropriate price signals to consumers. For instance, Finland's solid waste has been reduced by around 15% compared with

Box 6.6 Economic instruments

Water and waste water charges

The *2001 Act on Water Services* provides for water supply and waste water tariffs to (ultimately) cover investments and operating expenditure as well as environment costs, including restrictions on land use. In the short-run state aid (direct subsidies and public water management work) has been provided to municipalities, accounting for some 10% of their total cost of water management. *Municipal water supply charges* have increased by 31% since 1997 (being on average EUR 1.27/m² of water supplied in 2008). They consist of a fix (connection, basic charge) and volume-based components. *Municipal waste water charges* are based on water consumption (as a proxy for waste water volume); for large users they are based on the volume and quality of the waste water. These charges increased by 52% since 1997 (being on average EUR 1.90/m² of waste water in 2008). All municipal and industrial water usage is metered, however, only the minority of individual households is equipped with separate meters.

Water protection charges on industry and fish farms, applied in addition to compensation to owners of waters and commercial fishermen for loss of the value of a water area, were removed under the 2000 Environmental Protection Act. Where old permits apply charges continue to be used. Water abstraction charges and pollution charges are neither used nor in preparation in Finland.

Waste management

Waste charges for households, which include collection and treatment component, increased from EUR 6.54/4.05 per 600l/240l container in 2000 to EUR 9.25/5.42 in 2007. Many municipalities set lower charges for sorted waste and for waste that can be recovered. Waste treatment facilities charge waste transport companies by weighing the load: average municipal landfill charge in 2007 was around EUR 100/t. The treatment fees varied depending on the type of waste: e.g. EUR 68/t for biowaste and EUR 106/t for construction waste. Municipalities collect charges to cover the collection and treatment of waste as well as landfill closure and aftercare. Some estimates suggest that *revenues* to different actors increased from around EUR 200 million in 1997 to EUR 1 000 million at present. According to a study made by the Association of Finnish Local and Regional Authorities, in the half of the municipalities all waste management costs were covered by waste fees.

In addition to waste charges levied per tonne of waste 140 municipalities had introduced in 2002 an “*eco-charge*” at an average of EUR 33 per year per household. The purpose of the charge has been to promote waste sorting by covering costs associated with a network of recycling and collection stations where households can deliver card and paper, glass, metal, untreated wood and electronic waste and batteries free of charge.

Hazardous waste is subjected to service charges (EUR 270/t on average). The charges are collected by Ekokem Oy, a company that treats hazardous waste and is jointly owned by the state, municipalities and industrial companies.

Box 6.6 Economic instruments (cont.)

Since 1996 a tax has been applied to waste deposited in municipal landfills with the aim of discouraging landfilling and stimulating waste recovery. Private landfills, including industrial waste dumps, are excluded from the tax. The tax rate was FIM 90/t (approx. EUR 15/t) in 1996, raised to EUR 23/t in 2003-2004 as a result of the 2002 amendment of the Waste Tax Act and then to EUR 30/t from 2005 onwards. The revenue from the landfill tax is not earmarked. The landfill operator is subject to the tax and passes the tax on to the waste generator via municipal waste charges. In order to promote recovery of waste, the tax does not apply to waste which is recycled or composted. The waste tax generated revenue increased from FIM 41 million (EUR 6.8 million) in 1996 to EUR 56 million in 2007. According to a *ex post* survey carried out by the MoE in 2005 the waste tax has proved to be an efficient instrument to divert some waste streams from landfills (e.g. recoverable industrial waste, construction waste); SMEs and services (which initially could access municipal landfills) have been encouraged to consider alternative options to dispose of their waste.

Economic instruments are also applied to *beverage packaging*. Individual packaging-related surtaxes on non-refillable alcohol and soft drinks packaging have been in place since 1976. The packaging which did not enter a deposit-return system approved by the government is subjected to a EUR 0.51/l charge. For non-refillable beverage packaging recycled via deposit-return system, a charge of EUR 0.085/l was applied until 2007 when the charge was removed.

Beverage packaging taxation has been complemented by a *deposit-return system* for refillable and non-refillable containers. The majority of bottles (0.33, 0.5, 1, 1.5 litre) are part of a deposit-refund system, as are aluminium cans. Non-refillable plastic containers were added to the system in 2008. The rates for containers, determined by the MoE, range between EUR 0.1-0.4 for glass and plastic bottles, EUR 0.15 for metal cans and EUR 2.2-4.2 for bottle cases. The rate of return of glass bottles for beer and soft drinks has been close to 100% for a number of years. However, the collection rate for beverage cans with deposit is lower (approximately 80%).

National legislation applying producer responsibility to *used tyres* was implemented in 1995, giving rise to the first systematic tyre recycling scheme in Finland. The scheme is financed by a recycling charge (EUR 1.85-61.1 per tyre) paid by the consumer on purchase of a new tyre. The proceeds are transferred by the retailer to the producer or the importer, who, in turn, passes the funds on to the producers' organisation (Finnish Tyre Recycling Ltd) to cover the associated treatment and disposal costs. Since 1996, improved logistics within the system has permitted charges to be lowered. In recent years the charges have remained stable, except for the largest machinery and forest tyres. Collection rates are close to 100%, the majority undergoes material recovery, and a small proportion is retreaded.

Box 6.6 Economic instruments (cont.)

National legislation implementing the EU *End-of-Life Vehicles* (ELV) Directive came into force in September 2004, so the ELVs can be returned to authorised collection points without a charge. The Finnish legislation related to ELV vans was already in place in 2002. Finnish Car Recycling Ltd has been set up by car importers to coordinate the collection, treatment and recycling of ELVs according to the requirements of the directive.

An *oil waste charge* of EUR 0.06/kg is included in the price of lubrication oils and solid lubricants. The income from these charges is used to cover the costs of managing oil waste as well as cleaning up soil and groundwater contaminated by oil. In 2007 fiscal income from oil waste charges was EUR 4.25 million.

Nature conservation and biodiversity

There has been no significant change in the fishing and hunting fees. The *fishing licence fee* is collected by the State under the 1982 Fishing Act. In 1999 the annual fishing management fee was raised from FIM 80 to 90 (EUR 15) then to EUR 20 (or EUR 6 per week) in 2004. The revenue of EUR 8 million finances management of fish population. There is no data available on fishing fees collected by private owners of waters. Provisions on *fees related to recreational hunting* were laid down in the 1993 Act on Game Management Fee and Hunting Licence Fee. An annual hunting licence fee of EUR 24 (raised to EUR 28 in 2008) is paid to the State. A licence is required for the hunting of cervids and involves a fee of EUR 120. The revenue of EUR 14 million per year is used for financing game management.

Noise

The only economic instrument currently in use in the noise reduction policy is the *noise charge applied to night-time departures* with turbo jet aircraft in the Helsinki-Vantaa airport. The charge, introduced in 2008, is calculated according to the aircraft's noise certificate in accordance with ICAO and is included in the airport charges.

the business-as-usual prediction, thanks to the impetus of the economic instruments in the waste area. The revenue has enabled to finance environmental investments and services provided by public authorities in conformity with the Polluter Pays Principle.

Even though some *new economic instruments* have been introduced in the review period, for example on plastic non-refillable beverage containers, end-of-life vehicles and air traffic noise, as well as participating in the EU's CO₂ emission

trading scheme, further efforts are needed to increase impacts. A thorough evaluation of the various economic instruments in place could identify the most cost-effective ones. Initial steps have been taken, such as the establishment of a working group by the Ministry of Finance to assess and consider the renewal of the waste tax or plans for introducing road pricing by the Ministry of Transport and Communications. Such evaluations should be linked to the reform of the permitting procedures to ensure an optimal use of market-based approaches supplementing traditional regulatory approaches.

2.5 *Private sector initiatives*

The application of *environmental management systems* has expanded in Finnish businesses. At the beginning of 2007, there were a total of 991 enterprises with an ISO 14001 certification (up from 151 in 1997 and 508 in 2000) and 42 EMAS registered organisations (up from 9 in 1997). Virtually all forest industry companies have now an EMS system and publish environmental reports together with their annual reports even though corporate environmental reporting is not mandatory.⁴² Timber used for the Finnish forest industry is subjected to environmental certification, including the national Finnish Forest Certification System (FFCS) and international quality standards (Chapter 5). The turnover of Finnish environmental businesses has been growing by around 3% per year over the last 5 years and it is estimated at around EUR 4.5 billion (SITRA, 2007).

Industry has also been actively involved in *energy conservation and efficiency agreements* concluded by Finland's Ministry of Employment and the Economy and the Finnish Confederation of Industries in 1997 (Chapter 2). Building on the success of the scheme a new set of agreements has been developed in 2008. Similar agreements are being developed to improve material efficiency in enterprises as part of Finland's national programme to promote sustainable production and consumption.

The Finnish government explicitly recognises *eco-innovation* as a key element of Finland's economic development and business competitiveness.⁴³ The Science and Technology Policy Council of Finland and the National Technology Agency (TEKES) have included environmental objectives in their strategies. Specific policies to support eco-innovation have been designed by the Ministry of Employment and the Economy in co-operation with the MoE, government agencies and industry and include: *i*) the development of technology supplies, *ii*) strengthening the relationships between research and industry, *iii*) dissemination of information about new technologies, and *iv*) financing (Box 6.7). Studies of environmental policy integration in the Finnish technology policy, especially those regarding R-D funding, have shown elements of environmental policy integration.

Box 6.7 Promoting eco-innovation

Finland spends around 3.6 % of GDP (2006) on research and development (R-D). The share is one of the highest in the OECD area. Environment-related R-D accounts for about 10-15% of the total but has been on the decline. A large part of expenditure is covered by business (over 65%). Government funding is important and essentially comes from the National Technology Agency (TEKES). TEKES usually finances half of project's costs while participating companies and research institutes cover the other half. The MoE is represented in the management of TEKES and is involved in project development, but TEKES makes the final decision on the technology areas it would support.

TEKES has initiated and promoted “*technology clusters*” between researchers, the business community, public authorities and other funding organisations. The environmental cluster was established in 1997 to raise the level of know-how and to create conditions for entrepreneurs to develop environmental technologies. The programme covers climate change and energy efficiency, water technologies (in particular waste water treatment in rural areas), waste prevention and recycling technologies, new materials and transport technologies. The priorities are identified on the basis of the national (e.g. pollution of the Baltic sea) and global market opportunities (e.g. energy and material efficiency).

During the 2006-08 period, *eco-efficiency and eco-innovation* received greater attention. The main financiers of the programme are the MoE, the Ministry of Employment and the Economy, TEKES, and the Academy of Finland. The MoE has produced a series of fact sheets describing Finnish companies' eco-innovations. These nine fact sheets also give information on the environmental problems and challenges which have inspired the innovations.

In 2007 the *Finnish National Fund for Research and Development* (SITRA) has launched a new programme called “*Cleantech Finland*” aimed at making clean technologies a cornerstone of Finnish industry and Finland the leading country in environmental business by 2012. Capital investments form the main tool in boosting the development of SMEs. The programme also develops new methods to fund companies and looks for innovative models to facilitate the financing. SITRA's environmental programme is carried out in close collaboration with the private sector.

New instruments are being considered to *better link eco-innovation principles adopted at the strategy level and the actual practice of decision making*. These include: *i)* strengthening the regulatory instruments to increase the demand for eco-innovation and its products, *ii)* innovative funding for demonstration and pilot projects, *iii)* the assessment and verification of the environmental performance of

technologies (in the context of Environment Technology Action Programme (ETAP) project on environmental technology verification), and *iv*) working with business associations and municipalities on dissemination of information about good practices and products (MEE, 2005). In addition, more explicit targets related to eco-innovation and its environmental benefits could strengthen whole-of-government efforts. This should be supplemented by the decision-making procedures that include a systematic *ex ante* assessment of the most essential positive and negative environmental impacts of proposals as well as *ex post* assessments of technology programmes and projects that incorporate analysis of environmental impacts. Incorporation of provisions for eco-innovation products in public procurement policies and practices should be of particular importance.

2.6 Land use planning

Finland's regulatory framework for land use planning and construction was significantly reformed in 2000 with the adoption of *the Land Use and Building Act*. The new act: *i*) delegated planning decision-making to local authorities as local plans are not subject to the formal approval by the higher authority,⁴⁴ *ii*) introduced an interactive planning which requires consultation between administrative levels, and *iii*) promoted public participation and the use of advisory services, since "a procedure for participation and assessment" is required in every planning project. The protection of the environment has become an integral part of special planning as environmental impacts of the implementation of regional land use plans are now assessed before being approved to facilitate choices between alternative planning options. Additional instruments, such as building restrictions and protection order, were introduced to regulate environmental impacts.⁴⁵

At the *national level* national land use guidelines were adopted in 2000 and revised in 2008. They present goals and needs that should be accounted for in planning at regional and local level as well as by various national authorities (COMMIN, 2006).⁴⁶ The guidelines also include the principles of the European Spatial Development Perspective (ESDP). The compliance with the guidelines by local authorities is ensured by the RECs.

At the *sub-national level* three levels of land use plans have been introduced. Regional land use plans help to ensure that the national guidelines are duly considered in land use planning at the municipal level.⁴⁷ Local master plans aim to resolve questions concerning the preservation of natural and cultural values, the quality of living environment and the reduction of environmental hazards. Local detailed plans, such as town plans, are used to regulate the physical "townscape" (building size and type) taking local conditions into account and ensuring adequate

number of parks and local recreation areas. The municipal master and detailed plans are approved and carried out by the municipal councils only after necessary negotiations with neighbouring municipalities, the regional council and the RECs.⁴⁸ In order to plan in the vicinity of establishments involving accident hazards, an opinion must be obtained from TUKES and the rescue service authority.

In spite of reform, the *planning process is still influenced by short-term economic goals* which lead to compromising environmental objectives and result in lax enforcement of environmental safeguards. Current debates on regional plans concerns mainly: *i)* siting of large-scale commercial units outside the city centres (which contributes to urban sprawl and increased air pollution from transport), *ii)* the location of waste disposal sites (including incineration), and *iii)* protection of natural and cultural landscapes in light of plans for wind power plants and the extension of peat production areas (Nordregio, 2004). Regulations related to building near the shoreline and flood prevention are comprised of municipal building codes but presently not all municipalities set minimum elevation levels for buildings near shoreline or a minimum distance from a building to the shoreline.

Notes

1. The DMC is the total mass of material directly consumed by the economy in a given year. DMC equals domestic extraction of resources plus imports minus exports, including processed products for imports and exports. Domestic extraction refers to “used” extraction, thereby excluding leftover (*e.g.* mine tailings, crop and forest harvest residues, fish by-catch).
2. In Finland wood products account for three-quarters of the “food, feed and wood” category (against 25% on average in the OECD area).
3. The production of concentrates is the most material intensive part of metals’ industrial processing. By importing nickel and zinc in the form of concentrates, Finland externalises a large part of its metal intensity to the suppliers of these concentrates.
4. The total amount of compensation to LFAs must not exceed an average of EUR 250 per hectare.
5. By the Finnish Environment Institute (SYKE), the Agri-food Research Finland (MTT), the Finnish Game and Fisheries Research Institute (RKTL) with funds from the Ministries of Agriculture and Forestry and of the Environment.
6. An updated Act on the Financing of Sustainable Forestry was released in 2007, and should enter into force in 2009.
7. More than half of Finland’s forest area (*e.g.* the productive forests in southern Finland) is privately owned, accounting for three-quarters of Finland’s commercial roundwood production.
8. Because of a decline in the landed value of capture fisheries.
9. Most of this fund is directed at business development (EUR 105 million/year) and competence and innovation (EUR 92 million/year).
10. Finland is considering introducing feed-in tariffs for renewables, such as wind and biogas.
11. Directive 2003/87/EC establishing a scheme for greenhouse gas emission allowance trading within the Community.
12. Council Directive restructuring the Community framework for the taxation of energy products and electricity (2003/96/EC).
13. In 1997 energy and CO₂ taxes on electricity producers were replaced by a uniform consumption tax to conform to EU rules.
14. In practice the tax refund has benefited 10-12 pulp and paper companies. The refund is for the proportion of taxes in excess of 3.7% of value added, up to 85% less EUR 50 000.
15. A proposal for increased tax rebate is pending European Commission’s approval (it would apply retroactively as of 1 January 2008).
16. Pursuant to the Oil Pollution Preparedness, Response and Co-operation Convention (Chapter 8).
17. To avoid market fragmentation, each CO₂ gramme contributes to the tax percentage which is calculated as follows: 4 + CO₂ emissions/10. For instance, the tax rate for a car emitting 185 g/km is 22.5%. The scheme is based on the CO₂ emissions declared by the car manufacturer for a

combination of city and road driving (so called EU combined consumption according to Directive 1999/100/EC). Where such data are not available, the tax is based on the total weight and propelling force of the vehicle. In 2008 a 22% increase in the registration tax substituted for VAT (EU rules do not allow to apply VAT on top of the registration tax).

18. A lower rate applies to vehicles more than 15 years old.
19. Average CO₂ emissions of new registered passenger cars have already decreased, from around 179 g/km in 2007 to 163 g/km in the first quarter 2008.
20. Community guidelines for State aid in the agriculture and forestry sector 2007 to 2013 (2006/C 319/01), referring to Council Regulation 1698/2005, art. 47.
21. PAC expenditure does not include nature protection expenditure.
22. Public sector PAC expenditure are direct expenditure by national and territorial authorities, as well as expenditure under the responsibility of national and territorial authorities even if such expenditure are covered by user charges paid for the service provided.
23. The amendments covered large combustion plants (2002), environmental permitting (2002 and 2005), port reception facilities for ship-generated waste and cargo residues (2003), noise, emission trading and water management (2004), public participation (2005) and persistent organic pollutants (2006).
24. The Ministry is headed by two Ministers: the Minister of the Environment and the Minister of Housing who are responsible for the respective areas.
25. The changes have led to the Land Use Department and the Housing and Building Department of the MoE being merged. A new Department of Nature Environment is to start operations in 2009.
26. The NHS comprises three regional units: Lapland, Ostrobothnia and Southern Finland.
27. The SYKE and the RECs report to the MAF on these matters.
28. In particular the Technological Safety Authority (TUKES) under the Ministry of Employment and the Economy that controls high-risk installations (Seveso); the Radiation and Nuclear Safety Authority (STUK) under the Health and Social Affairs; and, the National Product Control Agency for Welfare and Health (STTV) that carries out risk assessment and risk management of chemicals.
29. EPOs, that replaced the three Water Courts, issue permits for: timber processing, metallurgy (over certain thresholds), power units of over 300 MW installed capacity, certain types of chemical industry, oil and gas exploration and drilling, mineral extraction and processing, fish farming, transport (harbours and airports), and waste water treatment plants of over 4 000 population equivalents. RECs handle some of the same sectors below the specified thresholds (*e.g.* power units with capacity between 50 MW and 300 MW), food industry, farms, waste management facilities, drinking water treatment plants, etc.
30. Permits issued by the EPOs and RECs are publicly available on their websites (with the exception of commercially confidential information), but not those issued by municipalities.
31. For example, the nationwide Finnish Association for Nature Conservation, through its regional and local offices, is a very active participant in the permitting of every major installation.
32. This higher rate of appeals is explained by the fact that EPOs deal with more complex cases and decide on issues of compensating prospective damage to water resources.
33. The consideration of appeals usually takes more than a year.
34. There may be several installations covered by one permit. In the case of renewal of the permit the fee can be lower.

35. Inspections are undertaken for new installations as part of the permitting process, to control self-monitoring arrangements, in case of accidents or complaints. Complaints can be brought by either individual citizens or NGOs (*e.g.* local offices of the Finnish Association for Nature Conservation). Practically all (even special) inspections are announced to the operator in advance to ensure the presence of relevant enterprise staff on the site.
36. A separate self-monitoring plan with technical details may be required for approval by the RECs. When a permit enters into force, the competent authority inspects the operator's self-monitoring system itself or uses third-party auditors to do so.
37. Class 1 installations (most IPPC installations, those with poor compliance history) should be inspected every year, Class 2 installations – once every two years, Class 3 – once in four years, and Class 4 – once at the time of permitting. Among all installations inspected by the RECs, there are 4% Class 1 installations, 15.5% are Class 2 installations, and 31% belong to Class 3. Each REC compiles its own list for each class of installations under its jurisdiction. In practice, there are more inspections than the minimum number prescribed by respective classes (and particularly for Class 1).
38. Inspectors are usually not specialised in any particular sector, with the exception of pulp and paper industry specialists in almost every REC and experts in metallurgy and aquaculture in selected regions.
39. Alternatively, corrective actions may be “recommended” with a specific deadline in an inspection report. The operator then is required to report on the completion of the corrective actions. If the operator fails to present a compliance plan, or its actions are judged inadequate by the competent authority, the latter issues a compliance notice and the case may be referred to the police for criminal prosecution.
40. The police conduct a pre-trial investigation itself or, if the offence is very serious, transfer it to the National Bureau of Investigation.
41. Criminal penalties vary from a fine (which has to be proportional to the benefits accrued due to non-compliance) to a maximum of 6 years of imprisonment, depending on the seriousness of the act. An environmental violation involving danger to public health may fall under Chapter 34 of the Penal Code which stipulates penalties of up to 10 years of imprisonment. The laws outside the Penal Code now cover only minor offences punishable by a fine. Revenues from fines go to the general budget.
42. In 2003, the Finnish accounting body (KILA) issued a general guidance on recognition, measurement and disclosure of environmental issues in the annual accounts and annual review.
43. For instance, the 2005 Roadmap for the Implementation of the EU Environmental Technologies Plan and the 2005 National Plan for Sustainable Production and Consumption defined national goals and actions connected with promoting environmental technologies and eco-innovation. In 2007, the programme of the new government explicitly referred to the deployment of innovative technologies to secure new, cost-efficient energy sources, including cogeneration of electricity and heat, biogas production in farms and waste treatment facilities.
44. Individuals, private entities, NGOs, and the public administration have the right however to appeal local planning decisions through an administrative court.
45. Conditional building restrictions define areas where building permits may not be granted for developments that would hinder the implementation of the regional land use plan. Reasonable compensation is paid where the refusal of planning permission results in substantial losses for landowners. Protection orders in regional land use plans are applied to limit construction and other land use changes that would endanger valuable natural or cultural features or landscapes.

Financial compensation is paid to acquire land for public purposes in such valuable nature areas. The public sector can also compensate for the property loss by granting its own land in exchange.

46. The guidelines include criteria of appropriate quality of the living environment, criteria for integrating economic and ecological community structures and for the preservation of natural values, the built heritage, sustainable use of natural resources.
47. The 19 Regional Councils, which are associations of municipalities, prepare regional land use plans which are subject to the MoE's ratification.
48. Municipalities may also decide on joint master plans that regulate road planning, and siting of retail trade, workplaces, and residential areas. Such joint plans require the approval of the Ministry of the Environment.

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7

ENVIRONMENTAL – SOCIAL INTERFACE*

Features

- Environment and health
- Environmental democracy and access to justice
- Sustainable development in education
- Environment and employment

* The present chapter reviews progress since the previous OECD Environmental Performance Review of 1997. It also reviews progress with respect to the objectives of the 2001 OECD Environmental Strategy.

Recommendations

The following recommendations are part of the overall conclusions and recommendations of the environmental performance review of Finland:

- further integrate *environmental health issues into policymaking in other sectors*, focusing on sectors where the most important health benefits can be achieved, and on the most cost-effective measures;
- reduce the health impact of particulate emissions from *road transport and small-scale wood combustion in urban areas*; strengthen *water supply management* of small water companies, co-operatives and private wells to reduce incidents of waterborne diseases; promote further efforts to reduce *exposure to radon*;
- promote *corporate environmental reporting*, including from small and medium-sized enterprises;
- further improve access of the general public to *pollution and compliance information* on a geographical and sectoral basis;
- further develop high quality teaching material and learning methods in *environmental education*; establish specialised courses on the environment and sustainable development at all education levels with stronger links to environmental research and innovation; enhance co-operation between different actors in formal and non-formal education for the coherent implementation of national strategies on education for sustainable development;
- promote policies that enhance *employment opportunities* associated to environmental goods and services, including “green” procurement, nature conservation and environment-related tourism.

Conclusions

Progress in reducing *health effects* of traditional pollutants (e.g. heavy metals, dioxins) has been supported by policy and institutional actions by environment and health authorities. Reducing *children’s exposure to pollution has become a priority*. Concerning *environmental democracy*, state of the environment reports, based on comprehensive databases, are published regularly. Environment and national sustainable development indicators have been used to report on progress to the public. Emergency situation warning systems have also been developed. *Provisions of the Aarhus Convention* and the EU related Directive have been integrated into the Finnish legal framework, including the EIA and land use planning frameworks. Access to courts has been freely exercised by individual citizens and NGOs, backed by well developed

environmental damage liability and compensation schemes. *Environmental education* has been extended through new learning curricula, teachers' training, and networking. It has been supplemented by teaching in nature and environmental schools.

