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Finland's Natural Resources and the Environment

Appendix 3 of the Government proposal for the 1995 budget

SVT

Environment 1995:1B

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Appendix 3 of the Government proposal to Parliament for the 1995 budget

The Government has not discussed the Appendix. It is intended as background material to the budget proposal.

Preface

Finland's Natural Resources and the Environment is an offprint of Appendix 3 of the Finnish Government's 1995 budget proposal. It was compiled by Statistics Finland. The editors were Jukka Hoffrén and Leo Kolttola.

The work was directed by a team chaired by Juha Kuisma, Special Advisor to the Prime Minister, with Heikki Sourama (Ministry of Finance), Veikko Marttila (Ministry of Agriculture and Forestry), Erja Fagerlund (Ministry of Trade and Industry), Jarmo Muurman (Ministry of the Environment) and Leo Kolttola (Statistics Finland) as members. Jukka Hoffrén (Statistics Finland) served as secretary.

Statistics Finland, March 1995

Heikki Salmi,
Director General

Introduction

The parliamentary debate on the 1994 State budget proposal revealed the need to coordinate decision-making regarding the environment and society. Such an approach is hindered by the fragmentary and incomplete nature of our knowledge of the interaction between the environment, nature and the economy. Enough is nevertheless known for us to produce the first overall review of the subject.

The UN Conference on Environment and Development held in Rio de Janeiro in 1992 was the largest meeting ever held at Head of State level in the organization's history. One of the outcomes was Agenda 21, an extensive action programme embracing all sectors of society, intended to bring to a halt, and even reverse, many of the trends threatening the Earth. The Conference also witnessed the signing of the first worldwide environmental agreement on slowing down climate change and on protecting biodiversity, and ratified principles concerning sustainable development of forests.

Together with other participating countries, Finland is committed to complying with what was decided at Rio and to working towards achievement of the targets set. With the extensive cooperation required in view, a Finnish National Commission on Sustainable Development, with the