However, *health* impact of particulate emission from *wood burning*, especially in combination with traffic pollution, is still a concern. Greater emphasis needs also to be placed on addressing incidents of waterborne diseases from insufficient drinking water treatment, as well as health impacts from noise and non-conventional pollutants, such as radon. A wider and better use of analysis of the health impact of pollution would help set targets at regional and local levels. *Environmental information* systems, especially environmental compliance information, should be made more accessible to the public on a sectoral and geographical basis. *Environmental education* could be further developed. *Employment* in environmental goods and services has not been growing; a wider application of "green" public procurements can provide new business opportunities, especially for SMEs. *Tourism*, associated with nature and biodiversity in rural areas, should be promoted, thus offering multiple benefits, such as health, employment and environmental awareness.



The present chapter reviews the environmental-social interface (concerning health, education and employment, and the environmental democracy), within a country with advanced welfare efforts and wide variations in population distribution (Box 7.1).

Box 7.1 Social context

The *population* of Finland was estimated at 5.25 million in 2006, and its annual growth rate has been about 0.2%, well below the OECD average of 0.75%. The drop in the population of working age could become the main constraint to medium-term economic growth. The foreign-born population is estimated at only 3.4% of the total (Figure 7.1).

The average *population density* is 15.6 inhabitants per square kilometer which makes Finland the most sparsely populated country in Europe after Norway and Iceland. However, the population is heavily concentrated in the south and south-west of the country, especially in the Helsinki Metropolitan Area (HMA) (Table 7.1). The HMA, includes: Helsinki (559 000 inhabitants), Espoo (227 000) and Vantaa (185 000) and concentrates 20% of the population, 25% of employment and one-third of the GDP. Although *urbanisation* has significantly increased, Finland remains one of the least urbanised OECD member countries: only 25.7% of the population resides in predominantly urban regions.

Box 7.1 Social context (cont.)

Health expenditure reaches 7.5% of GDP (2005). Overall public health has improved over the past decade. Infectious diseases have receded and premature mortality from cardiovascular diseases, cancers, accidents, suicides and chronic lung diseases has been reduced. Average life expectancy has increased, men life expectancy approaching the EU average, while female life expectancy reached that level. However, major causes of morbidity include musculoskeletal diseases, mental health disorders, infectious diseases, allergies and diabetes. Asthma, allergic diseases of the respiratory tract and eczemas have shown increases in both children and adults populations.

Health differences among regions and socio-economic groups have decreased. However, on about all measures eastern and northern populations are less healthy than western and southern ones. Life expectancy of men with a higher education and social status is about six years longer; among women, the difference is around three years. Poor health in certain parts of the HMA is prominent.

In a European comparison Finns rank high in *physical exercise*: in 2005, 27% of men and 31% of women aged 15–64 engaged in moderate physical exercise at least four times a week. Finland has, among the lowest smoking rate in the EU.

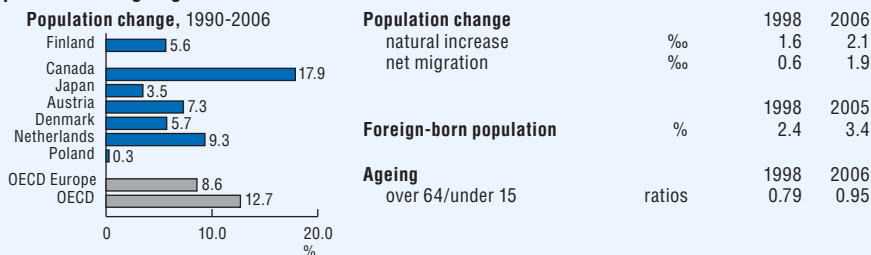
On broader measures of *well-being* Finland ranks well among OECD countries in inequality of income and poverty. The high level of taxation corresponds to more comprehensive *welfare provision*. However, among Nordic countries, Finland consistently ranks the lowest in terms of household disposable income and GDP per capita.

In 2007, the *employment rate* (the proportion of the employed among all persons aged from 15 to 64) was 69.3%, 7% higher than 10 years earlier and one of the highest among the OECD countries. *Unemployment* decreased significantly from 16.6% in 1994 to 6.7% in 2007 (in 1990, the unemployment rate stood at a 3.2%, but the crisis related to collapse of economic links, in particular with the Soviet Union, led to rapid growth in unemployment in a very short period, peaking in 1994). The unemployment rates are the lowest in the province of Southern Finland (5.5%) and the highest in the province of Eastern Finland (11.1%). Rigidities in the labour market and high contribution of employers to social security payments hamper growth in employment.

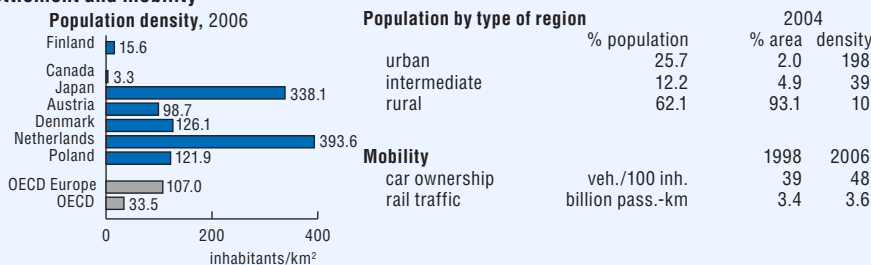
Education expenditure amounts to 6.1% of GDP. Attendance is compulsory between the ages of 7 and 16. The Finnish education system is comparatively egalitarian (e.g. no tuition fees for full-time students, free meals served to pupils at primary and secondary levels). In tertiary education, two, mostly separate sectors operate: the higher vocational schools and universities. In the OECD's assessment of student performance, PISA, Finland has consistently been among the highest scorers. While Finland is excellent at providing the population with basic skills, there are problems in the later stages of the education system. In the transition from secondary to tertiary education, only a minority of students is admitted to their preferred field of study immediately after completing secondary studies. Most need several attempts before gaining a study place, thus contributing to the high age of tertiary graduates.

Figure 7.1 Social indicators

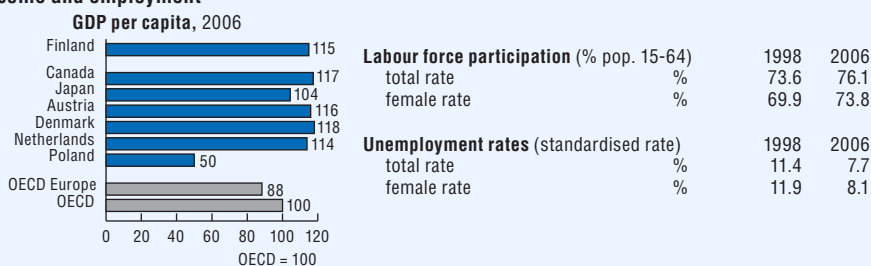
Population and ageing



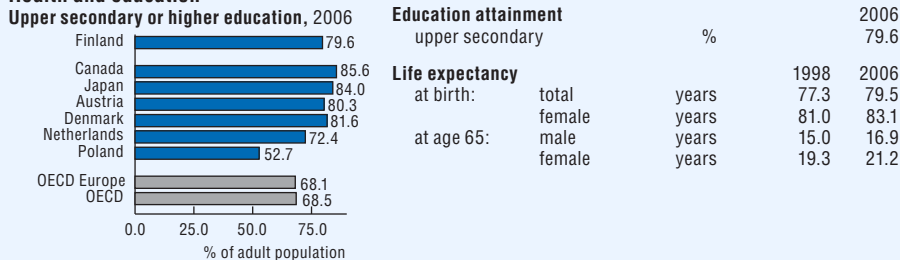
Settlement and mobility



Income and employment



Health and education



Source: OECD, Environment Directorate.

Table 7.1 Regional population distribution, 2006

Region ^a	Population	Population density ^a (inh. per km ²)	Land area ^b (km ²)
Uusimaa	1 359 150	213.3	6 370
Itä-Uusimaa	92 933	33.7	2 761
Varsinais-Suomi	455 584	42.7	10 665
Satakunta	229 966	28.9	7 956
Kanta-Häme	168 381	32.4	5 198
Pirkanmaa	468 986	37.2	12 613
Päijät-Häme	198 975	38.8	5 127
Kymenlaakso	185 196	36.2	5 111
South Karelia	135 604	24.2	5 613
Etelä-Savo	160 507	11.5	14 000
Pohjois-Savo	250 064	14.9	16 772
North Karelia	168 322	9.5	17 763
Central Finland	267 902	16.2	16 541
South Ostrobothnia	193 812	14.4	13 444
Ostrobothnia	173 627	22.4	7 747
Central Ostrobothnia	70 696	13.4	5 272
North Ostrobothnia	378 006	10.7	35 233
Kainuu	85 303	4.0	21 505
Lapland	185 800	2.0	92 856
Åland	26 766	17.2	1 555
Total Finland	5 255 580	17.3	304 111

a) Defined as EU NUTS 3.

b) May slightly differ depending on the definition of the total land area.

Source: Statistics Finland; National Land Survey.

1. Environment and Health

1.1 Objectives

Achieving an environment that ensures good health is among the key objectives of Finnish environmental policies. The 1994 *Health Protection Act* covers health hazards from pollution of water (drinking and bathing), indoor air, noise, radiation, chemicals use and waste. The Ministry of Social Affairs and Health (MSAH), in co-operation with the Ministry of the Environment and other government agencies, supervises and co-ordinates environmental health care programmes.¹ Municipalities manage most aspects of care provision based on their own tax revenue and non-earmarked state subsidies.

Environmental health objectives for the review period were set by the *Finnish Environmental Health Action Plan (FEHAP)* adopted in 1997.² The Plan, elaborated by a multidisciplinary Environmental Health Committee, assessed the state and trends in environmental health, defined objectives in reducing environmental health hazards, and identified implementation measures. The FEHAP considered maintaining high standard already achieved in quality of drinking water, food and radiation safety, and urgent actions needed for indoor and urban air quality and noise exposure. The FEHAP also identified longer-term actions to address *i)* climate change and ozone depletion impacts, *ii)* integration of environmental health into community planning and construction, *iii)* enhanced participation of citizens in promoting a healthy environment, and *iv)* strengthened environmental health research and development (FEHC, 1997). The 2001 Government Resolution on the Health 2015 included a target of “at least maintaining subjective healthiness and environment impacts on personal health”.

The FEHAP’s objectives have been translated into *sectoral and media specific regulations and programmes*: for example, to include social and health effects in environmental impact assessment procedures, to conduct studies on the health effects of urban air and water pollution and of the management of hazardous chemicals. Special emphasis has been placed on reducing exposures during pregnancy and early childhood. The Children Environmental Health Action Programme was published in 2007.

Local environmental health action plans have been drawn up, sometimes as part of municipal health promotion programmes or local agendas for sustainable development.

1.2 Exposure to health risks

Despite important improvement of public health over the past decade, environmental factors contribute to occurrences of cancer, allergies, asthma and other respiratory diseases (Box 7.1). In Finland, *environmental health hazards* are identified as associated with the quality of urban and indoor air, drinking water and noise (Table 7.2).

Health impacts of *ambient air pollution* remain a concern (Chapter 2). Risk assessment studies confirm that exposure to *particulates (especially PM_{2.5})* increases coronary heart diseases (a leading cause of death in Finland) and respiratory problems (TEKES, 2006). Each year particulates are estimated to contribute to as many as 1 300 premature deaths and aggravate of respiratory problems of 70 000 people (including 30 000-40 000 children) (Statistics Finland, 2005).³ The World Health Organisation estimates that particulate pollution reduces average life expectancy by about three months in Finland.

Exposure to particulate matter from *small scale wood burning* is common, especially in rural and semi-urban areas where district heating is not available. Monitoring data confirm high PM₁₀ concentrations from biomass combustion (*e.g.* during temperature inversion) and increased PAH levels in PM₁₀ on an annual basis (TEKES, 2006). Air quality deteriorates in winter when emissions are at their highest.⁴ Even though a relatively small number of individuals are affected, an

Table 7.2 **Public health effects of selected environmental factors**

Environmental factor	Effects	Impact on public health	Exposure trend/comment
Air pollution	Respiratory tract and cardiovascular disease, asthma, lung cancer	1 300 excess deaths per year, mainly cardiovascular disease	Main exposure to particulate air pollution. Exposure decreasing very slowly
Radon	Lung cancer	300 excess lung cancers per year; 70 000 Finnish homes have radon levels exceeding recommended limits.	Average exposure decreasing. The 2004 Building Code introduced a binding 200 Bq/m ³ limit of radon concentrations in new buildings
Noise	Broken concentration, stress, high blood pressure	Around 900 000 people affected	Stable or slightly decreasing. Most exposure from traffic and industrial noise
Waterborne bacteria and viruses	Acute gastrointestinal disease	During 2003-2006 on average 7-8 outbreaks a year with average 400 patients	Stable. Problems associated with small waterworks or individual wells.
Benzene and other PAHs	Lung cancer	About 1 excess lung cancers per year	Based on exposure in urban air
Dioxins	Impaired immune system and/or reproductive health	The average intake does not exceed proposed tolerable daily level. Fishermen and their families are on the average exposed to levels twice as high as the whole population.	Exposure of the whole population has decreased since 1980's by 60-70 %. Levels in fish are declining slowly; high levels in fatty species of Baltic fish
Benzene	Leukemia	Less than 1 excess leukaemia per year	Exposure in urban air
Cadmium	Kidney damage	Not a major concern of the public health. Some subgroups (hunters) are exposed from consumption of game.	Stable or slightly decreasing Cereals, root vegetables and sea food are the most important food stuff sources of cadmium. Cadmium levels in foodstuff is monitored due to a potential contamination of widely consumed cereal products

Source: Ministry of Social Affairs and Health.

increasing trend in using wood for small-scale heating in urban areas, in combination with exposure to traffic exhausts, is likely to aggravate such health impacts. Recently, the MSAH issued guidelines on the optimisation of burning processes for individual users and local authorities.

Box 7.2 Addressing exposure to indoor radon

In Finland the sources of radon are granites and gravel deposits (“eskers”) developed by glacial streams. As a colourless and odourless, radioactive gas, radon can accumulate indoor from radioactive decay of uranium in these underground and ground sources. In Finland radon levels are among the highest in Europe (along with the Czech Republic and Austria), with 12.3% of dwellings with radon levels over 200 Bq/m³ and 3.6% over 400 Bq/m³ (WHO, 2007). Exposure to indoor radon is estimated to contribute to 9% of deaths from lung cancer in European countries, and possibly to leukemia.

Finland issued as early as the 1980s radon exposure limits for residential settings. For existing dwellings radon levels of 400 Bq/m³ are not mandatory, but health authorities can ban the use of a dwelling with higher concentrations. For new buildings, the target value of 200 Bq/m³ was established. Still, even in the most radon prone areas, new construction is being approved. Modern construction methods (e.g. concrete slab foundations, airtight under-pressurised building envelopes) are well adapted to high radon concentrations.

Health authorities are responsible for surveying local indoor radon concentrations and inform and advice house owners on radon mitigation. Most radon measurement is funded by individual home owners or by local authorities in connection with local indoor radon surveys. Testing in conjunction with house sales is strongly advised but almost never performed in practice. Local measurement results are available at municipal scale, outlined in provincial maps and municipal statistics. The health authorities communicate individual measurement results in response to requests from house buyers. In 1997, the Radon Atlas of Finland was published along with a database containing 70 000 houses (with the target number of 100 000). The information included radon concentrations, geological, construction and housing data.

Radon levels in indoor air can be lowered in a number of ways: from sealing cracks in floors and walls to increasing the ventilation rate of the building; sub-slab depressurisation (SSD), crawl space or cellar houses, are the most common and effective methods. Improvements in insulation part of energy efficiency projects may in fact lead to an increase in radon levels in dwellings. From 2003 to 2007 local authorities, in co-operation with STUK, participated in a new radon campaign (Radon bee) to activate radon monitoring and mitigation measures. Levels of indoor radon exposure are decreasing, due to changes in building practices, radon prevention in new buildings and indoor radon mitigation activities. However, some newly constructed buildings are still accepted without radon control measures.

The *quality of indoor air* is also of concern. Average concentrations of *radon* in Finnish dwellings are among the highest in Europe (Box 7.2). Exposure to radon combined with moisture and smoking, causes a few hundred cases of lung cancer and results in about EUR 85 million of work time lost each year. Policy actions to reduce radon exposure have aimed at attaining indoor standards of 400 Bq/m³ in existing dwellings and 200 Bq/m³ in new buildings through better construction planning and permitting, applying technological solutions and better monitoring. As a result levels of indoor radon concentrations have shown decreasing trends during the last decade (Kunseler, 2007).

The amount of *chlorinated compounds* (PCDD/Fs and PCBs) in rivers and in the Baltic Sea was a serious concern in the 1980s and 1990s but has been on the decrease. Emissions from pulp and paper industry are now similar to those in other EU countries as a result of replacing elemental chlorine in bleaching, improved processes and effective waste water treatment. However, reduction of *dioxins concentrations in sediments* is slow. Salmon and herring caught in the Baltic Sea (particularly in the Gulf of Bothnia and the Gulf of Finland) may still subject consumers to higher than normal levels of PCB compounds and other dioxins (Kiviranta, 2005).⁵ A special government advice issued in 2004 recommended that despite the favourable nutritional qualities of fish, children, young people and people at fertile age should restrict the Baltic Sea fish consumption.⁶ Further reduction in PCDD/F and PCB intakes will depend on changes in population food habits rather than changes in the occurrence of these contaminants in the environment and foodstuffs.⁷ Parts of the population are also still affected by dioxin along River Kymijoki (from a plant that produced tetrachlorophenol as biocide in the period 1940-1984) (Toivonen, 2007).

Quality of drinking water in Finland is generally good. However, some 0.6 million Finns rely on small water companies, co-operatives or their own wells. There are approximately 1 000 water plants that are vulnerable to microbiological risks, using ground or *surface water* without any disinfection treatment. Since 1997, microbial drinking water pollution has resulted in 30 epidemics comprising 20 000 diarrhoea patients. The outbreaks are usually attributable to faecal pathogens (*e.g.* Norovirus and *Campylobacter*) (Statistics Finland, 2005). Inadequate sewage disposal, in combination with wells' contamination during floods, were identified as the source of many small waterborne outbreaks in private homes or rental cottages.⁸ Even though epidemics prompted several local authorities to make improvements in their water supply systems outbreaks are still occurring. More than half of the population use *groundwater* as a source of drinking water with often compromised quality. Chlorinated phenols and certain solvents used in dry cleaning have caused some local health problems that have spread through groundwater. While pesticide residue levels are very low or negligible, high concentrations of nitrate (30-100 mg/l) are commonly found. Some natural

compounds of soil, such as arsenic and uranium, may cause health risks in groundwater in certain areas. *Endocrine disruptors* have been identified as a new generation of concerns and pollutants with impacts on fertility.

Even though large areas of the country are not experiencing *noise problems*, noise impacts, especially from transport and industrial operations in urban areas, are not reduced (Chapter 3). A 2007 report released by MoE detailed noise effects on human health: annoyance, effects on sleep, cognitive performance (especially for children), increased risks for cardiovascular disease and hearing impairment (for extreme exposure). Estimated damage costs of noise reach EUR 340 million annually.

Protection of the population against *non-ionising radiation* (e.g. from mobile phone use and related transmission networks) is in its initial stages, partly because of lack of reliable information about their health impact. Finland was among the first countries to have implemented the EU Council recommendation on limiting public exposure of non-ionizing radiation (1999/519/EC) by establishing limits for higher frequency fields (mobile phones and their base stations) and guidelines for the construction near power transmission lines. According to polls, a majority of the Finnish population is “not concerned” about the health risks of electromagnetic fields, but a majority is also “not satisfied” with the information it receives from authorities (Eurobarometer, 2006). Finland should fill that information gap, partly using information developed elsewhere.

1.3 Environmental health perspectives

The 1997 FEHAP has provided an important reference for actions by government agencies, municipalities and other stakeholders. Even though the several objectives of the FEHAP have been achieved *further integration of environmental health issues into sectoral policy making* is needed. A review of progress in meeting the objectives would allow a better identification of sectors where the most important health benefits can be achieved with the most cost-effective measures. This is in line with the provisions of the 2001 Government Resolution on the Health 2015. Establishing an *ad hoc* multi-stakeholder evaluation body could help better coordinate actions by public authorities, municipalities and other stakeholders, including research institutes and NGOs.

This progress review could also contribute to *health and social administrative reform* (launched in 2008) to increase the sector’s efficiency and effectiveness. Consideration should be given to strengthening risk analysis methodologies and underlying scientific data since current environmental health risk analyses are fragmented and do not adequately cover priority areas (Koskinen, 2006). During the

review period, the Centre of Excellence for Environmental Health Risk Analysis under the National Public Health Institute (KTL) covered most of the research. The merger between the National Public Health Institute and the National Research and Development Centre for Welfare and Health (STAKES) is an opportunity for strengthening research on environmental health. The reform should also address problems of information about environmental health, establishing open communication channels through the media and the health care system itself.

2. Environmental Democracy

2.1 Provision and access to environmental information

The 1999 *Act on the Openness of Government Activities* reformed legislation on access to public information, promoted government's openness and good practice in information management and enabled individuals, citizen's groups and companies to monitor public authority actions, including the use of public resources (UNECE, 2008).⁹ The Act repealed the provisions of the Penal Code that had previously allowed penalising disclosure of information by the authority. Finland ratified the Aarhus Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters in 2004.

Provision of environmental information has been extensive. The first comprehensive state of the environment report was published in 1981 and the regular production started in 1992. Statistics Finland has included environmental information and indicators in its *Statistical Yearbook*. In 2007 and 2008 separate environmental statistical yearbooks were published. The annual Natural Resources and the Environment review, produced jointly by Statistics Finland, the MoE and SYKE, was distributed in the Parliament in connection with the publication of the Government budget. SYKE also provides a wide range of information and assessments through the European Environment Information and Observation Network (EIONET) and contributes to the OECD Environmental Compendium. *Two environmental periodicals* (the Finnish Environment and Environmental Administration Guidelines) publish regularly policy briefs, reviews, and research results.

At *sub-national level*, Regional Environmental Centres and the SYKE maintain environmental protection databases, including a comprehensive environmental information database (Hertta) and a compliance database (Vahti) (Box 7.3). The RECs have also their own State of the Environment websites with links to the national site and publish booklets and leaflets. Municipalities have only limited resources to produce their own environmental information materials.

Box 7.3 Environmental data (Hertta) and compliance monitoring data (Vahti) systems

Hertta

Hertta is a web-based environmental information database that combines data from different sources for research, monitoring, control, planning, and assessments of the environment. The database is easily accessible by users through a number of subsystems: Air Emission Data system (IPTJ); Data Bank of Environmental Properties of Chemicals (EnviChem), Database of Threatened Species, Forms for monitoring local detailed plans, Groundwater Database (POVET), Hydrology and Water Resources Management Data system (HYDRO), Information System for Monitoring Land Use Planning, Information System for Monitoring the Living Environment (ELYSE), Lake register, State of Finland's Surface Waters (PIVET). The contents of Hertta evolve constantly as new subsystems are being developed (e.g. phytoplankton and harmful algal blooms).

Data collection and storage for all subsystems are continuously performed by the Regional Environment Centres, the SYKE and several co-operation partners. Data produced by compliance monitoring Vahti or by various GIS data are also included. The quality and usability of Hertta have been improved, leading to an increased use of the system by employees of the environmental administrations: 5 000 times a month on average. Municipalities, provinces and partners working in cooperation with the administration also have access to the data systems via extranet services. Non-government entities and individuals can obtain access rights by sending an application including the reason for the request.

Vahti

Vahti is an environmental compliance database supporting the 13 RECs in processing environmental permits and monitoring compliance. Vahti contains links to all permitting documentation (permits and communication with operators), inspection reports, as well as data on raw materials use, production and pollution releases of individual installations. Vahti also contains compliance records by installations. In 2005, compliance monitoring and enforcement activities carried out by the RECs were added. The user interface makes it possible to add new customers, change or add customer data, retrieve reports from the database and write inspection reports. The system has other functions, such as mapping functions.

Currently, there are 800 active users of the system. While Vahti is primarily designed for the RECs, its main parts are accessible to the MoE and permitting authorities. Municipality-regulated installations are expected to be integrated into Vahti in the future. Vahti is not open to the public, but some of its outputs are connected to the Hertta database.

Over the review period Finland developed a set of *national sustainable development indicators* to monitor implementation of the national sustainable development strategy (1998). The MoE leads indicators work in co-operation with several ministries and research institutes and SYKE ensures practical support. This indicator set was first published in 2000 and updated in 2002 and 2004. The current set of 34 indicators was then released in 2006 together with the new national strategy for sustainable development (Niemi, 2006).

Concerning *emergency situation warning*, the 2003 Act and Decree on Rescue Services requires that each district operates an alert system for emergencies related to industrial accidents and natural disasters. The Government Decree on Handling and Storage of Dangerous Substances and Chemicals requires operators to prepare security reports and to inform the public of potential risks.

Corporate environmental reporting is not obligatory in Finland. However, a number of companies (including all forest industry companies), now publish environmental reports together with the annual corporate reports. Since 1996, a social and environmental corporate reporting award is given annually to the best report. The award is managed by the Environmental Communications Association, the Financial Daily, the Helsinki School of Economics and the Ministry of the Environment. Still, a limited number of small and medium-sized enterprises participate in social and environmental reporting.

2.2 Public participation

Wide public consultations have been an important part of *self-governance and consensus-based decision making in Finnish municipalities*. The 1995 Local Government Act recognised the autonomy of municipalities in undertaking decisions on their activities. The 1999 Act on the Openness of Government Activities added further consultation with the public at the national level.

Safeguards for public participation in environmental decision-making have been incorporated in a number of environmental acts, including the 1999 amendments to the 1994 Environmental Impact Assessment Procedure Act, the 2000 Environmental Protection Act, the 2000 Land Use and Building Act, and the 2005 Act on the Assessment of the Impacts of the Authorities' Plans, Programmes and Policies on the Environment. The Forest Act requires Metsähallitus and the regional forestry centres to consult with stakeholders when formulating forestry programmes.

In *Environmental Impact Assessment* procedures (25-30 per year), the public is consulted at least twice: first, after the publication of an assessment programme which contains information about the proposed projects and the assessment

procedures, and second, after the completion of an environmental report that presents a comprehensive evaluation of projects' environmental impacts and alternatives. Concerning *Strategic Environmental Assessment*, the EU Directive 2001/42/EC on the Assessment of the Effects of Certain Plans and Programmes on the Environment was transposed in 2005 into the Finnish legislation. The SEA procedure requires the environmental assessment report be open for public comments for 30 days. Consultations include meetings during which the project and programme details are discussed. Assessment reports and subsequently projects and programmes have been adjusted taking account of public comments.

Participation in *land-use planning* procedures has been strengthened with the adoption of the 2000 Land Use and Building Act. Planning and construction permits are subject to hearings involving the owners and tenants of neighbouring properties, even if located in other municipalities. Neighbours must be notified about applications for planning permission and the timing of official surveys of development sites.

A strong role in voicing public concerns has been played by *environmental non-governmental organisations (NGOs)*.¹⁰ Finnish NGOs take stands on a wide range of environmental issues, organize national and local campaigns to influence environmental and sectoral policy making, promote public awareness and environmental education. NGOs have been active in revealing violations of the EU legislation (*e.g.* Natura 2000, planning of waste incineration installations), drawing attention to illegal practices (*e.g.* transport of illegally logged timber from Russia to Finland), or mediating in disputes between local populations and authorities (*e.g.* conflicts between reindeer herders and the state forestry agency in Northern Lapland). NGOs have taken an active part in national multi-stakeholder committees designing national plans and policies (*e.g.* on waste management, sustainable consumption, and production).

NGOs also contribute in devising Finnish policies regarding *international environmental agreements*. NGO representatives have been invited to national preparatory meetings and included in Finland's national delegations as expert members, or in an environmental sub-committee on the EU matters. They are in numerous focal groups for international environmental issues, such as the Advisory committee on International Forest Policy and the one on climate change.

As of 2007, out of 416 municipalities, 288 had developed *Local Agendas 21 (LA21)* covering more than 75% of Finland's population. LA21 have been developed entirely by the municipalities with some pilot projects supported by the state funds. The RECs have provided environmental information. A 2007 LA21 evaluation found that the climate change, environmental education, production and consumption as well as land use planning, transport and environmental infrastructure have been the most important in the majority of plans. The report pointed out that some progress

has been achieved in large and medium-sized cities, such as Tampere and Hämeenlinna, in integrating economic, environmental and social policies but challenges are still faced by small municipalities.

2.3 Access to justice

Every citizen is entitled to make a request to the Chancellor of Justice or the Parliamentary Ombudsman to review the legality of the decision-making by authorities. Citizens can also lodge *appeals* against decisions of public authorities or other institutions exercising public authority. The Vaasa Administrative Court has jurisdiction to hear all appeals that are based on the Environmental Protection Act and the Water Act concerning the Finnish mainland.¹¹ Two divisions of the Court deal almost exclusively with environmental cases. The Ministry of Justice monitors access to justice in environmental matters in the operations of administrative courts.

Of 3 793 cases submitted to the Supreme Administrative Court in 2006, 524 (13.8%) related to construction decision and 288 (7.6%) related to environmental matters. Thus, *cases falling within the scope of the Aarhus Convention* account for about one fifth of all matters submitted annually to the Supreme Administrative Court. In the administrative courts 2 829 (11.6%) were environment or construction-related cases. The average time taken to process such cases in the administrative courts in 2006 was 11.8 months and 12.3 months respectively (UNECE, 2008). The procedures for appeals against decisions of authorities in the administrative courts have been reinforced in 2007 by extending individuals' rights to influence government decision making at the preparatory stage.

According to the 2000 Environmental Protection Act individual persons, registered associations and foundations whose rights or interests are affected by pollution can institute *legal proceedings against unlawful acts*. This provision has been applied when establishing the extent of pollution of soil or groundwater and the need for treatment of damage. It can also be applied when rectifying a violation or negligence, giving orders to prevent pollution or suspending operations.

Victims of pollution can claim *environmental damage compensation* for a loss resulting from pollution of water, air or soil, and exposure to noise, radiation, light, heat or smell. The liability is strict: proof of a legal offence is not required for the operator to be found liable for damages. Compensation claims for environmental damage are first addressed directly by the claimant to the organisation responsible for damage. If agreement is not reached on compensation sums, the claimant may resort to the courts at any time up to ten years after the damage is incurred. In some cases compensation are claimed from secondary parties. In practice, there are very few

damage compensation cases tried in court. Operators can take traditional insurance against regular damage compensation claims on a voluntary basis.

Finland has also a particular scheme for *compensating private owners of water bodies for prospective damage from water pollution*. The scheme is the legacy of the Water Courts which existed in the country before the year 2000. Now the scheme is part of the permitting process. The amount of compensation and the parties to be compensated are, if applicable, stipulated in the permit itself. This is usually a contentious issue which triggers many appeals against related permits.

3. Sustainable Development in Education

Protection of the environment and sustainable development have been promoted in the Finnish education system since 1985 through a number of initiatives at national and local levels. In 1997 and 2002, the National Board of Education (NBE) drew up *programmes for sustainable development in education*. Supported by the implementation of the Baltic 21 Education Programme (Baltic 21E Programme) efforts have led to the incorporation of sustainable development elements in teaching curricula of general and vocational secondary education by 2003 and of elementary education by 2004. Sustainable development teaching was included in core and free choice subjects and joint school events. An evaluation of progress showed that 72% of vocational and 66% of general education institutions had included sustainable development promotion measures in their curricula (Ministry of Education, 2006). The 2006 law on competence tests required the introduction of sustainable development elements in every vocational education programme.

By 2003, all universities had prepared sustainable development action plans; around 20% of university departments offered courses on sustainable development and 40% had at least one programme of sustainable development related studies (Ministry of Education, 2006). Performance and target agreements between the Ministry of Education and *tertiary education* establishments (universities and polytechnics) in the period 2004-06 stimulated an introduction of additional environmental courses, lectures and specialised master's programmes. Emphasis has been placed on establishing networks of academic institutions for developing teaching and studying material, environmental system criteria and self-assessment tools. Many polytechnics appointed a head teacher in charge of developing regionally important research projects on sustainable development and promoting sustainable development teaching.

At local level, *nature and environmental schools* have complemented the compulsory education system. Initiated in 1997 by the MoE, the schools offer courses and programmes in nature, environment and consumer themes by arranging

environmental events, clubs and courses for children, youth and adults. Teaching takes place mainly outdoor and includes active learning through experience. In 2006, there were 24 nature and environmental schools reaching 70 000 participants. Some of the schools are operated by teachers touring different places for teaching. Most of the nature schools are administrated and financed by the municipalities (Toivonen, 2007). Sustainable development curricula have also been introduced in continuous education for adults, including folk high schools, citizen's institutes, education centres and summer universities with the financial support of the Ministry of Education.

As a tool and incentive for improvement of educational establishments' operations the *Environmental Criteria for Schools and Educational Establishments* were developed in 2003. Since then several academic institutions have defined goals and actions for "greening" their operations. They also publish environmental and social responsibility reports. Educational establishments may apply for grants for external audits from the Finnish National Board of Education.

Building on the positive experience from the Baltic 21E Programme the *Finnish National Strategy of Education for Sustainable Development and Implementation Plan to 2014*¹² was adopted in 2006. This was the first national strategy devised by a European country for the UN Decade of Education for Sustainable Development. The Strategy identified fourteen proposals for action under the themes *i*) building partnership and development centre networks, *ii*) influencing basic education and in-service training, *iii*) the development of learning materials. The challenges in implementing the Strategy include: a continuing lack of high quality teaching material and learning methods on environment and sustainable development and the prevalence of introductory level courses and very few specialized courses, especially at tertiary education level. Decreasing funding is also a problem, especially for training, awareness-raising among teachers, advisers and peer instructors (FNCSO, 2006). Establishing stronger links between education systems, environmental research and innovation should also receive greater attention.

4. Environment and Employment

Estimates from 2004 indicate that approximately 20 000 persons were employed in *environment-related jobs*, with about 9 000 jobs in eco-industries and 11 000 jobs in environmental services. Finnish environmental technology net sales reach EUR 3.4 billion, similar in size to iron and steel production. Environmental service companies are engaged mostly in activities within Finland while eco-industry provided about 2 600 jobs abroad. One out of five environmental

technology companies has foreign operations and exports that make up a significant proportion of net sales in environmental technology, totaling nearly half of domestic net sales.

Finland does not have a detailed environmental employment strategy but various policy initiatives emphasise the connections between environmental policy and employment. Finland's programme to promote sustainable consumption and production (2005) provides new business opportunities with new jobs creation. The Finnish Roadmap for the *EU's Action Plan for Environmental Technologies* (ETAP) prepared in 2006 aims at strengthening the Finnish eco-industries by creating a greater market demand through regulatory and economic instruments and supporting start-ups, growth and internationalisation of eco-business by equity investments in SMEs, provision of business expertise and export promotion (MEE, 2005). The 2007 joint action programme Cleantech Finland was launched to boost environmental business, with a target of doubling the turnover of the sector by 2012 (SITRA, 2007). Increasing the presence of "green" criteria in public contracts is also expected to stimulate job creation in the environment sector as public procurement accounts for 15% of Finland's GDP.

Environmental tourism related to nature conservation efforts (e.g. bird life and wildlife watching tours, cross-country skiing and trekking), has already contributed to job creation, as for example in the case of the Syöte National Park (Chapter 5). Further promotion of natural and heritage assets, and healthy life styles, combined with the development of nature conservation areas and quiet areas could provide additional business opportunities, including for local populations.

Notes

1. Key government agencies engaged in managing environmental health include: The National Product Control Agency for Welfare and Health (chemicals), the National Food Agency (foodstuffs) and the Finnish Consumer Agency (product safety). The Centre of Excellence for Environmental Health Risk Analysis under the National Public Health Institute (KTL) carries environmental health risk analyses.
2. The FEHAP followed the endorsement of the Environmental Health Action Plan for Europe (EHAPE) at the Second WHO's Conference on Environment and Health (Helsinki, June 1994).
3. Most recent studies on health risks of fine particulates from domestic combustion and road traffic (PILTTI project, 2007) indicate that the primary fine particulates cause 900 premature deaths each year, including 750 cases due to exposure to direct (650) and re-suspended (100) particulates from traffic and 150 cases from residential wood combustion in cities.
4. Results from the PUPO-health project (from an air quality monitoring campaign of the Helsinki Metropolitan Area Council in the Lintuvaara area of Espoo) where wood for residential heating is widely used.
5. Professional fishermen were found to be a population highly exposed, with the concentrations of both compound groups being 2 to 4 times higher compared to non-fishermen of the same age.
6. The document recommended that large Baltic herring, more than 17 cm in total length, should be consumed a maximum of once or twice a month and as an alternative to large herring salmon caught in the Baltic Sea. Pike caught in the sea or inland waters can be consumed once or twice a month. In addition, consumers eating fish from inland waters on an almost daily basis were recommended to reduce their consumption of predatory fishes that accumulate mercury (large perch, pike perch and burbot). Pregnant women and nursing mothers were also advised to refrain from eating pike due to risk of methyl-mercury contamination of a natural origin.
7. Finland (and also Sweden) was granted derogation from the EU Council Directive 2001/102/EC that had established the maximum levels of PCDD/Fs in substances and products for animal nutrition, including limit value for fish and fish products. The derogation allows these countries to permit fish, in which the maximum level is exceeded, to be sold, but prohibits the exports to other EU countries. Finland and Sweden must annually report to the Commission the monitoring results of the levels of PCDD/Fs in fish from the Baltic region and the measures taken to reduce the human exposure to PCDD/Fs from fish. In 2005, this derogation for Finland and Sweden became permanent.
8. About 20% of the Finnish population, live in houses that are not connected to centralised sewerage systems and about 350 000 permanent residences and a further 450 000 holiday homes must treat their own waste water "on site". The treatment systems in many cases are obsolete or ineffective.
9. The Act requires that access to a document in the public domain should be granted within two weeks from the date when the authority received the request. If the number of requested documents is large, if they contain confidential parts or the decision requires special measures

or an irregular amount of work, the matter shall be decided and access granted within one month from the receipt of the request.

10. The Finnish Association for Nature Conservation (SLL), the largest non-governmental organisation for environmental protection and nature conservation in Finland, has 30 000 individual members in 203 local associations. The Nature League (Luonto-Liitto), that functions as nationwide youth organisation under SLL, has about 4 000 members. The Finnish Society for Nature and Environment (Natur och Miljö) has 4 000 members and 22 local groups that belong to the Swedish-speaking minority. Branches of international organisations, such as Greenpeace, Friends of the Earth, and WWF are also active. NGO activities are financed by membership fees, governmental contributions and grants from private foundations. A large part of the work is done on a voluntary basis.
11. The former special Land Courts have been abolished and their duties have been entrusted to the District Courts. The former Water Courts have now been transformed into Environmental Permit Authorities, while the former Water Court of Appeal has been incorporated in the Vaasa Administrative Court.
12. The subcommittee for education established by the Ministry of the Environment and the Finnish National Commission on Sustainable Development operated between May 2004 and December 2007.

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8

INTERNATIONAL CO-OPERATION*

Features

- Climate change challenges
- Marine pollution
- Official Development Assistance
- Bilateral co-operation with Russia
- Regional co-operation (Nordic, Arctic and Baltic)

* The present chapter reviews progress since the previous OECD Environmental Performance Review of 1997. It also reviews progress with respect to the objectives of the 2001 OECD Environmental Strategy.

Recommendations

The following recommendations are part of the overall conclusions and recommendations of the environmental performance review of Finland:

- *review and revise the taxation of energy products*, as part of the preparation and implementation of the new Climate Strategy;
- take measures in the farming sector to *reduce nutrient loading in coastal waters* in the context of the Common Agricultural Policy reform, the Nitrates Directive and the HELCOM Baltic Sea Action Plan; in particular, consider introducing more targeted agri-environmental measures;
- extend to *hazardous and noxious substances* the measures taken to prevent, control and respond to oil pollution from ships ;
- strengthen efforts to develop *sustainable forest management in north-west Russia* in the context of EU-Russia environment dialogue;
- increase the level of *official development assistance* (with UN target of 0.7% of GNI in mind) and its share devoted to environment; contribute to strengthening the capacity of recipient countries to absorb possible increases in financial flows (*e.g.* through CDM projects);
- ratify and implement global and regional environmental agreements; continue to promote synergies between *Multilateral Environmental Agreements*; in particular, pursue efforts towards setting up an international chemical strategy.

Conclusions

Finland attaches importance to environmental and sustainable development issues in its overall diplomacy. It has been a proactive partner in *multilateral environmental co-operation* and has contributed to raising international awareness concerning responses to climate change, biodiversity degradation, and material intensity issues associated with consumption and production patterns. Finland considers that environment and trade should be at an equal level in international law. It continues to encourage *regional environmental co-operation* within *Nordic, Baltic, Arctic and European frameworks*. As a member of the *European Union* since 1995, Finland has implemented or is implementing EU directives and is involved in the EU environmental action (particularly in the Baltic region and in co-operation with Russia). Finland has done its part to reduce the pollution load of the *Baltic Sea*, and to help control industrial and municipal point sources of pollution in the Gulf of Finland. Prosecution has been strengthened to address deliberate illegal discharges of

bilge oil associated with the increase of shipping in the Baltic Sea. *Bilateral co-operation with Russia* has focused on specific environmental issues and tangible results (e.g. creation of a Green Belt of protected natural areas on both sides of the border, waste water treatment in Saint Petersburg).

However, there is a need to strengthen efforts to address *climate change* mitigation concerns. A new, long-term, climate and energy strategy has been submitted to Parliament (following those of 2001 and 2005) in the framework of the new EU energy and climate change package. In 2006 Finland's GHG emissions had increased by 13% compared to 1990, well above the Kyoto commitment of 0%. The CO₂ emission per unit of GDP and the energy intensity of Finland are high among OECD countries. Meeting the Kyoto target will have to be achieved with the aid of further national measures, emission trading and the Kyoto mechanisms. Concerning the *Baltic Sea*, domestic measures are needed to further reduce nutrient loading from Finnish agriculture. The heavy presence of dioxine in the Baltic has led to an exception to EU directives for Finland (and Sweden). There is also a need to strengthen pollution prevention from ships (e.g. oil pollution, pollution from hazardous and noxious substances, waste dumping). Finland should further promote bilateral co-operation on *sustainable forest management* in north-west Russia so as to facilitate timber trade (Russia recently imposed an export tariff on its timber) while addressing illegal logging, in the EU and WTO contexts. Although identified as a key horizontal issue in Finland's development co-operation, environmental concerns should be better addressed and monitored in Finland's *official development assistance*.



Environmental co-operation remains a significant part of Finland's foreign policy. Finland is well aware that serious environmental issues can endanger *global security* and be a source of international conflicts. At global level, it gives particular importance to co-operation concerning climate change, biodiversity and sustainable consumption and production patterns. As an industrialised country with a large export industry (e.g. forestry-based sectors, non ferrous metals, electronics), Finland considers it has special responsibilities for the protection of the global commons, and that *environment and trade* should be at an equal level in international law. It believes environmental issues to be important in the *development* process of developing countries. Finland has hosted many important international meetings on the environment, supported the development of international environmental law and ratified most multilateral environment agreements.

1. Climate Change

Finland anticipates that its climate will become warmer by 2-5 °C by the 2050s. Precipitation is projected to increase, especially in winter. The climate change will probably be stronger and more rapid in the Arctic regions. The relative sea level of the Baltic Sea is not expected to rise as much as in others parts of the globe because of the land uplift relative to the mean sea level. Increases in the frequency or magnitude of extreme weather phenomena can be expected to have more significant negative impacts on the Finnish economy and society than gradual and potentially beneficial average temperature increases.

1.1 Challenging trends

Finland ratified the UN Framework Convention on Climate Change (UNFCCC) in 1994 and the 1997 Kyoto Protocol in 2002, together with the other EU countries. Under the protocol and as a result of the EU burden-sharing agreement, Finland should bring its average annual *greenhouse gas (GHG) emissions down to the base year¹ level by 2008-12*. This can be achieved through domestic measures, emission trading and use of the Kyoto flexibility mechanisms.

Because of its integration in the Nordic electricity power pool, Finland has experienced *wide fluctuations in annual GHG emissions*. GHG emissions in 2003 were nearly 20 % higher than in the base year (at some 15 tonnes per capita) while in 2000 and 2005 they were below the base year level (Figure 8.1). During these rainy years Finland imported very large amounts of hydro-electricity from Norway and Sweden and reduced production from its own peat- and fossil-fuelled power plants. By 2006 total GHG emissions had increased by 13% compared to the base year due to an increase in CO₂ emissions (Table 8.1).

While GHG emissions from energy have widely fluctuated since the base year, those from transport and industrial processes have increased and those from agriculture, waste management and the use of solvents have decreased. In 2006 energy industries accounted for 41% of total GHG emissions, followed by transport (18%), manufacturing industries and construction (14%), commercial and residential (9%), industrial processes (8%), agriculture (7%) and waste (3%) (Table 8.1). In 2006, most GHG emissions originated from *electricity and heat generation*, and from *fuel combustion in road transportation*. Efforts must concentrate on curbing these types of emissions in the years to come. Electricity and heat generation is covered by the EU emission trading scheme (EU-ETS, Directive 2003/87/EC), not fuel combustion in road transportation.

Under the “with measures” scenario, the 4th National Communication under the UNFCCC (NC4) estimated that *average annual GHG emissions would increase by about 10% in 2008-12*, compared to the target of 0% increase (Table 8.1). This scenario includes all measures either adopted or under implementation as of 2005, excluding the EU-ETS.² Additional measures to meet the Kyoto target include implementation of the EU-ETS and use of the project-based Kyoto flexibility mechanisms (*i.e.* Joint Implementation (JI) in other developed countries and Clean Development Mechanism (CDM) in developing countries).

Table 8.1 Greenhouse gas emissions
(million tonnes of CO₂ equivalent)

	Base year ^a	1997	2006	2010 ^b		2020 ^b		2006/base year (% change)	2010/base year (% change) ^c
				WM	WAM	WM	WAM		
CO ₂	56.7	62.6	68.1	66.8		70.7		20.1	17.8
CH ₄	6.3	5.9	4.5	4.2		4.0		-28.6	-33.3
N ₂ O	7.9	7.1	6.9	6.5		6.2		-12.7	-17.7
F-gas	0.1	0.2	0.8	0.9		1.2		700.0	800.0
HFC	0.03	0.17	0.75	..		..
PFC	0	0	0.02	..		..
SF ₆	0.07	0.08	0.04	..		..
Total GHG	71.0	75.8	80.3	78.4		82.1		13.1	10.4
Energy ^d	41.9	47.7	51.6	49.9	42.8	53.8	43.2	23.2	19.1
Transport	12.8	12.8	14.4	13.9	13.2	13.8	13.2	12.5	8.6
Industrial processes ^e	5.2	5.4	6.2	7.2	6.8	7.8	7.0	19.2	38.5
Agriculture	7.1	6.2	5.6	4.7	4.7	4.3	4.3	-21.1	-33.8
Waste	4.0	3.7	2.5	2.7	2.6	2.4	2.1	-37.5	-32.5
Total ^f	71.0	75.8	80.3	78.4	70.1	82.1	69.8	13.1	10.4
Sinks ^g		-20.9	-33.4	..	..	..	..

a) 1990 emissions for CO₂, CH₄ and N₂O plus 1995 emissions for F-gas.

b) Forecast under a “with measures” or “with additional measures” scenario.

c) Considering the “with measures” scenario.

d) Including emissions from energy industries, manufacturing industries and construction, commercial and residential sectors, as well as fugitive emissions.

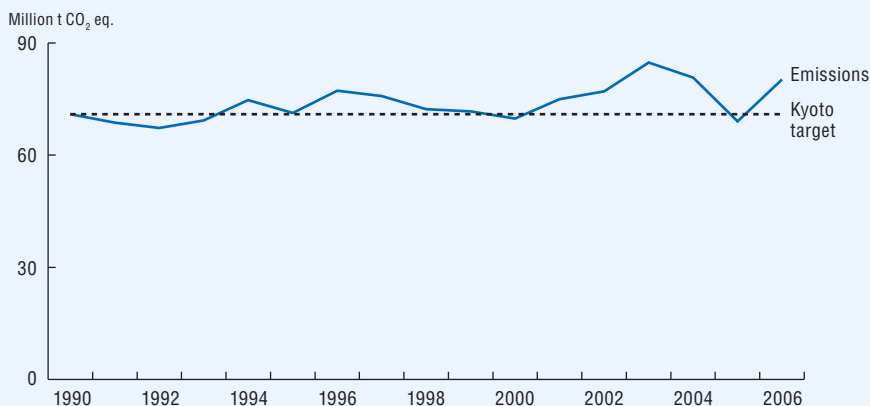
e) Including emissions from solvent and other product use.

f) Excluding international bunkers, as well as emissions/removals of the land use, land use change and forestry sector (LULUCF).

g) LULUCF emissions/removals, including forest land, cropland, grassland, peat extraction areas and harvested wood products.

Source: National Inventory Report April 2008, Fourth National Communication under the UNFCCC (2006).

Figure 8.1 Greenhouse gas emissions in relation to the Kyoto target, 1990-2006



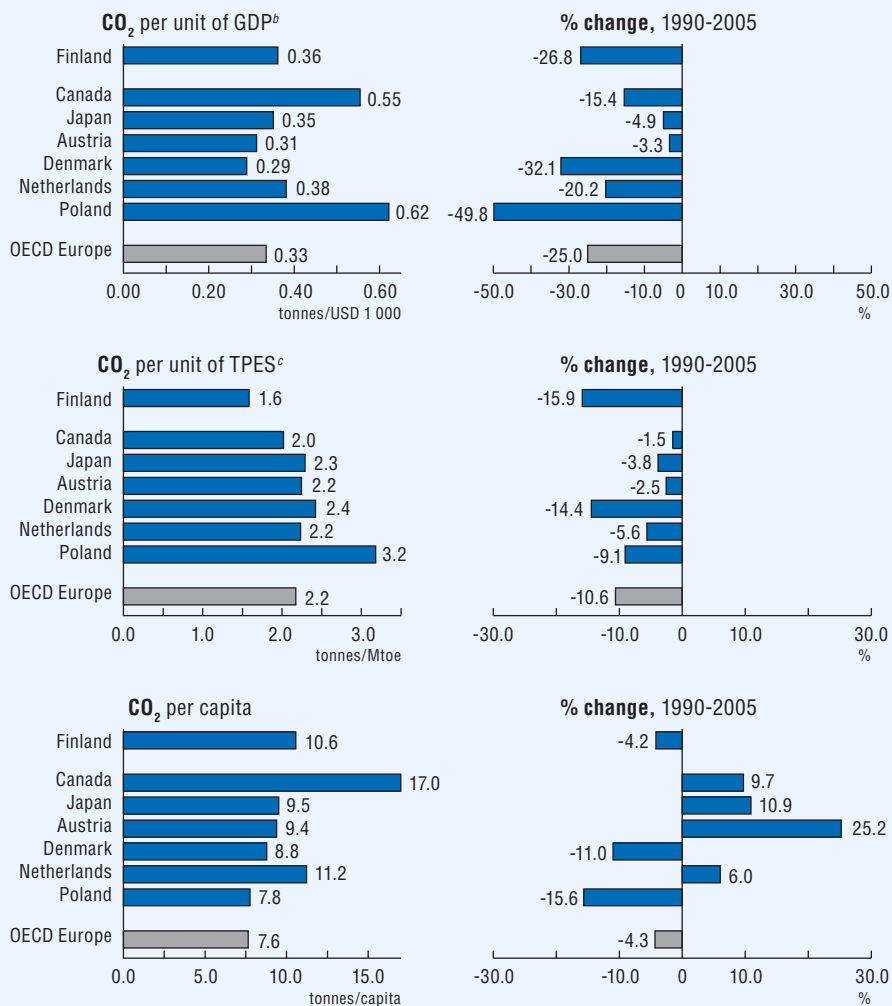
Source: Statistics Finland.

1.2 Climate and energy policies

Since 1990 *CO₂ emission intensities* (per unit of GDP, per unit of energy supply) have improved faster than the OECD-Europe average (Figure 8.2), and *CO₂ emissions from energy use* have been decoupled from GDP (Table 6.1 and Figure 2.1). However, Finland's *CO₂ intensity* (CO₂ per unit of GDP) and *energy intensity* (energy supply per unit of GDP) are still quite high (Figure 6.2). Only a few OECD countries have higher intensities. The CO₂ intensity of Finland is twice higher than France, Norway, Sweden or Switzerland. The energy intensity of Finland is twice higher than those of Denmark, Ireland, Italy or Switzerland (Reference IB).

In 2001, the Finnish Government prepared a First national climate strategy, containing a set of measures designed to reduce GHG emissions by 14 million tonnes (Mt) by 2010 so as to meet Finland's obligations under the Kyoto Protocol. Most of the reduction (6 Mt) was to come from changes in electricity supply (construction of an additional nuclear power plant or limiting coal consumption). The strategy also included promoting renewable energy sources (4 Mt), energy efficiency (3 Mt) and measures concerning methane and GHGs other than CO₂ (1 Mt). In 2005, a revised strategy, the *National Energy and Climate Strategy* (NECS), was adopted, together with a National Strategy for Adaptation to Climate Change (Table 8.2). The NECS took as its starting point a more conservative outlook under the "with measures"

Figure 8.2 CO₂ emission intensities,^a 2005



a) Includes CO₂ emissions from energy use only; excludes international marine and aviation bunkers; sectoral approach.

b) At 2000 prices and purchasing power parities.

c) Total primary energy supply.

Source: OECD-IEA (2007), *CO₂ Emissions from Fuel Combustion*; OECD (2007), *OECD Economic Outlook No. 82*; OECD-IEA (2008), *Energy Balances of OECD Countries*.

scenario than NC4 (*i.e.* an excess of 11.2 Mt compared to the base year). The NECS relies heavily on allocation of emission allowances under the EU-ETS, which started operating in 2005. In 2007, the European Commission (EC) approved an annual cap of 37.6 Mt for *Finland's National Allocation Plan (NAP) 2008-12*, a significant reduction from the one under the previous NAP 2005-07 (45.5Mt).³ It would contribute a 10.7 Mt GHG emission reduction compared to the base year; the remainder would come from *i)* domestic measures (for sectors outside the EU-ETS), and *ii)* government purchases of credits from the Kyoto flexibility mechanisms. The exact distribution between domestic measures and credit purchases has not yet been determined, though the government has already begun to procure emission credits from the international market and estimates that they could constitute up to 15-20% of all reduction efforts for the Kyoto period (*i.e.* in the range of 1 Mt).⁴

Table 8.2 **Key climate change adaptation challenges, by sector**

Sector	Vulnerability issues	Adaptation measures
Cross-sectoral	Increase in extreme weather events: floods and heavy rains, droughts, frosts, storms	Sectoral strategies to cope with extreme weather events (agriculture, forestry, energy)
Agriculture	Shifts in cropping zones and pest distribution; increase in wheat/potato yields	Change in crop varieties and cultivation practices; plant breeding
Forestry	Displacement of boreal forests and change of broadleaved forests into boreal forests	Change in forest management practices; protection of gene pools of forest trees
Water resources	Increased/reduced runoff in winter/summer; Increased/reduced flood risks from precipitation/snowmelt	Change in water management practices; raising of flood banks and including rain-induced floods in land use planning
Energy	Decrease in heating-degree days; ^a increased potential for bioenergy and for hydropower in winter	Change in hydropower production; planning for decreased energy consumption
Health	Lengthened transmission period for tick-borne diseases; increased exposure to ultraviolet radiations	Reduction of tick populations; public awareness and housing design
Tourism	Reduced winter snow cover; increased summer beach tourism on the Baltic Sea	Increased use of artificial snow; developing alternatives to ski tourism

a) The higher the temperature the lower the number of heating-degree days.

Source: Adapted from UNFCCC (2006).

The most important measure for *emission reductions in the EU-ETS* sector is the construction of Finland's 5th nuclear power plant (Olkiluoto 3). This will represent annually more than half of reduction potentials in Finland during the Kyoto period. Outside the EU-ETS, a key measure is to facilitate *the use of bioenergy* (wood and wood-based fuels in particular) in small combined heat and power plants.⁵ Other measures will contribute to achieving the Kyoto target (Table 8.3). The NECS does not, however, specify the size of the reductions it expects to achieve through the proposed measures. It lacks an analysis of *cost and reduction potential of the different domestic measures* (e.g. energy efficiency improvement in the industry, transport and residential sectors; development of renewables; deployment of the EU-ETS) (IEA, 2008).

Table 8.3 **Key climate policy measures for the Kyoto period, by sector**

Sector	Key measures
Cross-sectoral	
Integrated climate programme	National Climate Strategy since 2001
Taxation	CO ₂ tax since 1990 plus energy tax (pursuant to 2003/96/EC ^a since 2004)
Emission trading	EU Emission Trading Scheme (EU ETS) since 2005
R-D	Several programmes under the National Technology Agency
Subsidies	Government purchases of credits from Kyoto flexibility mechanisms since 1999
Energy	
Energy mix	5th nuclear power plant to start operating from 2009 (delayed)
Energy sector liberalisation	Electricity Market Act since 1995
Energy efficiency	Voluntary agreements with industry since 1997; building codes since 1985; 10% energy tax rebate for combined heat and power (CHP) since 2003
Renewable energy sources	Investment subsidies, feed-in tariffs from 2010
Transport	
Fuel taxes	CO ₂ tax on road fuels since 1990; tax incentive and mandatory blending for bio-fuels since 2007
Vehicle taxes	CO ₂ -based taxes for passenger cars for both registration tax since 2008 and annual circulation tax from 2010
Agriculture	Agri-environmental payments since 1995
Waste management	Landfill tax since 1996
Forestry	Payments for biodiversity enhancement since 1996

a) EU Directive on restructuring the Community framework for the taxation of energy products and electricity. The energy tax applies to energy products used as fuel or for heating.

Source: Adapted from UNFCCC (2006).

1.3 Post Kyoto

In November 2008 the Finnish government unveiled a *Long-Term Climate and Energy Strategy* (LTCES) to meet its GHG emission reduction objectives by 2020, as part of the forthcoming post-Kyoto's EU burden-sharing agreement.⁶ The LTCES was submitted to Parliament on 6 November 2008 and will replace the 2005 NECS.⁷ As GHG emissions from agriculture and waste are decreasing continuously, new policies will focus on energy production, transport and energy use in residential sectors. According to the proposed strategy, decisions on planned nuclear plants should be made by 2011. Finland is considering building more nuclear reactors to replace old fossil fuel-fired power plants. There are plans for at least three more new plants in addition to the Olkiluoto 3 reactor, which is due to be completed by 2012. The strategy also outlines actions to meet Finland's renewables target for 2020.⁸ Major increases are envisaged for wind power, wood energy, waste combustion, ground-source heat pumps and biogas. Feed-in tariffs will be established for wind power and biogas in 2010, and later possibly also for wood energy. Moreover, the strategy entails halting and reversing the growth in final energy consumption so that, in 2020, final energy consumption will be at least 10% less than it would without new energy policy measures. The longer-term vision entails a further decrease in final energy consumption by 2050 of at least one third of the 2020 quantity. To attain these objectives, new taxation and subsidy policies will favour fuel-efficient, hybrid and electric vehicles and public transport. And greater efficiency will be promoted through tighter controls over new buildings and subsidies for thermal renovations. The proposed strategy also addresses concerns such as security of energy supply and availability at a reasonable price.

As GHG emissions are projected to increase or at best to stabilise between 2010 and 2020 (Table 8.1), the question arises whether the LTCES will manage to respond to more stringent GHG emission reduction objectives by 2020 in the most cost-effective way. *For sectors covered by the EU-ETS*, the European Commission's proposal to set a single EU-wide cap for the period beyond 2012, which will decrease along a linear trend line until 2020, and to auction a much larger share of allowances will balance the needs for economic efficiency and fairness between the relevant sectors and member states, and will provide more predictability for industry. Auctioning best ensures the efficiency, transparency and simplicity of the system and it provides revenues that can be used to reduce distorting taxes. The implicit "carbon tax" on electricity generation will be a much more cost-effective way to drive future investment in renewable energy sources than feed-in tariffs.

For *sectors outside the EU-ETS*, carbon taxes offer an opportunity to replace taxes which reduce efficiency by distorting incentives (*e.g.* to work and to invest) by taxes which correct negative externalities caused by the use of fossil fuels, raising

economic efficiency on both accounts. To create an effective and uniform incentive towards efficient energy consumption, without creating distortions between energy products, all fuels (including transport fuels) should be taxed according to their carbon content, which is not fully the case in Finland despite Finland having been a pioneer in implementing a carbon tax.⁹ Also, to assure the efficiency of carbon taxes, it is important to allow their effects to be fully reflected in the user cost of all products; any existing direct or indirect energy subsidies should be abolished, as part of the energy sector liberalisation.

The use of *road bio-fuels* has been negligible in Finland so far. The situation is expected to change following entry into force on 1 January 2008 of a new law on “Promoting Bio-fuels Use in Transport”, which forces fuel distributors to deliver/sell set amounts of liquid bio-fuels to consumers each year. According to this law, in 2008 the share of bio-fuels had to be at least 2% of the energy content of sold road fuels. The share should increase to 4% in 2009 and 5.75% in 2010, pursuant to the EU bio-fuel directive (2003/30/EC). Finnish industry has carried out R-D in this sector for several years with a view to supply domestic¹⁰ as well as international markets. However, taxes on the carbon content of all fuels would constitute a more efficient policy than subsidies for bio-fuel use as they would directly target CO₂ emissions. Also, more fuel-efficient vehicles offer large GHG emission reduction potential and would be more cost-efficient than replacing fossil fuels with bio-fuels (OECD, 2007a). The recent decision to base on CO₂ emissions (declared by the manufacturer) both annual circulation and registration taxes for passenger cars goes in the right direction (Chapter 6).

The use of *Kyoto flexibility mechanisms* is likely to be one of the most cost-effective means of reducing GHG emissions in Finland in the short term.¹¹ However, their use to acquire domestic emission rights is currently restricted¹² and will continue to be so. More importantly, one definite advantage of using economic instruments (like carbon taxes or auctioning off emission permits) to curtail energy consumption and GHG emissions in Finland is that it creates strong incentives for innovation to raise energy efficiency and to develop substitutes for polluting fossil fuels, like renewable or carbon free energy sources.

1.4 Forest sinks

Under the Kyoto Protocol there are two main groups of *Land Use, Land-Use Change and Forestry (LULUCF) activities*. Article 3.3 of the Protocol addresses afforestation, reforestation and deforestation (ARD) since 1990; accounting of ARD activities is mandatory. ARD activities in Finland are a net GHG source due to deforestation taking place at higher rates than afforestation/reforestation. Projected

net carbon stock changes from ARD are +1.9 to +2.4 million tonnes (Mt) CO₂ per year in 2008-12. Article 3.4 identifies four additional land use activities (forest management, cropland management, grassland management, and revegetation)¹³ accounting of these activities is elective. Finland has elected removals from forest management that are projected to far exceed ARD's net emissions in 2008-12.¹⁴ In 2008 wood products have been included in Finland's LULUCF national inventory for the first time. On average, their impact is limited, with a net sink varying between 0.3 and -2 Mt CO₂ equivalent per year.

The *net sink of the LULUCF sector in Finland is significant* and has been growing over the last decade, largely due to forest growth¹⁵ and the associated increase of forest biomass. In 2006 the LULUCF net sink accounted for 33.4 Mt, *i.e.* more than 40 % of Finland's total GHG emissions (Table 8.1). Including LULUCF in 2008-12, however, will have limited impact on Finland's total GHG emissions in the Kyoto period, as it will be limited to the maximum allowance that Parties to the Kyoto Protocol may account for removals from forest management (-0.59 million tonnes CO₂ per year for Finland).¹⁶ Would Parties to the Kyoto Protocol decide to set (much) higher ceilings for the post Kyoto (second commitment) period, Finland could consider launching a special programme for forest owners on increased carbon sequestration.

2. Marine Pollution: The Baltic Sea

As a shallow sea, the Baltic Sea is particularly vulnerable to pollution originating from precipitation, land-based sources, and from ships. The Helsinki Commission (HELCOM) has an international secretariat that provides support for the Helsinki Conventions (1974 and then 1992) aimed at protecting the marine environment of the Baltic Sea through intergovernmental co-operation. It has assessed the sources and inputs of nutrients and hazardous substances and their effects on ecosystems in the Baltic Sea for almost 30 years. With regard to *hazardous substances*, the mercury and PCB concentrations in small Baltic herring muscle decreased over the last decade, as did lead concentration in herring liver. However, the concentrations of dioxins and furans (PCDD-equivalents) in guillemot eggs have not decreased significantly since 1990¹⁷ and cadmium concentrations in herring liver are not significantly lower than those of the early 1980s. EC Regulation No. 1881/2006 sets maximum levels for certain contaminants in foodstuffs. It regulates cadmium, lead, mercury, dioxins, dioxin-like PCBs and benzo(a)pyrene in muscle meat of fish. By derogation, until the end of 2011, Finland may put on the market herring, river lamprey, salmon and trout originating in the Baltic region even if the levels of dioxins and dioxin-like PCBs exceed those prescribed in the Regulation. The derogation applies to fish and fish

products intended for domestic consumption, provided that, *inter alia*, a system is in place to inform vulnerable sections of the population of dietary recommendations. As for *nutrients*, eutrophication is an issue of major concern almost everywhere around the Baltic Sea area; satellite-derived chlorophyll-like pigments in the Baltic Sea are clearly higher than in the Skagerrak and North Sea.

Hazardous substances and nutrients enter the Baltic Sea *via rivers or direct discharges*.¹⁸ Mercury emissions from the Finnish industrial and mining activities to inland and coastal waters decreased from 27 to 10 kilograms a year in 1997-2005, while that of lead remained virtually unchanged and that of cadmium decreased from 2.88 to 1.75 tonnes a year. Over that period, waterborne inputs of total nitrogen from Finland to the Baltic Sea increased from 64 239 to 78 435 tonnes a year, while that of total phosphorus increased from 3 040 to 3 382 tonnes a year.

2.1 Pollution from land-based sources: domestic measures

The discharge reduction targets set by the 2nd National Water Protection Programme (NWPP), and covering the period 1986-95, were met for municipal and industrial waste waters (organic matter and phosphorus), but not for agriculture (phosphorus) (OECD, 1997). Only a few of the more ambitious targets set by the 3rd NWPP for 2005 from their early or mid-1990s levels, were met (Table 8.4). In 2005, Finland launched an Action Plan for the Protection of the Baltic Sea and Inland Watercourses to implement the (first ever) 2002 Finnish Programme for the Protection of the Baltic Sea whose discharge reduction targets are in turn based on the 3rd NWPP adopted in 1998.¹⁹ The action plan identifies *eutrophication as the most significant environmental challenge*, particularly in the Gulf of Finland. In November 2006 the Finnish Government approved the national Water Protection Policy Outlines to 2015 to facilitate the drafting of river basin management plans, pursuant to the EU Water Framework Directive.

Nutrient pollution from Finland to the Baltic Sea originates mainly from agriculture and municipal waste water (Table 8.5). Responding to the OECD recommendation to continue efforts in *waste water treatment* to reduce nitrogen releases into the Baltic Sea, the performance of municipal treatment plants has been improved and all plants now use biological-chemical treatment methods. Both the organic matter, phosphorus and nitrogen loads to receiving waters have decreased while the average removal rate of treatment plants has increased. The present removal rate for nitrogen is 54% (compared to more than 95% for organic matter and phosphorus). Public waste water treatment plants serve 81% of the population, a high share by OECD standards (Figure 8.3).

Responding to the OECD recommendation to take more effective measures to reduce nutrient releases from *agriculture*, there have been significant decreases in national balances of nitrogen (N) and phosphorus (P),²⁰ mainly due to reduced use of commercial fertilisers. Finland's national balances of N and P are lower than the OECD and EU15 averages, when expressed per hectare of agricultural land (Table 8.6). However, no clear reduction in nutrient loading or improvement of water quality of rivers, lakes and estuaries was detected in agricultural catchments over the period 1990-2005 (Ekholm *et al.*, 2007), and the 50 % reduction target for the year 2005 was not reached (Table 8.5). After joining the EU (in 1995) Finnish agriculture has gradually become more specialised, and the regional division between

Table 8.4 Progress in implementing the 3rd National Water Protection Programme

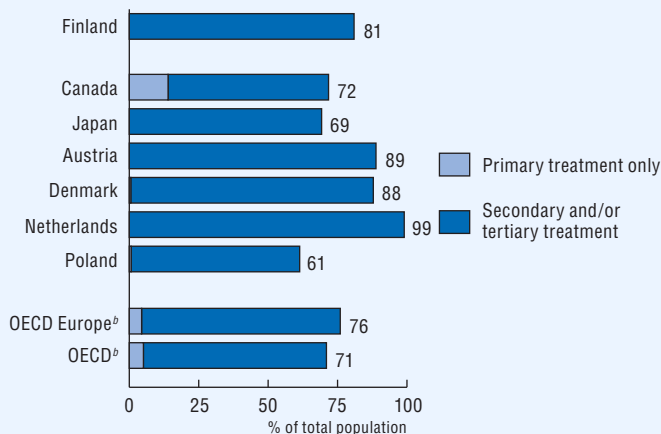
Pollution source	Pollutant	Reference year	Reduction (%)	
			2005 target	Status in 2003
Agriculture	Phosphorus	early 1990s	50	no significant reduction
	Nitrogen	early 1990s	50	no significant reduction
Forestry	Phosphorus	early 1990s	50	30-56
	Nitrogen	early 1990s	50	8-24
Fish farming	Phosphorus	1993	30	48
	Nitrogen	1993	30	43
Fur farming	Phosphorus	1993	55	not achieved
	Nitrogen	1993	55	not achieved
Peat production	Phosphorus	1993	30	9
	Nitrogen	1993	30	8
Industry	COD _{cr}	1995	45	27
	Phosphorus	1995	50	36
	Nitrogen	1995	50	18
	Oil	1995	55	55
	Chrome	1995	90	90
	Nickel	1995	75	70
	Copper	1995	80	33
Population centres	Zinc	1995	65	58
	Phosphorus	early 1990s	35	26
Scattered settlements ^a	Nitrogen	early 1990s	14	14
	BOD ₇	early 1990s	60	15
	Phosphorus	early 1990s	30	15

a) Not connected to sewerage.

Source: SYKE.

animal and crop farms has widened. While national nutrient balances have clearly decreased, the nutrient balances showed smaller decreases in intensive animal production areas of the near-coastal regions in south-western and western Finland.

Figure 8.3 Population connected to public waste water treatment plant, 2006^a



a) Or latest available year.

b) Secretariat estimates.

Source: OECD Environment Directorate.

There have been steps in the right direction. The Finnish Agri-Environmental Programme (AEP), introduced in 1995, has been adopted by 90% of the farmers and covers 96% of the arable area.²¹ Since its inception, the AEP has required a farm level approach and its second phase (2000-06) introduced new requirements to improve crop and livestock farming. The 2000 Environmental Protection Act requires permits and inspections on large animal farms. However, the intensification of animal production has not been sufficiently considered by the AEP (Turtola, 2007). Also, the 1991 EU Nitrates Directive, transposed in Finnish legislation in 2000, applies to all of Finland, without regional or local differences. There is a *need for better targeted agri-environmental measures*,²² as recommended by the Finnish Water Protection Policy Outlines to 2015, which set a (less ambitious) target²³ to reduce agricultural nutrient loads by a third by 2015 from its 2001-05 level.²⁴ The effectiveness of the AEP and reduction in nutrient surpluses would be enhanced by decoupling agricultural support from production (Lehtonen *et al.*, 2007).

Table 8.5 **Nutrient loads from Finland to the Baltic Sea,^a by source**
(%)

Nutrient source	Bothnian Bay		Bothnian Sea		Archipelago Sea		Gulf of Finland	
	N	P	N	P	N	P	N	P
Agriculture	52	51	57	64	69	77	44	55
Municipal waste water	13	4	20	6	15	5	28	14
Scattered settlements	4	12	5	13	5	9	7	14
Atmospheric deposition	13	9	9	3	2	0	12	4
Forestry	8	16	4	5	1	1	3	3
Industry	6	5	3	5	3	0	5	8
Fish farming	1	1	1	2	4	7	0	1
Other ^b	3	2	2	1	1	0	1	0
Total	100	100	100	100	100	100	100	100
Total load (tonnes)	18 000	980	12 000	520	5 500	390	12 000	500

a) Annual average over 2000-04.

b) Peat production and storm water overflows.

Source: SYKE.

Table 8.6 **Gross nitrogen and phosphorus balance estimates^a**

(kg N or P per ha of total agricultural land)

	Finland	EU15	OECD
Nitrogen			
1990-92	83	113	88
2002-04	55	83	74
Phosphorus			
1990-92	20	18	16
2002-04	8	10	10

a) The gross nitrogen/phosphorus balance calculates the difference between the nitrogen/phosphorus inputs entering a farming system (*i.e.* mainly livestock manure and fertilisers) and the nitrogen/phosphorus outputs leaving the system (*i.e.* the uptake of nutrients for crop and pasture production).

Source: OECD, Environment Directorate.

Progress is also needed to reduce nutrient discharges to the Baltic Sea from *sources other than municipal sewage and agriculture*. Pollutant loads from industry and fish farms have been reduced in Finland, but diffuse loads from managed forests and scattered rural settlements proved to be more difficult to curb. A share of the nutrient pollution burden is also due to atmospheric deposition (Chapter 2).

2.2 Pollution from land-based sources: international co-operation

In 1992, the *HELCOM's Baltic Sea Joint Comprehensive Environmental Action Programme* (JCP) identified 162 pollution “hot spots” in the Baltic Sea catchment area. Half of them have been cleaned up under the JCP, reflecting progress in the treatment of municipal and industrial waste water. Most of the remaining hot spots are located in Poland and Russia (Table 8.7). In 1992, HELCOM had estimated the

Table 8.7 **Pollution hot spots in the Baltic Sea catchment area**
(number)

	1992	2008 ^a	Balance (eliminated hot spots)
Denmark	4	3	1
Estonia	12	5	7
Finland	10	1	9
Germany	8	0	8
Latvia	9	7	2
Lithuania	15	7	8
Poland	49	20	29
Russia	32	22	10
Sweden	12	5	7
Transboundary ^b	5	3	2
Other ^c	6	6	0
Total	162	79	83
Agriculture runoff	17	12	5
Coastal programme ^d	7	4	3
Industry	63	23	40
Municipality	75	40	35
Total	162	79	83

a) As of March 2008.

b) Hot spot shared between two countries.

c) Non-HELCOM countries: Belarus, Czech Republic and Ukraine.

d) Coastal lagoons and wetlands where specific environmental measures are needed.

Source: HELCOM.

cost of cleaning up all the hot spots at around EUR 18 billion; considerable investment is still needed to successfully complete the JCP by 2012. Bilateral or multilateral assistance to the development of waste water infrastructure in the Baltic Sea catchment area²⁵ should be made conditional upon recipient countries *applying the polluter pays principle* to the pricing of waste water services, thereby helping them to maintain and operate the infrastructure.

Concerning the *Gulf of Finland*, nearly half (14) of the 30 hot spots in its *catchment area* have been cleaned up. The only remaining hot spot in Finland relates to agriculture in south-west Finland. Changes in the nutrient loads into the Gulf of Finland are largely governed by changes in the Russian national loads, especially changes in the loads from the River Neva. Following a strong reduction, by about 35% in the early 1990s, mainly caused by the collapse of agricultural and industrial production in the former Soviet Union, the decrease in N and P loads into the Gulf of Finland has continued in the 1990s but at a lower rate, and in the early 2000s there was a slow increase (Pitkänen and Tallberg, 2007). Finland will contribute to further progress through its bilateral co-operation in the Gulf of Finland (Box 8.1).

Box 8.1 The Gulf of Finland: bilateral co-operation to reduce marine pollution

In the period 1990-2007, Finnish environmental support to the Baltic states, north-west Russia and Poland involved some 1 600 projects and some EUR 150 million (an average of some EUR 8 million per year). Concerning the *Gulf of Finland itself*, responding to the 1997 OECD recommendation to facilitate the construction and use of facilities that would reduce transboundary marine pollution, most of the Finnish support focused on waste water treatment projects in St Petersburg, Tallinn and smaller municipalities in the Baltic countries. An evaluation of the environmental co-operation in Finland's neighbouring regions in 2000 concluded that co-operation has overall been quite effective and relevant. However, it will take some time to complete large investment projects and to be able to measure the impact on the Baltic Sea. Co-operation has been based on bilateral Agreements and Memoranda of Understandings; most of the projects have been co-financed with the host countries, international financial institutions, the EU and other donor countries.

Russia accounts for more than half of the nitrogen load and three fourths of the phosphorous load in the Gulf of Finland. In the early 1990s, the city of St Petersburg was identified as the biggest single point-source polluter within the whole Baltic Sea region. Finland thus considered the *development of St Petersburg's water sector* as

Box 8.1 The Gulf of Finland: bilateral co-operation to reduce marine pollution (*cont.*)

the most cost-efficient way of improving the state of the Gulf of Finland, particularly in the open sea and in the outer archipelago. Co-operation between the Finnish Ministry of the Environment (MoE) and the St Petersburg Water Utility (Vodokanal) is based on multiannual programmes (1999-2003, 2004-07, 2008-11). Since 1991, Finland has supported approximately 100 projects in St Petersburg, amounting to some EUR 29 million. The most important project to date is the South West waste water Treatment Plant, which started operating in 2005. It can treat the waste waters of about 700 000 inhabitants according to EU and HELCOM standards. The total cost of the project was nearly EUR 200 million, with Finland contributing EUR 10 million. Planned projects could lead to reduction of the environmental loading of 1.5 million persons from St Petersburg into the Gulf of Finland. This includes chemical phosphorus removal at the three largest waste water treatment plants in St Petersburg, as well as developing sewerage, connection to sewers and rehabilitating existing waste water treatment plants.*

Together with Denmark and Sweden, and with the assistance of the Nordic Investment Bank, Finland has contributed to the development of water supply and waste water treatment in the *Leningrad oblast* (four cities). A bilateral project is being implemented to improve waste water treatment in the city of Sosnovy Bor. Lately special attention has been paid to big poultry farms in the oblast, because of their rapid development and impacts on the state of the Gulf of Finland.

Co-operation and support to municipal waste water treatment projects in *Estonia* in the period 1991-2003 were based on an agreement on environmental protection (1991) and an agreement on water protection (1994) between Finland and Estonia. Bilateral co-operation with Estonia was defined annually, through protocols between MoE and the Estonian Ministry of the Environment. The main project was the construction of the Tallinn waste water treatment plant in 1992-98. The total cost of the project was EUR 45 million, with Finland contributing EUR 6 million to it. Before the construction, Tallinn was one of the main sources of pollutant dischargers to the Gulf of Finland. The nutrient load has now been considerably reduced. In 1993-2001 Finland supported the Small Municipalities Environment Programme (SMEP) to improve water supply and waste water treatment standards of 13 small municipalities in Estonia. The total cost of the project was EUR 47 million, of which Finland contributed EUR 3 million. A follow-up programme was implemented in 1998-2003 for another 17 small municipalities. The support of MoE for projects in the Baltic States was phased out in 2006, following enlargement of the EU to the Baltic states in 2004.

* The latter project would be part of the Programme for closing direct discharges to the river Neva (EUR 700 million).

The overarching *HELCOM Baltic Sea Action Plan* (BSAP), adopted at the HELCOM Ministerial Meeting in November 2007, seeks to restore a *good ecological status of the Baltic Sea by 2021*.²⁶ HELCOM has estimated that the maximum allowable annual N and P inputs into the Baltic Sea should be 600 000 tonnes and 21 000 tonnes, respectively. This would entail reducing by some 135 000 tonnes and 15 000 tonnes, respectively, the average annual inputs of N and P compared to their levels in 1997-2003. The BSAP proposes a burden sharing among the Baltic Sea countries, with Finland's shares around 1% for both N and P.²⁷ National programmes designed to achieve the required reductions should be prepared by 2010, for each country to select the most cost-effective measures, which can also be incorporated into River Basin Management Plans. The BSAP also encourages bilateral and multilateral projects to reduce transboundary nutrient inputs from non-HELCOM countries, which account for 3% and 11% of the total reduction targets for N and P. Instead of a burden-sharing agreement, Finland has promoted the idea of a regional cap-and-trade for nutrient loads, but no full consensus among HELCOM countries has yet been achieved. Implementation of the BSAP on nutrients should be coordinated with the JCP and address the remaining hot spots. In addition to eutrophication, the BSAP also addresses hazardous substances, biodiversity and nature conservation as well as marine pollution.

2.3 Pollution from ships

Traffic volume in the Gulf of Finland has increased rapidly in recent years and with it the risk of accidents. *Transport of oil in the Gulf* increased from 40 million tonnes in 2000 to 150 in 2007 and is planned to exceed 200 million tonnes by 2015. Finland has ratified the 1990 Convention on Oil Pollution Preparedness, Response and Co-operation (OPRC), which entered into force in 1995. Liability and compensation regimes for *oil pollution incidents* are covered by the 1992 Protocols (updated by the 2000 Protocols) to the Convention on Civil Liability for Oil Pollution Damage (CLC) and the Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage (FUND), as well as the 2003 Protocol on the Establishment of a Supplementary Fund for Oil Pollution Damage. These agreements have all been ratified by Finland. At the national level, Finland has also a special Oil Pollution Compensation Fund managed by the Ministry of the Environment. The Fund can compensate for pollution damage caused by land-based sources or ships. The scheme is financed by a charge (EUR 0.5/t) collected from oil importing enterprises. The fund's revenue has been rising from EUR 6 million in 1999 to EUR 8 million in 2008.

Finland has recently ratified the *2001 Convention on Civil Liability for Bunker Oil Pollution Damage*, which entered into force in Finland on 18 February 2009. The Convention, which entered into force internationally on 21 November 2008, covers

spills of oil carried as fuel in ships' bunkers.²⁸ Ships over 1 000 gross tonnage registered in a state party to the "Bunker Convention" are required to carry on board a certificate certifying that the ship has insurance to cover the registered owner for pollution damage in an amount equal to the limits of liability under the applicable national or international limitation regime. In all cases, this amount should not exceed an amount calculated in accordance with the 1996 Protocol to the Convention on Limitation of Liability for Maritime Claims (LLMC), which Finland ratified. The Convention makes the ship owner, defined broadly so as to include the owner, registered owner, bareboat charterer, manager and operator of a ship, liable to pay compensation for pollution damage (including the costs of preventative measures) caused in the territory, including the territorial sea of a State Party, as well as in its exclusive economic zone, or if a state party has not established one, in an equivalent area.

In 2004, the International Maritime Organization (IMO) designated the *Baltic Sea as a Particularly Sensitive Sea Area (PSSA)* (excluding the Russian waters). This is a direct signal to seafarers to take into account the Baltic Sea's vulnerable environment, particularly in the Gulf of Finland. The Baltic Sea is shallow and surrounded by a broken coastline of bays and islands, and is partly covered by ice in wintertime. In response, the three countries of the Gulf of Finland (*i.e.* Estonia, Finland and Russia) have enhanced their co-operation to take preventive measures against accidents and they have increased their preparedness to combat oil pollution. First, the Gulf of Finland *mandatory Ship Reporting System (GOFREP)* came into operation in 2004. This system has been established to improve maritime safety, to protect the marine environment, and to monitor compliance with the International Regulations for Preventing Collisions at Sea. It has been estimated that it reduces the risk of collision between two vessels by 80%. Secondly, Russia has decided to allow only double-bottom tankers and, in wintertime, only ice-reinforced double-hull tankers to arrive at the new oil ports in the Gulf of Finland. Thirdly, Finland has decided to increase its *oil-spill response capability*. Three vessels will be converted to oil-spill response vessels and a delivery contract for a new multipurpose ice-going vessel with oil-recovery capability has been signed (the vessel should be in operation in spring 2011). Finally, Finland ratified the 1989 Convention on Salvage, which rewards actions that prevent a major pollution incident (for example, by towing a damaged tanker away from an environmentally sensitive area).

The 1982 UN Convention on the Law of the Sea (UNCLOS) entered into force in Finland in 1996. Finland has established an Exclusive Economic Zone (EEZ), as defined in the Convention, in 2005. Current *Finnish environmental regulations apply to ships within the EEZ* regardless of the flag country of the ships. The Convention defines ways where Finland can, under certain circumstances, request information from a foreign ship or inspect the ship suspected of having violated environmental

norms. A foreign ship can even be intercepted if the violation is obvious and causes substantial harm or danger to the environment. A fine may be imposed for environmental crimes and delicts. The *control of foreign-flag ships calling at Finnish ports* complies with the minimum requirement of the Paris Memorandum of Understanding on Port State Control (Table 8.8). As a party to the 1965 Convention on Facilitation of International Maritime Traffic (FAL), Finland should reduce the time ships spend in port, which implies a simplification of procedures. Finland is in the process of ratifying the 2001 Convention on the *Control of Harmful Anti-fouling Systems on Ships* (AFS), which entered into force at EU level in 2003 and internationally in September 2008. Ships are no longer permitted to apply organotin compounds which act as biocides in their anti-fouling systems; for ships already carrying such compounds on their hulls, a coating has to be applied to prevent leaching. The Convention applies to all ships that enter a port of a Party. Finland has ratified the 1997 Protocol to the 1973 Convention for the Prevention of Pollution from Ships, as modified by its 1978 London Protocol (MARPOL 73/78), which sets *limits on SO_x and NO_x emissions from ship exhaust* and prohibits deliberate emissions of ozone-depleting substances.

Despite all these achievements, there is *room for progress*. Among the primary sources of sea-based pollution of the marine environment is *waste dumping from boats*. Nevertheless, Finland has not signed the 1996 London Protocol to the 1972 Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (LC), although Finland is a party to this Convention. The Protocol extends the list of materials that should not be dumped at sea from vessels, aircraft,

Table 8.8 **Control of ships calling at Finnish ports,^a 2003-06**
(number)

	Foreign ships calling	Foreign ships inspected	Foreign ships inspected ^b (%)
2003	1 372	451	33
2004	1 248	351	28
2005	1 245	394	32
2006	1 250	444	35

a) Commercial traffic only.

b) Minimum requirement under the Paris MoU on Port State Control is 25%.

Source: SYKE.

platforms or other man-made structures. Moreover, Finland has not ratified the 2000 Protocol on Preparedness, Response and Co-operation to *Pollution Incidents by Hazardous and Noxious Substances*. Under this protocol (which entered into force in June 2007), ships carrying HNS²⁹ must be covered by measures similar to those already in existence for oil incidents concerning preparedness and response to spills (e.g. ships are required to carry a shipboard pollution emergency plan to deal specifically with incidents involving HNS). As for *liability and compensation in the case of HNS*, they are dealt with under the 1996 Convention on Liability and Compensation for Damage in Connection with the Carriage of Hazardous and Noxious Substances by Sea (HNS), which has not yet entered into force and that Finland has signed but not ratified. As all other OECD countries, Finland will be able to ratify the HNS Convention only after approval of a related protocol, which is under preparation and is due to be approved by the International Maritime Organisation in 2010.

3. Trade and the Environment

Within the World Trade Organisation (WTO) context, Finland considers that *trade and environment should be acknowledged as equal parts of international law*, and that conflicts among contracting parties should primarily be solved within the structure of MEAs, including observership status for these in the WTO. Finland aims at minimising environmentally harmful customs duties, trade barriers and agricultural and fishery subsidies, and at resolving the rights issues between the Convention on Biological Diversity (CBD) and the WTO agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS). This helps developing countries to enter markets and fosters trade and environment preconditions. Finland supports acknowledging environmental labelling systems; jointly agreed rules and regulations catalyse innovations and facilitate exports of technology and expertise. Finnish authorities also promote *corporate environmental responsibility* (Box 8.2).

3.1 Ozone depleting substances

Ozone depleting substances (ODS) have never been produced in Finland. Finland is among the 20 OECD countries that operate a commercial ODS destruction facility, which explains why ODS production of these substances reported under the Montreal Protocol is sometimes negative, particularly for CFCs and halons. The use of most ODS has been forbidden in Finland in compliance with (and often ahead of) the Protocol (non-article 5 parties) and EU schedules. The Finnish Environment Institute (SYKE) estimates that the remaining emissions of CFCs are currently about

Box 8.2 Corporate environmental responsibility and the paper mill of Fray Bentos (Uruguay)

The *OECD Guidelines for Multinational Enterprises*, with voluntary compliance by enterprises, contain recommendations in several areas, including environmental management. The National Contact Point (NCP) in Finland is the Advisory Committee on International Investment and Multinational Enterprises of Finland (MONIKA), which operates under the Ministry of Employment and the Economy (MEE). Members of the MONIKA committee come from various ministries, the Bank of Finland, business, labour organisations and NGOs. The committee has met several times since its creation in 2001.

In 2006, the Finnish NCP issued two final statements concerning two requests from an Argentinean NGO, the Centre for Human Rights and Environment (CEDHA), regarding *construction of a paper mill in Uruguay* by Botnia S.A. Metsä-Botnia Oy. The one-million-tonne eucalyptus pulp mill is located in Fray Bentos on the Uruguay River (which forms the natural border between Uruguay and Argentina). The original controversy between Argentina and Uruguay over potential pollution of the Uruguay River by the pulp mill stemmed largely from the populations and community of Gualeguaychú, which live immediately across the river in Argentina, and which have benefited of pristine vacation beachfront resorts. The disputes further escalated to the top of the governments of Argentina and Uruguay and were brought to the International Court of Justice in the Hague.

The *first request* was an alleged non-observance by Botnia of Chapter II (General Policies), Chapter III (Disclosure), Chapter V (Environment) and Chapter VI (Bribery) of the *OECD Guidelines*. After reviewing the evidence provided, the Finnish NCP reached the conclusion in December 2006 that Botnia had not violated the Guidelines in the pulp mill project in Uruguay and issued a statement on the specific instance.

The *second request* was brought against Finnvera Oyj, the Finnish export credit/investment guarantee agency. The NCP concluded in November 2006 that the request for specific instance did not merit further examination because Finnvera Oyj cannot, in its view, be considered as a multinational enterprise and the OECD Guidelines cannot be considered to refer to a state's export guarantee activities.*

The construction phase finalised, the paper mill of Fray Bentos received the authorisation to start operations from the Uruguayan government in November 2007. It represents the *largest private investment in Uruguay's history*.

* Nevertheless, Finnvera Oyj should implement the Recommendation on Common Approaches on Environment and Officially Supported Export Credits, which the OECD Council adopted in 2003 and replaced in 2007. The 2007 revision calls for stronger environment-related requirements for export deals to qualify for export credit backing from their governments.

5% of the 1990 levels. HCFCs are the only ODS still in use in Finland. *The use of HCFCs has decreased* from 350 tonnes in 1990 to about 170 tonnes in 2007. Current HCFC emissions are about 70% less than the 1990 levels. Technology and legal provisions concerning HCFC use have substantially developed during this period.

Concerning *ODS trade*, there have been no legal cases regarding attempts to trade ODS over the review period. According to customs and environmental authorities there was some illegal activity at the turn of the millennium, but it has clearly declined since, for two main reasons: appliances containing CFCs are fewer since their use in manufacturing has been banned; and, a fee is no longer charged for returning electronic waste (including refrigerators) in line with the EU Waste Electrical and Electronic Equipment directives (2002/96/EC and 2003/108/EC).³⁰ Furthermore, EU Council Regulation on ODS (No. 2037/2000) requires the removal of controlled ODS from refrigeration equipment before such appliances are scrapped. *Border measures* have also been put in place to prevent illegal trade of ODS. Customs Finland uses data systems that identify if customs tariff numbers of restricted substances (as per annex IV of EU Council Regulation No. 2037/2000) are to be declared, or if the registration number of the importer indicates prior offenses. Trucks from Russia are inspected by drive-through x-ray systems that reveal presence, for instance, of pressurized containers.

3.2 Hazardous substances

Finland seeks to ensure that the risks of hazardous substances will be controlled by 2020 by means of an *international chemical strategy*, with improved international chemical conventions and strengthened co-operation between them. Finland has therefore initiated and actively engaged in setting up a trio of complementary Conference of the Parties (COP) decisions for the *Basel, Rotterdam and Stockholm Conventions*. The resulting *ad hoc* joint working group (co-chaired by Finland) should identify ways to enhance co-operation and co-ordination at both administrative and programmatic level. To support *REACH*,³¹ the new European Chemicals Agency has settled and started operations in Helsinki.

Finland became a party to the 1989 *Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal* in 1991. Trade in hazardous waste has increased over the review period, particularly exports, though not as quickly as the generation of hazardous waste that far exceeds national targets³² (Figure 8.4). The National Waste Plan, which was implemented in 1998 and was updated in 2002,³³ set a maximum volume of hazardous waste generated in Finland of 700 000 tonnes/year by 2005 (compared to 500 000 tonnes in the late 1990s). The current generation is 2.3 million tonnes a year. Illegal trade does not constitute a

Figure 8.4 Trade in hazardous waste, 1997-2006



Source: SYKE.

problem in Finland, even though each year there are a few cases concerning hazardous waste traded without complying with the obligatory notification procedure. Pursuant to the new EU legislation³⁴ border-area agreements are being drafted with Sweden and Norway to simplify the notification procedure for cross-border shipments of specific waste flows to the nearest suitable facility in the border area. Under the 1995 ban amendment to the Basel Convention, which has been in force in the EU since 1998,³⁵ Finland must not export hazardous waste intended for recovery, recycling or final disposal to non-OECD countries. Finland has no restrictions on the import of hazardous waste for recovery (restrictions apply to the import of hazardous waste for final disposal). Finland has signed but not yet ratified the 1999 Protocol on Liability and Compensation for Damage Resulting from the Transboundary Movement of Hazardous Waste and their Disposal. This protocol provides for a compensation regime for liability and prompt compensation for damage resulting from the transboundary movement of hazardous waste and “other waste”³⁶ and their disposal, including in the case of illegal traffic.

In 2004 Finland accepted the 1998 *Rotterdam Convention on “prior informed consent”* (PIC), whose objective is to regulate the trade of 22 pesticides and 5 dangerous chemical substances that are widely prohibited or strictly controlled, including 7 of the 12 persistent organic pollutants (POPs) covered under the

Stockholm Convention. In Finland, chemicals subject to the (voluntary) PIC procedure have either been banned before 1995 or never approved to be used as pesticides, and a national notification procedure for the export of severely restricted or banned chemicals has been applied since 1989. No exports of PIC chemicals have taken place after the entry into force (in 2004) of the Convention and no cases of illegal exports have been detected by Customs Finland.

In accordance with the *Stockholm Convention on Persistent Organic Pollutants* (POPs), ratified by Finland in 2002, and entered into force in 2004, the use, production, marketing, import and export of the (intentionally produced) chemicals listed in Annexes A and B of the Convention (pesticides and PCBs) have been prohibited in Finland. Regulatory measures have been taken to limit emissions of unintentionally produced POPs (including dioxins, furans, PCBs and HCBs), as per the obligations set out in Annex C of the Convention. Products containing PCB are classified as hazardous waste and must be treated accordingly, mainly in the hazardous waste incineration plant in Finland. HCB releases by industry into water and municipal sewerage have been prohibited since 1994. Limit values on dioxin and furan emissions due to waste incineration have been imposed since 2006. Small scale burning of wood³⁷ is not regulated; attempts to reduce emissions have consisted of providing information on good combustion practices and fuel quality. However, atmospheric emissions of dioxins and furans (PCDD/F) have remained virtually unchanged since 1990 (Chapter 2). There is an urgent need to improve emission inventories and to produce more reliable monitoring data (SYKE, 2006). Dioxin and furan releases are estimated based on emission factors, with very few actual measurements. The overall assessment of PCB releases in Finland is still deficient. Few data are available on HCB concentrations, and are dating from the end of the 1980s.

3.3 *Endangered species*

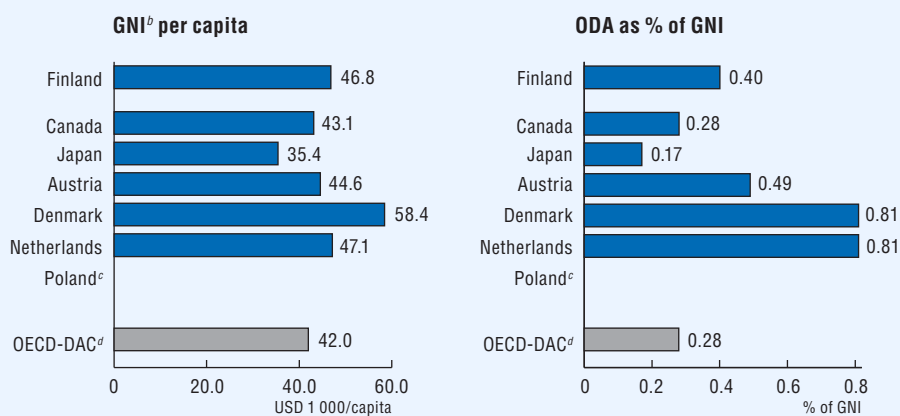
In Finland trade in species and goods listed *under the 1973 Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)* is modest. There has been a steady rise in import permits for CITES specimens and goods (from 36 in 1997 to more than 120 in 2007) and in illegal trade (less than one CITES related seizure by customs per year in 1997-2002 to 20 seizures since 2003). Most cases involved tourists bringing home items subject to license (mostly from south-east Asia), stuffed animals and skin products. Since 1997 five detected cases have been serious nature conservation offences, including four transit cases of CITES specimens or goods (live birds, live reptiles, sea turtle shells, snake skin products). The fifth case involved a dealer, who on several occasions wilfully imported live orchids without due documentation.

No attempts to smuggle *Finnish wildlife* out of the country has been detected. In 2000 Finland made a unilateral statement (“reservation”) that it will not be bound by the provisions of the CITES Convention relating to trade in three subspecies of red fox and four subspecies of weasels. These species that are used in *fur farming* are listed in CITES Appendix III (species that are not necessarily threatened on a global level, but that are protected within individual states).

4. Official Development Assistance

In 2007 Finland’s Official Development Assistance (ODA) amounted to EUR 746 million, representing 0.40% of the Gross National Income (GNI). *Finland’s ODA has increased over the review period*; it has remained higher than the OECD-DAC average, both per capita and as a share of GNI (Figure 8.5). In 2008 Finland’s aid volume rose to EUR 830 million and the government decision on spending limits for 2008-11³⁸ has envisioned an increase to 0.51% of GNI by 2010. Responding to the OECD recommendation to restore the level of ODA to the UN target of 0.7% of GNI as soon as budgetary constraints permit, the 0.70% target has been deferred

Figure 8.5 Official development assistance, 2007^a



a) 2007: provisional data.

b) Gross national income in USD at current exchange rates.

c) Poland is not member of the OECD Development Assistance Committee.

d) Member countries of the OECD Development Assistance Committee.

Source: OECD-DAC.

to 2015 (the EU timetable) from the previous commitment to reach it by 2010. Finland's ODA used to be at higher levels, (0.8% in 1990), before the deep economic recession of the early 1990s.

Although environmental protection has been identified as a key horizontal issue for Finland's development co-operation during the past years, *environmental objectives have not been sufficiently reflected in the funding of development co-operation activities*, accounting for less than 10% in 2001-06. Moreover, the level of funding has been decreasing in the past years, thus by 2007 only 7 % of the overall development co-operation funding was directed towards activities which have primarily supported environmental objectives.³⁹ Concomitantly, environment is not yet fully mainstreamed into project and programme interventions (OECD, 2007b). Positive steps have been taken to improve the situation. Policy guidelines on environment and development co-operation have been produced in 2007. Finland is committed to promoting the use of strategic environmental assessment (SEA) in its partner countries, as a tool to promote the integration of environmental concerns to development plans and strategies, as agreed in the Paris Declaration on Aid Effectiveness.⁴⁰

The *support to multilateral environmental agreements* (MEAs) has remained unchanged in the 2000s (about EUR 35 million per year), despite Finland implementing an increasing number of Conventions/Protocols. Funding has been primarily directed to the three Rio conventions (*i.e.* the UN Framework Convention on Climate Change (UNFCCC), the UN Convention on Biodiversity and the UN Convention to Combat Desertification), as well as the UN Forum on Forests.⁴¹ Finland has met its "fair share" commitment (USD 6.4 million/year in 2005-07)⁴² under the Bonn agreement on climate change, adopted in 2001, under which Parties to the UNFCCC agreed that predictable and adequate levels of funding be made available to developing countries to help them meet climate challenges. A challenge will arise from the need to provide new and additional funding to the three new funds of the Bonn agreement.⁴³ Support for chemical agreements has been relatively low, which can in part be attributed to their novelty.

5. Regional and Bilateral Co-operation

Since the 1975 Helsinki Conference on Security and Co-operation in Europe, the environment has been an important part of Finland's regional diplomacy. As a member of the *European Union* since 1995, it has implemented or is implementing EU directives concerning the environment, and is involved in the EU environmental action, particularly in the Baltic region (with the recent extension of the EU in the region) and in the EU-Russia environmental co-operation. Finland continues to

encourage regional environmental co-operation within *Nordic, Baltic and Arctic frameworks* and acts in close co-operation with like-minded countries, particularly other Nordic countries. Several regional co-operation fora are significant for environmental policy (despite the importance of the EU) with co-operation focusing on areas where synergies can be found. Finland has started to carefully examine the work of the different regional councils so as to strengthen synergies (Box 8.3).

5.1 Nordic co-operation

The Nordic Council of Ministers (NCM) adopted a Declaration on a Sustainable Nordic Region in 1998 and a *strategy for sustainable development* in the Nordic region in 2000. The strategy sets short-term objectives (2001-04, 2005-08) as well as long-term goals (2020). The NCM also adopted the *Nordic Environment Action Plan (NEAP) 2005-08*, which lays the foundations for Nordic co-operation in the areas of environment and health; marine protection; nature conservation and climate change. In addition, chemicals management and global issues, such as promoting an international mercury agreement, have been an area of active Nordic co-operation. The *Nordic Environment Finance Corporation (NEFCO)* participates in projects that have a major positive impact on the Nordic environment (*e.g.* modernising industrial and power plants). With EU enlargement, the geographic focus of NEFCO has moved towards north-west Russia and Ukraine. The Nordic Investment Bank (NIB) provides loan capital for environmental initiatives, including in the Arctic Region. The NCM's Arctic Programme of Co-operation prioritises environmental issues. An Arctic strategy will be drawn up, building on NEAP and focusing on climate change and pollution. The NCM budget for environmental co-operation is EUR 5 million, or 5% of its total budget.

5.2 Arctic co-operation

The 1991 *Arctic Environmental Protection Strategy* is the basis for environmental co-operative efforts by the eight Arctic countries. From Finland's point of view, current challenges in the environmental work of the Arctic Council are to: *i)* increase the visibility of environmental concerns in the Arctic region *ii)* improve the knowledge base on environmental issues in Lapland and on their socio-economic and health impacts, and *iii)* increase monitoring of the use of natural resources, biodiversity and chemicals in the Arctic region. As a non-riparian country of the Arctic Ocean, Finland has no stake in the present UN driven discussions on the definition of EEZs and claims on natural resources. However, it is likely to be affected by the deep ecological and economic transformations of the region including access to energy and new transport routes.

Box 8.3 Environmental co-operation within regional Nordic, Baltic and Arctic frameworks

The *Nordic Council* (NC) established in 1952 (Finland joined in 1956) regroups five like-minded countries (Denmark, Finland, Iceland, Norway and Sweden) and three autonomous territories (Faroe Islands, Greenland and the Aland Islands). The NC is unique in that *parliamentarians and members of the governments* meet for political discussions. The NC has held an ordinary session every autumn since 1996. Special sessions on specific themes are organised in between. The *non-binding resolutions* that the NC adopts^a are then promoted by national delegates within their respective parliaments and proposed to the five governments. Concerning the environment, policy work is conducted by the Environment and Natural Resources Committee. The NC is managed by a Secretariat which shares its premises with Secretariat of the Nordic Council of Ministers in Copenhagen and national secretariats in the Nordic parliaments. The *Nordic Council of Ministers* (NCM), formed in 1971, is the forum for Nordic governmental co-operation. The NCM consists, in fact, of several individual councils of ministers that meet a couple of times a year (*e.g.* Council of Ministers for the Environment). Issues are reviewed and followed up by committees of senior officials from the member countries. While Denmark, Finland, Sweden are members of the EU, Iceland and Norway are part of the European Economic areas. Thus, the five countries implement EU directives concerning the environment.

The *Council of the Baltic Sea States* (CBSS), established in 1992, is a political forum for intergovernmental co-operation among the 5 Nordic countries, the 3 Baltic States (Estonia, Latvia, Lithuania), Germany, Poland, and Russia, as well as the European Commission. The CBSS seeks to remove barriers to trade and investment and facilitate cross-border co-operation, improve nuclear and radiation safety, promote democracy and human rights, transform curricula and teaching methods, and contribute to the EU's policy frameworks for Northern Europe such as the Northern Dimension Environmental Partnership. CBSS Ministerial Meetings are held every year. The Council is dealing with sustainable development issues rather than environmental ones.

Co-operation in the Barents Euro-Arctic Region (northern parts of Finland, Norway, Russia and Sweden that) was launched in 1993 on two levels: intergovernmental (*Barents Euro-Arctic Council*, BEAC), and interregional (*Barents Regional Council*, BRC), with stability and sustainable development^b as the overall objectives. Members of the BEAC are the 5 Nordic countries, Russia and the European Commission. Thirteen counties or similar sub-national entities form the BRC. Three indigenous people, the Sámi, the Nenets and the Vepsians, cooperate in the Working Group of Indigenous People, which has an advisory role to both the BEAC and the BRC. The Barents co-operation has developed within a range of fields (*e.g.* forestry, mining, energy, transport). BEAC and BRC decisions and recommendations are followed up by working groups and task forces. A large number of projects are implemented, mainly financed from national sources. EU funding, (*e.g.* Interreg), represents a very large share. BEAC Environment Ministers have met regularly since 1995.

Box 8.3 Environmental co-operation within regional Nordic, Baltic and Arctic frameworks (*cont.*)

The *Arctic Council* (AC), established in 1996, is a high level intergovernmental forum which provides a means for promoting co-operation, coordination and interaction among the Arctic States on *issues of sustainable development and environmental protection* in the Arctic. Member states are the 5 Nordic countries, Russia, Canada and the United States. In addition to the member states, Arctic organisations of Indigenous people with a majority of Arctic Indigenous constituency have the status of Permanent Participants. The AC Ministerial Meetings are held every two years. Meetings of Senior Arctic Officials are held every six months. The AC has six working groups dealing with: contaminants; monitoring and assessment; flora and fauna; emergency prevention, preparedness and response; the marine environment; and sustainable development.

- a) The Nordic governments decided not to cast the statutes of the Nordic Council in the form of an international convention and not to make them binding.
- b) Few places on earth are as rich in forests, fish, minerals, oil and gas as the Barents Euro-Arctic Region.

The *Barents Euro-Arctic Council* (BEAC) established a Working Group on Environment in 1999. Priorities of the working group in 2007-09 are *i*) climate change; *ii*) environmental hot spots in north-west Russia (with the overall objective of eliminating by 2013 the 42 hot spots identified by the Arctic Monitoring and Assessment Programme); *iii*) cleaner production and sustainable consumption (with the objective of reducing the levels of hazardous substances in the Arctic); *iv*) nature protection (with the objective of developing a network of protected areas); and *v*) water issues (with the objectives of providing the population in north-west Russia with clean drinking water and of addressing transboundary water management).

5.3 Baltic co-operation

The *Helsinki Commission* (HELCOM), established in 1980, works to protect the marine environment of the Baltic Sea from all sources of pollution area and preserve its ecological balance through intergovernmental co-operation among Denmark, Estonia, the European Community, Finland, Germany, Latvia, Lithuania, Poland, Russia and Sweden. HELCOM is the governing body of the 1992 Convention on the Protection of the Marine Environment of the Baltic Sea Area (the new Helsinki Convention reflecting changes in

the frontiers in the region) that entered into force in 2000.⁴⁴ The EU set of water directives and EU support funds have largely contributed to reducing by half the number of pollution hot spots identified by HELCOM in the Baltic Sea catchment area (Table 8.7). In 2007 HELCOM adopted the Baltic Sea Action Plan (BSAP), which defines objectives and measures related to eutrophication, discharges of hazardous substances, environmental protection in maritime transport, and nature protection. The Action Plan aims at a good ecological state of the Baltic Sea by 2021.

Under the 1991 Convention on environmental impact assessment (EIA) in a transboundary context (Espoo Convention), delegations of a “Baltic Sea sub-region” group have agreed upon common principles regarding implementation of the Convention. The co-operation has taken a concrete form with a *joint transboundary EIA* related to the plan from the Russian-led consortium *Nord Stream* to construct a gas pipeline from Russia to Germany on the Baltic seabed. All Baltic Sea states are involved in this EIA.

Finland has actively promoted the concept of *regional identity of the Baltic Sea Region*, most notably in the EU. Eight EU member states (Finland, Sweden and Denmark, the three Baltic member states, Germany and Poland) have formed the Baltic Europe Intergroup in the European Parliament, to examine and discuss overall EU policy towards the Baltic region. As regards environment, the Intergroup is urging for EU action and support for the Baltic Sea, given its fragile ecology and because it has become almost an internal EU Sea with all the littoral States (except Russia) as EU members.

5.4 *Bilateral co-operation with Russia*

Finland’s bilateral co-operation with Russia has sought to create tangible environmental benefits. Project co-operation with Russia has been based on a 1992 Agreement on co-operation with four administrative entities that share borders with Finland in the north-west of Russia (Murmansk oblast, the Republic of Karelia, the city of St Petersburg and the Leningrad oblast) and a separate 1993 agreement concerning environmental projects. A major focus of Finland’s bilateral co-operation with Russia has been on *waste water treatment* (Box 8.1) as well as nature conservation and forestry. Comparatively little progress has been achieved concerning air emissions from the smelters of the Kola Peninsula and radioactive waste and spent nuclear fuel from dismantled Soviet Navy nuclear reactors in the Barents Sea off Murmansk. Finland has also striven to foster environmental co-operation between the EU and Russia. During its 2006 EU Presidency, Finland actively contributed to launching the EU-Russia environmental dialogue, which provides a platform for environmental co-operation between the EU and Russia. Finland supports activities under the EU’s Northern Dimension Environmental Partnership (NDEP) on environmental protection (EUR 16 million) and nuclear safety (EUR 2 million).

Bilateral co-operation on *nature conservation* has been extended from the border regions to the oblasts (regions) of Arkhangelsk and Vologda in north-west Russia following the launch in 1997 of the Finnish Russian Development Programme on Sustainable Forest Management and Conservation of Biological Diversity in North West Russia (NWRDP). Responding to the OECD recommendation in 1997 to support the creation of a *green belt of protected natural areas* along both sides of the Finnish-Russian border, over 50 nature conservation projects have since been completed.⁴⁵ In 2006, co-operation culminated with establishment, in the Republic of Karelia, of the Kalevala National Park. The Kalevala National Park belongs to a list of new protected areas that the government of Russia is committed since 2001 to establish by 2010.⁴⁶ The Green Belt is a network of separate protected natural areas. Most of the sites on the Finnish side are part of the EU Natura 2000 network. The NWRDP objectives are to establish new conservation areas and to strengthen the network of protected areas in north-west Russia and to carry out joint activities on both sides of the border (*e.g.* nature inventories, biodiversity research, studies on endangered species).

Bilateral co-operation on *forestry*, also based on NWRDP, is to support sustainable use and management of Russian forests, and reform of the Russian forest sector, with focus on training. For example, in 2009-11, five projects will be carried out in Karelia, Vologda, Komi and Nizhny Novgorod to strengthen forest regulations and governance. Given the predominant role of the Russian-Finnish timber trade the overall effect of traceability systems put in place by some major Finnish forest industry companies to reduce illegal timber imports from Russia should be subject to further review.⁴⁷

Timber exports from Russia have long been crucial to the Finnish forest industry, which has in recent years bought 20% of its timber from Russia. In order to develop its forest sector and attract foreign direct investment, Russia announced in early 2007 plans to raise export duties on round wood. In July 2007, the export duty was raised to EUR 10/m³ (or 20%) and was extended to birch timber and aspen.⁴⁸ In April 2008, the export duty was further raised to EUR 15/m³ (or 25%). Export duties on raw timber (including aspen) are expected to reach EUR 50/m³ (80% of value) in the course of 2009. As of 2011, an export duty of EUR 50/m³ (80%) would be levied on all timber. Without the economic crisis which broke out during the autumn 2008, such high export duties would have affected the present Finnish forest industry capacity. However, the declining international demand for wood products has somewhat reduced Finnish forest industries' need for raw material, and the domestic supply seems to be sufficient. Issue of Russian export duties on round wood which affects forest industry in Finland and in other EU member states and China⁴⁹ has, however, become an obstacle to Russian accession to WTO.⁵⁰

Notes

1. Finland's base year emissions are calculated as the sum of the emissions of CO₂, CH₄ and N₂O in 1990, and emissions of fluorinated gases (HFCs, PFCs and SF₆) in 1995. This methodology is allowed by Art. 3.8 of the Kyoto Protocol for Parties included in Annex I.
2. Emissions are also expected to decline somewhat after the commissioning of Olkiluoto 3, the new nuclear plant.
3. In 2005-07 all EU-ETS facilities were granted 94.5% of their emissions from their grandfathering period.
4. Non-ET-sector emissions have decreased from nearly 40 Mt in 1990 to around 35 Mt since 2000. The fixing of ETS-sector emissions to 37.6 Mt and the possibility to use sinks of about 0.6 Mt annually allow for 34 Mt emissions from the non-ET-sector while estimated average annual emissions in 2008-12 are about 33 Mt. Furthermore, Finland has plans to have more flexibility by using Kyoto mechanisms for about 1 Mt.
5. Finland makes extensive use of combined heat and power plants. They, account for 40% of power production capacity and 75% of district heat production. The technology is generally competitive and receives little support.
6. In December 2008, the EU Council agreed to achieve at least a 20% reduction in EU's GHG emissions by 2020 compared to 1990. The EU aims to reduce the emissions from the energy production and industry sectors by 21% from 2005 to 2020 with the help of the EU-ETS. According to the Commission's proposal, Finland should, by means of national measures, cut emissions from other sectors, such as transport, house-specific heating and agriculture, by an average of 16% from the 2005 level, by 2020.
7. For the preparation of the strategy, a ministerial working group for climate and energy policy was established, chaired by the Minister of Economic Affairs and including representatives from all Government parties.
8. In March 2007 the EU Council decided to set a mandatory EU target of 20% renewable energy in total final consumption of energy by 2020 (the proposed renewable energy target for Finland is 38% against a current share of 25-30%). Three sectors are concerned: electricity, heating and cooling and transport.
9. Natural gas has a 50% carbon tax rebate; peat is tax exempt.
10. The oil refining company Neste Oil recently built its first "renewable diesel" refinery in Porvoo, where diesel is produced from vegetable oils (imported palm and rapeseed) and animal fats.
11. The government has already (in 2008) reserved EUR 30 million for post Kyoto credit purchases. The amount will be re-evaluated in 2010.
12. The EC set at 10% of the 2008-12 cap the percentage of credits deriving from the project-based Kyoto flexibility mechanisms that operators can use within the EU-ETS. The government can purchase these credits as well to cover up to around 50% of the needed reduction from the base year to the target (according to the supplementarity principle in the Kyoto Protocol).

13. Detailed national balances with respect to peat carbon stores have been prepared in Finland. They reveal that both undisturbed and forestry drained peatlands currently have a positive carbon balance, the former because of peat accumulation, the latter because of an increase in root biomass and litter carbon.
14. There are large uncertainties in assessing net emissions from cropland management and grassland management.
15. Harvest of Finnish forest resources accounts for less than 60% of annual increment (Chapter 5).
16. In addition to the maximum allowance removals from forest management may be accounted for to compensate net emissions from afforestation, reforestation and deforestation since 1990.
17. In the past waterway pollution could be attributed to a large extent to chemical and forest industries which used chlorine in large amounts for pulp bleaching until the early 1990s. This has now stopped in Finland (HELCOM, 2004). Today the most significant dioxin source in the Gulf of Finland and the entire Baltic Sea is the Kymi River in Finland. It accounts for 90% of the Gulf of Finland's total dioxin load. The dioxin pollution of the sediments of the Kymi River is mainly the result of chlorophenol production in a factory operated in Kuusankoski from 1940 to 1984.
18. Only a fraction of Finnish atmospheric emissions is deposited into the Baltic Sea. The highest fractions are found in Denmark and Sweden (20% for lead and cadmium, 10% for mercury), and the lowest in Russia (0.5% for lead, cadmium and mercury).
19. Three National Water Protection Programmes (NWPPs) have been adopted in 1976, 1989 and 1998 respectively. An interim assessment of the 3rd NWPP was carried out in 2003.
20. Between 1990-92 and 2002-04, there were a decrease in gross national N balance (from 211 000 to 123 000 tonnes) and a decrease in gross national P balance (from 51 000 to 18 000 tonnes) (OECD, 2008).
21. Total (EU and national) funding of AEP has been around EUR 300 million per year in its first two periods (1995-99 and 2000-06).
22. This could be associated with delineating vulnerable areas under the EU Nitrates Directive.
23. All Finland's surface waters and groundwater should achieve at least good ecological status and good chemical status by 2015, pursuant to the EU water framework directive.
24. In 2005 agriculture accounted for 63% of the total phosphorus load and 51% of the nitrogen load to Finnish watercourses.
25. HELCOM countries that joined the EU in 2004 (Estonia, Latvia, Lithuania and Poland) can get support from the EU Cohesion Fund. Russia can get support through other EU instruments (Box 8.2).
26. In line with the proposed EU Marine Strategy which aims at achieving good environmental status of the EU's marine waters by 2021.
27. Poland's shares are the highest: 47% for N and 58% for P.
28. Other regimes covering oil spills do not include bunker oil spills from vessels other than tankers.
29. Hazardous and Noxious Substances (HNS) are defined as any substance other than oil which, if introduced into the marine environment is likely to create hazards to human health, to harm living resources and marine life, to damage amenities or to interfere with other legitimate uses of the sea.

30. Manufacturers, importers and retailers of electronic and electrical goods must put systems in place that allow customers to recycle their obsolete devices free of charge.
31. REACH, the new European Community Regulation on chemicals and their safe use (EC 1907/2006) entered into force on 1 June 2007. It deals with the Registration, Evaluation, Authorisation and Restriction of Chemical substances.
32. This increase partly results from changes in the waste classification in 2002 (Chapter 4). Many waste streams earlier considered as non-hazardous in Finland were classified as hazardous in the new European Waste List (2000/532/EC and its subsequent amendments).
33. A new National Waste Plan was adopted in April 2008 (Chapter 4).
34. Regulation (EC) No. 1013/2006 of the European Parliament and of the European Council on shipments of waste came into force in Finland in July 2007 through amendment 747/2007 to the Waste Act (1072/1993).
35. In June 2008, COP 9 failed to extend the ban to all OECD countries.
36. Waste collected from households other than through separate collection and residues arising from the incineration of household waste.
37. More than half of the dioxin and furan releases caused by energy production are from small scale (residential) burning of wood.
38. Finland's aid budget is annual, but the budget frame (spending limits) is set by each government for the entire parliamentary period of four years. The government agreed on spending limits in May 2008.
39. This partly reflects statistical difficulties to account environmental funding following the (donor-wide) shift from project-based to sector-wide support.
40. The "Paris Declaration", endorsed in 2005, is an international agreement to which over one hundred Ministers, Heads of Agencies and other Senior Officials adhered, committing their countries and organisations to continue to increase efforts in harmonisation, alignment and managing aid for results with a set of monitorable actions and indicators.
41. Established in 2000 as subsidiary body to the Economic and Social Council of the United Nations (ECOSOC), the United Nations Forum on Forests (UNFF) has the main objective to promote "... the management, conservation and sustainable development of all types of forests and to strengthen long-term political commitment to this end...". The Forum has universal membership, and is composed of all member states of the United Nations and specialised agencies.
42. The "fair share" reflects a strong political commitment by EU countries, Canada, Iceland, New Zealand and Switzerland to increase climate change funding for developing nations. The level of funding is to be revised in 2008.
43. Two funds fall under the UNFCCC and will be operated by the Global Environment Facility (GEF). First, a special climate change fund to finance activities concerning adaptation to climate change; technology transfer; energy, transport, industry, agriculture, forestry and waste management, as well as, activities to assist fossil-fuel dependent developing countries to diversify their economies. Secondly, a least developed countries fund to support a work programme for these countries. The third fund, the Kyoto Protocol adaptation fund, will be established under the Protocol to finance concrete adaptation projects and programmes in developing countries that ratify the Protocol.
44. The 1992 Helsinki Convention supersedes the 1974 Helsinki Convention that entered into force in 1980. Both Conventions were prepared under the aegis of UNEP.

45. Including the EU TACIS project Development of Protected Areas in the Borders of the Russian Karelian Republic (1999-2000) and the EU Interreg III project Kalevalan puisto (2003-05), both implemented by Metsähallitus, a state enterprise that administers more than 12 million hectares of state-owned land and water areas in Finland.
46. The list includes two other areas where nature inventories have been carried out and protected areas proposed as part of Finnish-Russian co-operation: the Onezhkoe Pomore National Park on the White Sea (Arkhangelsk oblast) and the Ingermanlandsky strict nature reserve (zapovednik) in the Gulf of Finland (Leningrad oblast).
47. According to the Russian federal forest agency, which established satellite surveillance, up to 5% of logging in Russia is illegal (*i.e.* 8-9 million m³). The European Forest Institute estimates range between 5 and 15%. The part entering the Finnish market is difficult to estimate; most exports seem to occur in the Asian part of Russia.
48. Finnish investments in Russian forest industry have been minimal due to legal and administrative uncertainties. In June 2006, Russia had already raised export duties for softwood from EUR 2.5/m³ to EUR 4/m³. Export duties for aspen (a species of poplar) were set at EUR 5/m³ from July 2007 until the end of 2008.
49. China accounts for 60% of Russian timber exports compared to 22% for the EU.
50. No export duties on timber are collected in the EU, United States, Canada or Brazil. Russia has denied that the rise in duties is violating the 2004 bilateral agreement between the EU and Russia on the terms of Russia's accession to the WTO.

Selected Sources

The government documents, OECD documents and other documents used as sources for this chapter included the following. Also see list of websites at the end of this report.

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- I.A Selected environmental data
- I.B Selected economic data
- I.C Selected social data
- II.A Selected multilateral agreements (worldwide)
- II.B Selected multilateral agreements (regional)
- III. Abbreviations
- IV. Physical context
- V. Selected environmental websites

I.A: SELECTED ENVIRONMENTAL DATA (1)

		CAN	MEX	USA	JPN	KOR	AUS	NZL	AUT	BEL	CZE	DNK
LAND												
Total area (1000 km ²)		9985	1964	9632	378	99	7741	268	84	31	79	43
Major protected areas (% of territorial area)	2	6.7	8.6	19.5	8.0	3.8	13.0	19.5	28.0	3.3	15.8	2.0
Nitrogenous fertiliser use (t/km ² of agricultural land)		2.5	1.1	2.6	9.2	18.8	0.2	1.8	3.2	10.6	6.8	7.4
Pesticide use (t/km ² of agricultural land)		0.06	0.04	0.07	1.16	1.27	-	0.03	0.10	0.50	0.11	0.12
Livestock densities (head of sheep eq./km ² of agr. land)		174	217	168	706	1324	62	573	489	1635	267	869
FOREST												
Forest area (% of land area)		34.1	33.0	33.1	68.2	63.5	21.3	31.0	46.8	22.1	34.3	11.8
Use of forest resources (harvest/growth)		0.4	0.2	0.6	0.4	0.1	0.6	..	0.7	0.9	0.7	0.7
Tropical wood imports (USD/cap.)	3	1.6	0.2	2.1	10.7	6.1	4.0	3.4	0.4	24.2	0.3	3.8
THREATENED SPECIES												
Mammals (% of species known)		20.3	31.8	16.8	23.3	11.4	23.8	18.0	22.0	35.9	20.0	22.0
Birds (% of species known)		9.8	16.2	11.7	13.1	6.3	13.0	21.0	27.7	24.9	50.0	16.3
Fish (% of species known)		29.6	27.6	31.7	36.0	8.9	1.0	10.0	50.6	23.4	41.5	15.8
WATER												
Water withdrawal (% of gross annual availability)		1.5	16.4	19.2	19.7	40.3	4.8	1.2	4.5	32.4	12.1	4.2
Public waste water treatment (% of population served)		72	36	71	69	83	..	80	89	55	74	88
Fish catches (% of world catches)		1.2	1.4	5.2	4.5	1.8	0.2	0.6	-	-	-	1.0
AIR												
Emissions of sulphur oxides (kg/cap.)		63.9	25.8	44.8	5.9	8.5	123.2	20.3	3.2	13.8	21.4	4.0
(kg/1000 USD GDP)	4	2.1	2.9	1.2	0.2	0.4	4.2	0.9	0.1	0.5	1.2	0.1
% change (1990-2005)		-34	-3	-37	-24	-50	58	54	-64	-60	-88	-88
Emissions of nitrogen oxides (kg/cap.)		73.6	13.9	57.3	15.0	27.1	77.7	39.3	27.3	25.5	27.2	34.3
(kg/1000 USD GDP)	4	2.4	1.6	1.5	0.6	1.4	2.7	1.7	0.9	0.9	1.5	1.1
% change (1990-2005)		-1	14	-26	-6	50	25	58	7	-26	-63	-32
Emissions of carbon dioxide (t./cap.)	5	17.0	3.7	19.6	9.5	9.3	18.5	8.4	9.4	10.7	11.6	8.8
(t./1000 USD GDP)	4	0.55	0.40	0.53	0.35	0.47	0.63	0.37	0.31	0.38	0.64	0.29
% change (1990-2005)		28	33	20	15	98	45	63	34	3	-23	-6
WASTE GENERATED												
Industrial waste (kg/1000 USD GDP)	4, 6	..	..	..	40	40	20	10	..	50	30	10
Municipal waste (kg/cap.)	7	420	340	760	410	370	690	400	590	470	300	740
Nuclear waste (t./Mtoe of TPES)	8	6.2	0.1	1.0	1.5	3.2	-	-	-	2.0	1.7	-

.. not available. - nil or negligible.

1) Data refer to the latest available year. They include provisional figures and Secretariat estimates. Partial totals are underlined. Varying definitions can limit comparability across countries.

2) IUCN management categories I-VI and protected areas without IUCN category assignment; national classifications may differ.

3) Total imports of cork and wood from non-OECD tropical countries.

4) GDP at 2000 prices and purchasing power parities.

Source: OECD Environmental Data Compendium.

OECD EPR / SECOND CYCLE

FIN	FRA	DEU	GRC	HUN	ISL	IRL	ITA	LUX	NLD	NOR	POL	PRT	SVK	ESP	SWE	CHE	TUR	UKD*	OECD*
338	552	357	132	93	103	70	301	3	42	324	313	92	49	505	450	41	784	244	35096
8.2	11.8	55.7	2.8	8.9	5.6	0.5	12.5	17.0	15.6	4.6	28.1	4.9	25.2	7.7	9.2	28.7	3.9	18.3	12.4
7.0	7.5	10.5	2.7	5.8	0.6	8.1	4.2	-	13.4	10.0	6.3	2.3	4.6	3.3	5.1	3.6	3.3	5.9	2.2
0.07	0.24	0.19	0.12	0.17	-	0.07	0.55	-	0.55	0.07	0.10	0.44	0.15	0.14	0.07	0.09	0.04	0.15	0.07
334	485	635	227	169	54	1165	388	948	1859	862	342	413	241	312	378	772	233	599	188
73.9	28.3	31.8	29.1	22.1	0.5	9.7	33.9	33.9	10.8	30.8	30.0	41.3	40.1	35.9	67.1	30.5	13.2	11.8	31.0
0.7	0.6	0.5	0.6	0.5	-	0.7	0.5	0.5	0.6	0.5	0.6	0.8	0.5	0.5	0.7	0.8	0.5	0.6	0.6
1.4	6.8	1.8	2.7	0.1	2.8	11.2	7.2	-	15.6	3.6	0.3	17.6	0.1	6.2	2.2	0.6	0.5	2.7	4.0
10.8	19.0	37.9	37.8	37.8	-	1.8	40.7	51.6	18.6	13.7	13.5	26.2	21.7	13.3	18.3	32.9	14.3	15.8	..
13.3	19.2	27.3	1.9	14.5	44.0	5.4	18.4	23.1	21.6	16.1	7.8	38.1	14.0	26.9	17.5	36.4	3.7	16.2	..
11.8	36.1	68.2	26.2	43.2	-	23.1	35.1	27.9	22.1	9.4	21.0	62.9	24.1	51.4	10.9	38.9	11.1	11.1	..
2.1	18.2	18.9	12.1	4.8	0.1	2.3	44.0	3.3	11.5	0.6	18.3	12.0	0.9	34.3	1.5	4.7	19.1	18.1	11.5
81	80	93	56	60	57	70	69	95	99	77	61	65	56	92	86	97	42	97	71
0.1	0.6	0.3	0.1	-	1.7	0.3	0.3	-	0.5	2.6	0.2	0.2	-	0.9	0.3	-	0.5	0.7	25.3
16.0	7.6	6.8	48.0	12.8	27.5	14.1	7.1	6.2	3.8	5.2	33.2	20.7	16.5	28.9	4.4	2.3	26.9	11.7	25.7
0.5	0.3	0.3	2.1	0.8	0.8	0.4	0.3	0.1	0.1	0.1	2.7	1.1	1.2	1.3	0.1	0.1	3.4	0.4	1.0
-66	-65	-90	14	-87	12	-67	-77	-80	-67	-54	-61	-31	-84	-42	-63	-59	28	-81	-45
36.6	19.8	17.5	28.3	20.1	94.0	28.1	19.0	29.9	21.1	42.6	21.3	24.6	18.1	35.1	22.7	11.5	15.0	27.0	32.2
1.2	0.7	0.7	1.2	1.3	2.8	0.8	0.7	0.5	0.7	1.1	1.7	1.3	1.3	1.5	0.8	0.4	1.9	1.0	1.2
-35	-34	-50	13	-15	1	-4	-43	-39	-38	-7	-49	4	-55	22	-35	-47	66	-45	-22
10.6	6.4	9.9	8.6	5.7	7.5	10.6	7.7	24.6	11.2	8.0	7.8	6.0	7.1	7.9	5.6	6.0	3.0	8.8	11.1
0.36	0.23	0.38	0.39	0.37	0.22	0.31	0.30	0.42	0.38	0.20	0.62	0.32	0.52	0.34	0.19	0.19	0.39	0.31	0.43
1	9	-16	36	-18	16	42	14	8	16	29	-15	59	-33	65	-4	9	70	-5	16
110	50	20	..	30	10	40	20	30	40	20	120	50	130	30	110	-	30	30	50
490	520	570	440	470	530	800	550	700	620	800	260	470	280	600	500	700	430	590	560
1.9	4.2	1.2	-	1.7	-	-	-	-	0.1	-	-	-	-	3.0	1.2	4.1	1.9	-	1.0

UKD: pesticides and threatened species: Great Britain; water withdrawal and public waste water treatment plants: England and Wales

5) CO₂ from energy use only; sectoral approach; international marine and aviation bunkers are excluded.

6) Waste from manufacturing industries.

7) CAN, NZL: household waste only.

8) Waste from spent fuel arising in nuclear power plants, in tonnes of heavy metal, per million tonnes of oil equivalent of total primary energy supply.

I.B: SELECTED ECONOMIC DATA (1)

	CAN	MEX	USA	JPN	KOR	AUS	NZL	AUT	BEL	CZE	DNK
GROSS DOMESTIC PRODUCT											
GDP, 2006 (billion USD at 2000 prices and PPPs)	1017	1028	11319	3537	1008	611	96	255	304	195	170
% change (1990-2006)	55.4	60.9	59.1	23.3	136.7	68.4	62.4	42.6	37.6	31.5	43.0
per capita, 2006 (1000 USD/cap.)	31.2	9.8	37.8	27.7	20.9	29.5	23.0	30.8	28.9	19.1	31.3
Exports, 2006 (% of GDP)	36.3	31.9	11.1	16.1	43.2	20.9	29.3	56.3	87.5	76.3	52.0
INDUSTRY 2											
Value added in industry (% of GDP)	32	27	23	31	43	26	25	32	27	40	27
Industrial production: % change (1990-2005)	46.7	51.3	55.9	3.2	210.9	30.5	29.5	70.1	21.0	11.8	38.3
AGRICULTURE											
Value added in agriculture (% of GDP)	3	3	4	2	1	4	4	7	2	1	4
Agricultural production: % change (1990-2006)	28.4	52.1	24.7	-9.2	19.7	12.5	46.3	-1.4	21.2	..	1.4
Livestock population, 2006 (million head of sheep eq.)	106	234	696	36	25	275	99	16	23	11	22
ENERGY											
Total supply, 2006 (Mtoe)	270	177	2321	528	217	122	18	34	61	46	21
% change (1990-2006)	28.8	44.2	20.5	18.8	131.9	39.7	27.5	36.6	22.7	-6.0	16.8
Energy intensity, 2006 (toe/1000 USD GDP)	0.27	0.17	0.21	0.15	0.21	0.20	0.18	0.13	0.20	0.24	0.12
% change (1990-2006)	-17.1	-10.3	-24.3	-3.7	-2.1	-17.1	-21.5	-4.2	-10.9	-28.5	-18.3
Structure of energy supply, 2006 (%) 4											
Solid fuels	10.1	4.9	23.8	21.3	24.3	43.9	11.9	12.0	8.0	44.2	25.4
Oil	35.1	56.8	40.4	45.6	43.2	31.6	39.4	42.8	40.7	20.9	38.4
Gas	29.3	27.4	21.6	14.7	13.3	19.1	18.7	22.2	25.0	16.1	21.1
Nuclear	9.4	1.6	9.2	15.0	17.9	-	-	-	20.2	14.5	-
Hydro, etc.	16.0	9.4	5.0	3.4	1.3	5.3	29.9	23.1	6.1	4.4	15.1
ROAD TRANSPORT 5											
Road traffic volumes per capita, 2004 (1000 veh.-km/cap.)	9.8	0.7	16.2	6.5	3.2	9.8	12.2	9.3	9.0	4.6	7.8
Road vehicle stock, 2005 (10 000 vehicles)	1883	2205	24119	7404	1540	1348	271	502	559	439	245
% change (1990-2005)	13.8	129.3	27.8	31.1	353.5	37.9	47.0	36.0	31.2	69.4	29.5
per capita (veh./100 inh.)	58	21	81	58	32	66	66	61	53	43	45

.. not available. - nil or negligible.

1) Data may include provisional figures and Secretariat estimates. Partial totals are underlined.

2) Value added: includes mining and quarrying, manufacturing, gas, electricity and water and construction;
production: excludes construction.

Source: OECD Environmental Data Compendium.

OECD EPR / SECOND CYCLE

FIN	FRA	DEU	GRC	HUN	ISL	IRL	ITA	LUX	NLD	NOR	POL	PRT	SVK	ESP	SWE	CHE	TUR	UKD	OECD
161	1743	2225	257	162	11	151	1556	28	494	188	505	198	79	1036	282	245	603	1760	31225
44.5	34.9	30.1	62.5	38.6	64.7	174.6	23.5	108.2	49.4	65.0	79.2	40.2	46.5	60.7	42.1	22.2	86.3	47.7	48.7
30.5	28.4	27.0	23.0	16.1	34.6	35.6	26.4	60.5	30.2	40.4	13.3	18.7	14.7	23.5	31.1	32.7	8.3	29.1	26.6
44.5	26.9	45.1	18.6	77.8	32.2	79.8	27.9	166.4	73.2	46.6	40.3	31.1	85.7	26.0	51.3	52.5	28.2	28.4	26.0
32	25	30	23	31	27	42	29	20	26	38	30	29	32	30	28	27	31	26	29
75.6	18.2	16.9	19.5	92.2	..	312.8	10.5	57.6	20.8	35.5	113.0	15.1	19.5	27.0	55.3	27.6	78.3	8.6	34.6
4	3	1	7	4	9	3	3	1	3	2	3	4	5	3	2	1	12	1	3
-8.4	-4.2	-6.3	14.5	-23.0	12.1	7.0	5.3	22	-7.2	-7.8	-24.3	-2.6	..	16.3	-15.7	-6.9	24.9	-5.0	..
8	144	108	19	10	1	49	57	1	36	9	54	15	5	90	12	12	96	102	2373
37	273	349	31	28	4	15	184	5	80	26	98	25	19	145	51	28	94	231	5537
30.4	19.8	-2.0	40.0	-3.4	100.1	49.8	24.4	33.0	19.4	21.8	-2.2	47.5	-12.4	58.5	7.9	13.7	77.6	8.9	22.5
0.23	0.16	0.16	0.12	0.17	0.41	0.10	0.12	0.17	0.16	0.14	0.19	0.13	0.24	0.14	0.18	0.12	0.16	0.13	0.18
-9.8	-11.2	-24.6	-13.9	-30.3	21.5	-45.5	0.7	-36.1	-20.1	-26.2	-45.4	5.2	-40.2	-1.4	-24.1	-6.9	-4.7	-26.3	-17.7
20.2	4.7	23.5	27.3	11.4	1.8	15.7	9.2	2.5	9.9	2.7	57.9	13.3	23.6	12.3	5.3	0.6	28.1	17.9	20.6
29.0	32.6	35.3	58.0	28.3	22.9	55.3	45.0	67.7	41.4	34.2	23.9	54.8	18.1	48.9	28.9	46.4	33.3	36.4	39.9
10.6	14.2	22.7	8.9	42.5	-	26.2	38.4	28.0	43.8	18.2	12.5	14.6	28.5	21.4	1.7	9.7	27.6	35.2	21.9
16.4	42.2	12.5	-	13.1	-	-	-	-	1.2	-	-	-	25.2	10.8	34.6	26.0	-	8.5	11.1
23.7	6.2	6.0	5.8	4.8	75.3	2.7	7.4	1.8	3.8	44.9	5.6	17.3	4.6	6.5	29.4	17.4	11.0	2.0	6.6
9.7	8.6	7.1	8.7	2.3	10.2	9.5	8.9	8.9	8.0	7.8	3.9	7.4	2.7	4.8	8.2	8.0	0.8	8.2	8.4
282	3617	4803	552	333	21	198	3894	34	806	252	1472	552	150	2516	463	419	843	3217	64939
26.2	27.1	28.8	118.7	49.4	59.8	108.5	30.2	68.0	40.7	29.9	126.8	151.3	44.4	74.2	17.9	28.9	257.1	35.0	38.7
54	59	58	50	33	72	48	66	73	49	55	39	52	28	58	51	56	12	53	56

3) Agriculture, forestry, hunting, fishery, etc.

4) Breakdown excludes electricity trade.

5) Refers to motor vehicles with four or more wheels, except for Italy, which include three-wheeled goods vehicles.

I.C: SELECTED SOCIAL DATA (1)

	CAN	MEX	USA	JPN	KOR	AUS	NZL	AUT	BEL	CZE	DNK	FIN	
POPULATION													
Total population, 2006 (100 000 inh.)	326	1049	2994	1278	483	207	42	83	105	103	54	53	
% change (1990-2006)	17.9	24.9	19.9	3.5	12.7	21.3	24.4	7.3	5.8	-1.1	5.7	5.6	
Population density, 2006 (inh./km ²)	3.3	53.4	31.1	338.1	486.6	2.7	15.6	98.7	345.3	130.0	126.1	15.6	
Ageing index, 2006 (over 64/under 15)	76.4	17.4	61.3	152.6	51.0	68.6	58.6	106.0	100.5	97.0	81.8	94.7	
HEALTH													
Women life expectancy at birth, 2005 (years)	82.6	77.9	80.4	85.5	81.9	83.3	81.7	82.2	81.6	79.1	80.2	82.3	
Infant mortality, 2005 (deaths /1 000 live births)	5.3	18.8	6.8	2.8	5.3	5.0	5.1	4.2	3.7	3.4	4.4	3.0	
Expenditure, 2005 (% of GDP)	9.8	6.4	15.3	8.0	6.0	9.5	9.0	10.2	10.3	7.2	9.1	7.5	
INCOME AND POVERTY													
GDP per capita, 2006 (1000 USD/cap.)	31.2	9.8	37.8	27.7	20.9	29.5	23.0	30.8	28.9	19.1	31.3	30.5	
Poverty (% pop. < 50% median income)	10.3	20.3	17.0	15.3	..	11.2	10.4	9.3	7.8	4.4	4.3	6.4	
Inequality (Gini levels)	2	30.1	48.0	35.7	31.4	..	30.5	33.7	26.0	26.0	25.0	25.0	
Minimum to median wages, 2000	3	42.5	21.1	36.4	32.7	25.2	57.7	46.3	x	49.2	32.3	x	
EMPLOYMENT													
Unemployment rate, 2006 (% of civilian labour force)	4	6.3	3.2	4.6	4.1	3.5	4.8	3.8	4.7	8.2	7.1	3.9	7.7
Labour force participation rate, 2006 (% 15-64 years)	79.4	64.4	75.2	79.5	69.1	77.2	80.3	79.1	67.8	71.1	81.7	75.2	
Employment in agriculture, 2006 (%)	5	2.6	14.1	1.5	4.3	7.7	3.5	7.1	5.5	2.0	3.8	3.0	4.7
EDUCATION													
Education, 2006 (% 25-64 years)	6	85.6	32.4	87.8	84.0	76.7	66.7	69.4	80.3	66.9	90.3	81.6	79.6
Expenditure, 2005 (% of GDP)	7	6.2	6.5	7.1	4.9	7.2	5.8	6.7	5.5	6.0	4.6	7.4	6.0
OFFICIAL DEVELOPMENT ASSISTANCE													
ODA, 2007 (% of GNI)	8	0.28	..	0.16	0.17	..	0.30	0.27	0.49	0.43	..	0.81	0.40
ODA, 2007 (USD/cap.)	119	..	72	60	..	118	75	216	184	..	470	184	

.. not available. - nil or negligible. x not applicable.

1) Data may include provisional figures and Secretariat estimates. Partial totals are underlined.

2) Ranging from 0 (equal) to 100 (inequal) income distribution; figures relate to total disposable income (including all incomes, taxes and benefits) for the entire population.

3) Minimum wage as a percentage of median earnings including overtime pay and bonuses.

Source: OECD.

OECD EPR / SECOND CYCLE

FRA	DEU	GRC	HUN	ISL	IRL	ITA	LUX	NLD	NOR	POL	PRT	SVK	ESP	SWE	CHE	TUR	UKD	OECD
614	824	111	101	3	42	589	5	163	47	381	106	54	441	91	75	730	606	11758
8.2	3.8	10.5	-2.9	19.2	20.8	3.9	22.1	9.3	9.9	0.3	7.2	1.8	13.4	6.1	11.5	29.9	5.9	12.7
111.2	230.7	84.5	108.3	3.0	60.2	195.6	181.1	393.6	14.4	121.9	114.9	110.0	87.2	20.2	181.3	93.1	248.7	33.5
89.5	144.5	129.6	103.6	53.9	54.4	138.3	77.3	79.0	75.5	83.4	111.5	72.3	115.0	101.2	101.4	21.3	90.2	73.5
83.8	81.8	81.7	76.9	83.1	81.8	83.2	82.3	81.6	82.5	79.4	81.4	77.9	83.9	82.8	83.9	74.0	81.1	..
3.6	3.9	3.8	6.2	2.3	4.0	4.7	2.6	4.9	3.1	6.4	3.5	7.2	4.1	2.4	4.2	22.6	5.1	..
11.1	10.7	10.1	8.1	9.3	7.5	9.0	7.4	9.2	8.7	6.2	10.2	7.1	8.3	9.1	11.3	7.6	8.3	..
28.4	27.0	23.0	16.1	34.6	35.6	26.4	60.5	30.2	40.4	13.3	18.7	14.7	23.5	31.1	32.7	8.3	29.1	26.6
7.0	9.8	13.5	8.2	..	15.4	12.9	5.5	6.0	6.3	9.8	13.7	..	11.5	5.3	6.7	15.9	11.4	10.2
28.0	28.0	33.0	27.0	35.0	32.0	33.0	26.0	27.0	25.0	31.0	38.0	33.0	31.0	23.0	26.7	45.0	34.0	30.7
60.8	x	51.3	37.2	x	55.8	x	48.9	47.1	x	35.5	38.2	..	31.8	x	x	..	41.7	..
9.2	9.8	8.9	7.4	2.9	4.4	6.8	4.7	3.9	3.5	13.8	7.7	13.3	8.5	7.0	4.1	9.7	5.3	6.1
68.8	77.7	65.4	60.7	85.7	73.5	63.2	67.5	79.1	79.7	62.9	78.1	68.7	72.4	78.7	87.6	52.5	76.4	71.8
3.4	2.3	12.0	4.9	6.3	5.7	4.3	1.3	3.0	3.3	15.8	11.8	4.4	4.8	2.0	3.7	27.3	1.3	5.5
67.4	83.2	58.7	78.1	63.3	66.2	51.3	65.5	72.4	78.9	52.7	27.6	86.5	49.8	84.1	85.0	28.3	69.1	68.5
6.0	5.1	4.2	5.6	8.0	4.6	4.7	3.7	5.0	5.7	5.9	5.7	4.4	4.6	6.4	6.2	4.1	6.2	5.8
0.39	0.37	0.16	..	..	0.54	0.19	0.90	0.81	0.95	..	0.19	..	0.41	0.93	0.37	..	0.36	0.28
161	149	45	..	..	274	66	766	379	791	..	38	..	128	474	223	..	163	62

4) Standardised unemployment rates; MEX, ISL, TUR: commonly used definitions.

5) Civil employment in agriculture, forestry and fishing.

6) Upper secondary or higher education; OECD: average of rates.

7) Public and private expenditure on educational institutions; OECD: average of rates.

8) Official Development Assistance by Member countries of the OECD Development Assistance Committee.

II.A: SELECTED MULTILATERAL AGREEMENTS (WORLDWIDE)

Y = in force S = signed R = ratified D = denounced

			CAN	MEX	USA
1946	Washington	Conv. - Regulation of whaling	Y	D	R R
1956	Washington	Protocol	Y	D	R R
1949	Geneva	Conv. - Road traffic	Y	R	R
1957	Brussels	Conv. - Limitation of the liability of owners of sea-going ships	Y	S	
1979	Brussels	Protocol	Y		
1958	Geneva	Conv. - Fishing and conservation of the living resources of the high seas	Y	S	R R
1959	Washington	Treaty - Antarctic	Y	R	R
1991	Madrid	Protocol to the Antarctic treaty (environmental protection)	Y	R	R
1960	Geneva	Conv. - Protection of workers against ionising radiations (ILO 115)	Y		R
1962	Brussels	Conv. - Liability of operators of nuclear ships			
1963	Vienna	Conv. - Civil liability for nuclear damage	Y		R
1988	Vienna	Joint protocol relating to the application of the Vienna Convention and the Paris Convention	Y		
1997	Vienna	Protocol to amend the Vienna convention	Y		
1963	Moscow	Treaty - Banning nuclear weapon tests in the atmosphere, in outer space and under water	Y	R	R R
1964	Copenhagen	Conv. - International council for the exploration of the sea	Y	R	R
1970	Copenhagen	Protocol	Y	R	R
1969	Brussels	Conv. - Intervention on the high seas in cases of oil pollution casualties (INTERVENTION)	Y	R	R
1973	London	Protocol (pollution by substances other than oil)	Y	R	R
1969	Brussels	Conv. - Civil liability for oil pollution damage (CLC)	Y	D	D S
1976	London	Protocol	Y	R	R
1992	London	Protocol	Y	R	R
1970	Bern	Conv. - Transport of goods by rail (CIM)	Y		
1971	Brussels	Conv. - International fund for compensation for oil pollution damage (FUND)		D	D S
1976	London	Protocol	Y	R	R
1992	London	Protocol (replaces the 1971 Convention)	Y	R	R
2000	London	Amendment to protocol (limits of compensation)	Y	R	R
2003	London	Protocol (supplementary fund)	Y		
1971	Brussels	Conv. - Civil liability in maritime carriage of nuclear material	Y		
1971	London, Moscow, Washington	Conv. - Prohib. emplacement of nuclear and mass destruct. weapons on sea-bed, ocean floor and subsoil	Y	R	R R
1971	Ramsar	Conv. - Wetlands of international importance especially as waterfowl habitat	Y	R	R R
1982	Paris	Protocol	Y	R	R R
1987	Regina	Regina amendment	Y	R	R
1971	Geneva	Conv. - Protection against hazards of poisoning arising from benzene (ILO 136)	Y		
1972	London, Mexico, Moscow, Washington	Conv. - Prevention of marine pollution by dumping of wastes and other matter (LC)	Y	R	R R
1996	London	Protocol to the Conv. - Prevention of marine poll. by dumping of wastes and other matter	Y	R	R S
2006	London	Amendment to Annex I of Prot (storage of CO2)	Y	R	R S
1972	Geneva	Conv. - Protection of new varieties of plants (revised)	Y	R	R R
1978	Geneva	Amendments	Y	R	R R
1991	Geneva	Amendments	Y		R
1972	Geneva	Conv. - Safe container (CSC)	Y	R	R R
1972	London, Moscow, Washington	Conv. - International liability for damage caused by space objects	Y	R	R R

II.A: SELECTED MULTILATERAL AGREEMENTS (WORLDWIDE)

Y = in force S = signed R = ratified D = denounced

			CAN	MEX	USA
1972	Paris	Conv. - Protection of the world cultural and natural heritage	Y	R	R R
1973	Washington	Conv. - International trade in endangered species of wild fauna and flora (CITES)	Y	R	R R
1974	Geneva	Conv. - Prev. and control of occup. hazards caused by carcinog. subst. and agents (ILO 139)	Y		
1976	London	Conv. - Limitation of liability for maritime claims (LLMC)	Y		R
1996	London	Amendment to convention	Y	S	
1977	Geneva	Conv. - Protection of workers against occupational hazards in the working environment due to air pollution, noise and vibration (ILO 148)	Y		
1978	London	Protocol - Prevention of pollution from ships (MARPOL PROT)	Y	R	R R
1978	London	Annex III	Y	R	R
1978	London	Annex IV	Y		
1978	London	Annex V	Y	R	R
1997	London	Annex VI	Y		S
1979	Bonn	Conv. - Conservation of migratory species of wild animals	Y		
1991	London	Agreem. - Conservation of bats in Europe	Y		
1992	New York	Agreem. - Conservation of small cetaceans of the Baltic and the North Seas (ASCOBANS)	Y		
1996	Monaco	Agreem. - Conservation of cetaceans of the Black Sea, Mediterranean Sea and Contiguous Atlantic Area	Y		
1996	The Hague	Agreem. - Conservation of African-Eurasian migratory waterbirds	Y		
2001	Canberra	Agreem. - Conservation of albatrosses and petrels (ACAP)	Y		
1982	Montego Bay	Conv. - Law of the sea	Y	R	R
1994	New York	Agreem. - relating to the implementation of part XI of the convention	Y	R	R S
1995	New York	Agreem. - Implementation of the provisions of the convention relating to the conservation and management of straddling fish stocks and highly migratory fish stocks	Y	R	R
1983	Geneva	Agreem. - Tropical timber	Y	R	R
1994	New York	Revised agreem. - Tropical timber	Y	R	R R
2006	Geneva	Revised agreem. - Tropical timber		S	R
1985	Vienna	Conv. - Protection of the ozone layer	Y	R	R R
1987	Montreal	Protocol (substances that deplete the ozone layer)	Y	R	R R
1990	London	Amendment to protocol	Y	R	R R
1992	Copenhagen	Amendment to protocol	Y	R	R R
1997	Montreal	Amendment to protocol	Y	R	R R
1999	Beijing	Amendment to protocol	Y	R	R R
1986	Vienna	Conv. - Early notification of a nuclear accident	Y	R	R R
1986	Vienna	Conv. - Assistance in the case of a nuclear accident or radiological emergency	Y	R	R R
1989	Basel	Conv. - Control of transboundary movements of hazardous wastes and their disposal	Y	R	R S
1995	Geneva	Amendment			
1999	Basel	Prot. - Liability and compensation for damage			
1989	London	Conv. - Salvage	Y	R	R R
1990	Geneva	Conv. - Safety in the use of chemicals at work (ILO 170)	Y		R
1990	London	Conv. - Oil pollution preparedness, response and co-operation (OPRC)	Y	R	R R

II.A: SELECTED MULTILATERAL AGREEMENTS (WORLDWIDE)

Y = in force S = signed R = ratified D = denounced

2000	London	Protocol - Pollution incidents by hazardous and noxious substances (OPRC-HNS)
1992	Rio de Janeiro	Conv. - Biological diversity
2000	Montreal	Prot. - Biosafety (Cartagena)
1992	New York	Conv. - Framework convention on climate change
1997	Kyoto	Protocol
1993	Paris	Conv. - Prohibition of the development, production, stockpiling and use of chemical weapons and their destruction
1993	Geneva	Conv. - Prevention of major industrial accidents (ILO 174)
1993		Agreem. - Promote compliance with international conservation and management measures by fishing vessels on the high seas
1994	Vienna	Conv. - Nuclear safety
1994	Paris	Conv. - Combat desertification in those countries experiencing serious drought and/or desertification, particularly in Africa
1996	London	Conv. - Liability and compensation for damage in connection with the carriage of hazardous and noxious substances by sea (HNS)
1997	Vienna	Conv. - Supplementary compensation for nuclear damage
1997	Vienna	Conv. - Joint convention on the safety of spent fuel management and on the safety of radioactive waste management
1997	New York	Conv. - Law of the non-navigational uses of international watercourses
1998	Rotterdam	Conv. - Prior informed consent procedure for hazardous chemicals and pesticides (PIC)
2001	London	Conv. - Civil liability for bunker oil pollution damage
2001	London	Conv. - Control of harmful anti-fouling systems on ships
2001	Stockholm	Conv. - Persistent organic pollutants

Source: IUCN; OECD.

OECD EPR / SECOND CYCLE

Y = in force S = signed R = ratified D = denounced

JPN	KOR	AUS	NZL	AUT	BEL	CZE	DNK	FIN	FRA	DEU	GRC	HUN	ISL	IRL	ITA	LUX	NLD	NOR	POL	PRT	SVK	ESP	SWE	CHE	TUR	UKD	EU		
	R						S	S	S	S	R					R		R	R		R	R							
R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	
R	R		R	R	R	R	R	R	R	R	R	R	S	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	
R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	
R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	
R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	
					R											R							R						
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R	R	R		R	R	R	R	R	R	R	R	R	S	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	
R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	
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	S				S									S															
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								R	R	R					S	R	R		R				R						
R	R	R	R	R	R	R	R	R	R	R	R	R		R	R	R	R	R	R	R	R	R	R	R	R	R	S	R	R
								R	R					S	R							R	S				R		
R	R	R	R	R	R	R	R	R	S	R	R			R	R	R						R	R						
R	R	R	R	R	R	R	R	R	R	R	R	R	R	S	S	R	R	R	S	R	R	R	R	R	R	R	S	R	R

II.B: SELECTED MULTILATERAL AGREEMENTS (REGIONAL)

Y = in force S = signed R = ratified D = denounced

			CAN	MEX	USA
1933	London	Conv. - Preservation of fauna and flora in their natural state	Y		
1940	Washington	Conv. - Nature protection and wild life preservation in the Western Hemisphere	Y	R	R
1946	London	Conv. - Regulation of the meshes of fishing nets and the size limits of fish	Y		
1950	Paris	Conv. - Protection of birds	Y		
1957	Geneva	Agreem. - International carriage of dangerous goods by road (ADR)	Y		
1975	New York	Protocol	Y		
1958	Geneva	Agreem. - Adoption of uniform conditions of approval and reciprocal recognition of approval for motor vehicle equipments and parts	Y		
1960	Paris	Conv. - Third party liability in the field of nuclear energy	Y		
1963	Brussels	Supplementary convention	Y		
1964	Paris	Additional protocol to the convention	Y		
1964	Paris	Additional protocol to the supplementary convention	Y		
1982	Brussels	Protocol amending the convention	Y		
1982	Brussels	Protocol amending the supplementary convention	Y		
1988	Vienna	Joint protocol relating to the application of the Vienna Convention and the Paris Convention	Y		
1962	Stockholm	Agreem. - Protection of the salmon in the Baltic Sea	Y		
1972	Stockholm	Protocol	Y		
1964	London	Conv. - Fisheries	Y		
1968	Strasbourg	Agreem. - Restriction of the use of certain detergents in washing and cleaning products	Y		
1983	Strasbourg	Protocol	Y		
1968	Paris	Conv. - Protection of animals during international transport	Y		
1979	Strasbourg	Protocol	Y		
1969	London	Conv. - Protection of the archaeological heritage	Y		
1973	Gdansk	Conv. - Fishing and conservation of the living resources in the Baltic Sea and the Belts			
1982	Warsaw	Amendments			
1974	Stockholm	Conv. - Nordic environmental protection	Y		
1992	Helsinki	Conv. - Protection of the marine environment of the Baltic Sea area	Y		
1979	Bern	Conv. - Conservation of European wildlife and natural habitats	Y		
1979	Geneva	Conv. - Long-range transboundary air pollution (CLRTAP)	Y	R	R
1984	Geneva	Protocol (financing of EMEP)	Y	R	R
1985	Helsinki	Protocol (reduction of sulphur emissions or their transboundary fluxes by at least 30%)	Y	R	
1988	Sofia	Protocol (control of emissions of nitrogen oxides or their transboundary fluxes)	Y	R	R
1991	Geneva	Protocol (control of emissions of volatile organic compounds or their transboundary fluxes)	Y	S	S
1994	Oslo	Protocol (further reduction of sulphur emissions)	Y	R	
1998	Aarhus	Protocol (heavy metals)	Y	R	R
1998	Aarhus	Protocol (persistent organic pollutants)	Y	R	R
1999	Gothenburg	Protocol (abate acidification, eutrophication and ground-level ozone)	Y	S	R

OECD EPR / SECOND CYCLE

Y = in force S = signed R = ratified D = denounced

JPN	KOR	AUS	NZL	AUT	BEL	CZE	DNK	FIN	FRA	DEU	GRC	HUN	ISL	IRL	ITA	LUX	NLD	NOR	POL	PRT	SVK	ESP	SWE	CHE	TUR	UKD	EU			
				R				S						R						S		R				R				
					R		R		R	R			R	R			R	R	R	R		S		R	R		R			
				S	R			S		S		R		R	R	R					S		R	R	R	R	R			
				R	R	R	R	R	R	R	R	R		R	R	R	R	R	R	R	R	R	R	R	R	R	R	R		
				R	R		R	R	R	R		R		R	R	R	R	R	R	R	R	R	R	R	R	R	R	R		
R	R	R	R	R	R	R	R	R	R	R	R	R	R		R	R	R	R	R	R	R	R	R	R	R	R	R	R		
				S	R		R	R	R	R	R				R	S	R	R		R		R	R	R	S	R	R	R		
				S	R		R	R	R	R					R	S	R	R		R		R	R	S	R	R	R	R		
				S	R		R	R	R	R	R				R	S	R	R		R		R	R	S	R	R	R	R		
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						R		R		R										R				R						

II.B: SELECTED MULTILATERAL AGREEMENTS (REGIONAL)

Y = in force S = signed R = ratified D = denounced

		CAN MEX USA		
1980	Madrid	Conv. - Transfrontier co-operation between territorial communities or authorities	Y	
1995	Strasbourg	Additional protocol	Y	
1998	Strasbourg	Second protocol	Y	
1980	Bern	Conv. - International carriage of dangerous goods by train (COTIF)	Y	
1982	Paris	Memorandum of understanding on port state control	Y	R
1983	Bonn	Agreem. - Co-operation in dealing with poll. of the North Sea by oil and other harmful subst.	Y	
1989	Bonn	Amendment	Y	
1989	Geneva	Conv. - Civil liab. for damage caused during carriage of dang. goods by road, rail, and inland navig. (CRTD)		
1991	Espoo	Conv. - Environmental impact assessment in a transboundary context	Y	R S
2001	Sofia	Amendment		
2003	Kiev	Prot. - Strategic environmental assessment		
1992	Helsinki	Conv. - Transboundary effects of industrial accidents	Y	S S
2003	Kiev	Prot. - Civil liability and compensation for damage caused by the transboundary effects of industrial accidents on transboundary waters		
1992	Helsinki	Conv. - Protection and use of transboundary water courses and international lakes	Y	
1999	London	Prot. - Water and health	Y	
2003	Kiev	Prot. - Civil liability and compensation for damage caused by the transboundary effects of industrial accidents on transboundary waters		
1992	La Valette	European Conv. - Protection of the archaeological heritage (revised)	Y	
1992	Vienna	Agreem. - Forecast, prevention and mitigation of natural and technological disasters		
1993	Lugano	Conv. - Civil liability for damage resulting from activities dangerous to the environment		
1993	Copenhagen	Agreem. - Co-op. in the prevention of marine poll. from oil and other dangerous chemicals	Y	
1994	Lisbon	Treaty - Energy Charter	Y	
1994	Lisbon	Protocol (energy efficiency and related environmental aspects)	Y	
1998	Aarhus	Conv. - Access to env. information and public participation in env. decision-making	Y	
2003	Kiev	Prot. - Pollutant Release and Transfer Registers (PRTR)		
1998	Strasbourg	Conv. - Protection of the environment through criminal law		
2000	Florence	Conv. - European landscape convention	Y	
2000	Geneva	Agreem. - International carriage of dangerous goods by inland waterways (AND)		

Source: IUCN; OECD.

OECD EPR / SECOND CYCLE

Y = in force S = signed R = ratified D = denounced

JPN	KOR	AUS	NZL	AUT	BEL	CZE	DNK	FIN	FRA	DEU	GRC	HUN	ISL	IRL	ITA	LUX	NLD	NOR	POL	PRT	SVK	ESP	SWE	CHE	TUR	UKD	EU	
				R	R	R	R	R	R	R		R	S	R	R	R	R	R	R	R	R	R	R	R	R	R		
				R	S				R	R			S		S	R	R				S	R		R	R			
				R	S				R	R			S			R	R				S	R		R	R		R	
				R	R	R	R	R	R	R	R	R		R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
				R		R	R	R	R	R		R	R	R		R	R	R	R	R	R		R	R			R	
				R	R	R	R	R	R								R	R						R			R	
				R		R	R	R	R								R	R						R			R	
				R		R	R	R	R								R	R						R			R	
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Reference III

ABBREVIATIONS

AC	Arctic Council
ACARE	Advisory Council for Aeronautics Research in Europe
AEP	Agri-Environmental Programme
BATs	Best Available Techniques
BEAC	Barents Euro-Arctic Council
Bq	Becquerel (unit of radioactivity)
BSAP	Baltic Sea Action Plan
CAP	Common Agricultural Policy
CBD	Convention on Biological Diversity
CBSS	Council of the Baltic Sea States
CDM	Clean Development Mechanism
CFC	Chlorofluorocarbons
CHP	Combined heat and power
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
COP	Conference of the Parties
dB	Decibel
DMC	Domestic material consumption
EIONET	European Environment Information and Observation Network
EEA	European Environment Agency
EIA	Environmental impact assessment
ERRAC	European Rail Research Advisory Council
ERTRAC	European Road Transport Research Advisory Council
EU	European Union
EU-ETS	Emission trading scheme (EU)
FEHAP	Finnish Environmental Health Action Plan
FFCS	Finnish Forest Certification System
FNCSD	Finnish National Commission on Sustainable Development
GBRs	General Binding Rules
GDP	Gross Domestic Product
GFT	Government financial transfers
GHG	Greenhouse gas
GNI	Gross National Income

HELCOM	Helsinki Commission
HCB	Hexachlorobenzene
HCHCs	Hydrochlorofluorocarbons
HMA	Helsinki Metropolitan Area
HNS	Hazardous and Noxious Substances
IPPC	Integrated Pollution Prevention and Control
JCP	Baltic Sea Joint Comprehensive Environmental Action Programme
JI	Joint Implementation
LAeq	Equivalent average sound level measured using the A-weighting
LA21	Local Agenda 21
LRTAP	Convention on Long-range Transboundary Air Pollution
LULUCF	Land Use, Land-Use Change and Forestry
MAF	Ministry of Agriculture and Forestry
MAPP	Major accident prevention policy document
MARPOL	Protocol to the Convention for the Prevention of Pollution from Ships
MEA	Multilateral environmental agreements
MEE	Ministry of Employment and the Economy
Metsähallitus	Forest and Park Service
METSO	Forest Biodiversity Programme for Southern Finland
MoE	Ministry of the Environment
MSAH	Ministry of Social Affairs and Health
Mt	Million tonnes
MTC	Ministry of Transport and Communications
MTK	Central Union of Agricultural Producers and Forest Owners Association
NAP	National Allocation Plan
NBSAP	National Strategy and Action Plan for the Conservation and Sustainable Use of Biodiversity
NC	Nordic Council
NCM	Nordic Council of Ministers
NEAP	Nordic Environment Action Plan
NEC	National Emission Ceilings (EU)
NECS	National Energy and Climate Strategy
NEFCO	Nordic Environment Finance Corporation
NGOs	Non-governmental organisations
NHS	Natural Heritage Services
NWP	National Waste Plan

NWRDP	Finnish Russian Development Programme on Sustainable Forest Management and Conservation of Biological Diversity in North West Russia
ODA	Official Development Assistance
ODS	Ozone depleting substances
OSPAR	Convention for the Protection of the Marine Environment of the North-East Atlantic
PAC	Pollution abatement and control
PCBs	Polychlorinated biphenyls
PCDD/F	Polychlorinated dibenzodioxins and dibenzofurans (dioxins and furans)
PIC	Convention on prior informed consent
PM	Particulate matter
POP	Persistent organic pollutant
RECs	Regional Environment Centres (MoE)
TEKES	Finnish Funding Agency for Technology and Innovation
TUKES	Safety Technology Authority
TWG _s	BREFs' National Technical Working Groups
SITRA	Finnish Innovation Fund
STAKES	National Research and Development Centre for Welfare and Health
SYKE	Finnish Environment Institute
TPES	Total primary energy supply
TWh	TeraWatt Hour
UN-ECE	UN Economic Commission for Europe
UNFCCC	UN Framework Convention on Climate Change
VOC _s	Volatile organic compounds
WTO	World Trade Organisation
YTV	Helsinki Metropolitan Area Council

Reference IV

PHYSICAL CONTEXT

Finland extends over a *total area* of 338 145 km² between latitudes 60 and 70. One quarter of the country is north of the Arctic Circle. Finland shares borders with Russia, Norway and Sweden, and is bounded in the west and south by the Gulf of Bothnia and the Gulf of Finland. Its 1 126 kilometre coastline is dotted with some 180 000 islands with an area of 100 m² or more, largely concentrated in the south-western archipelago, which merges into the Åland Islands in the west.

Most of the country is low-lying. The average height above sea level is 152 metres; the only extensive highland area is the north-west tip of the country, joining Scandinavia. The last Ice Age had a profound impact on the Finnish soil and landscape; the movements of the ice sheet abraded the bedrock and resulted in the formation of eskers and lake basins. About 10% of Finland's total area consists of inland water, with nearly 190 000 lakes with surface areas of over 500 square metres, and 56 000 lakes with surface areas of over one hectare; most are shallow, the mean depth being 7 metres. Lake Saimaa is the fifth largest in Europe. Finland is one of the few countries in the world whose *surface area is still growing* (by about 7 km² a year), owing to the post-glacial rebound.

Almost all of Finland lies within the *boreal zone of coniferous forests*, which stretches from northern Asia to Scandinavia. Only the south-western corner of the country belongs to the *boreo-nemoral vegetation* (*i.e.* oak) zone. There are no true tundra or permafrost areas in Finland. About 74% of the land area is covered by forest and woodland and 7% is used for agriculture. The proportion of *peatland* has been roughly halved by drainage but is still, at 25% of the land area, among the highest in the world; over half is covered by enough trees to be ranked as forest. The growing season is relatively short: 175-180 days on the south coast and about 130 days at the Arctic Circle. Despite a relatively mild climate in the south, Finland's coastline is typically icebound in late winter, including southern ports, requiring icebreakers to clear port lanes.

Forests are Finland's most important *natural resource*. Other natural resources include: chromium, iron, copper, lead, zinc and nickel, as well as hydropower and peat.

Reference V

SELECTED ENVIRONMENTAL WEBSITES

Website	Host institution
<i>www.valtioneuvosto.fi</i>	Finnish Government
<i>www.environment.fi</i>	Finland's environmental administration
<i>www.tem.fi</i>	Ministry of Employment and the Economy
<i>www.lvm.fi</i>	Ministry of Transport and Communications
<i>www.mmm.fi</i>	Ministry of Agriculture and Forestry
<i>www.stm.fi</i>	Ministry of Social Affairs and Health
<i>www.stat.fi</i>	Statistics Finland
<i>www.finlex.fi</i>	Finnish legislation
<i>https://oa.doria.fi</i>	Finnish universities and polytechnics
<i>www.ktl.fi</i>	National Public Health Institute
<i>www.metsa.fi/sivustot/metsa</i>	Metsähallitus (Forest and Park Service)
<i>www.stakes.fi</i>	National Research and Development Centre for Welfare and Health
<i>www.ara.fi</i>	Housing Finance and Development Centre of Finland
<i>www.tukes.fi</i>	Safety Technology Authority
<i>www.stuk.fi</i>	Radiation and Nuclear Safety Authority
<i>www.tekes.fi</i>	Finnish Funding Agency for Technology and Innovation
<i>www.sitra.fi</i>	Finnish Innovation Fund
<i>www.ytv.fi</i>	Helsinki Metropolitan Area Council
<i>www.helcom.fi</i>	Helsinki Commission (Baltic Marine Environment Protection)

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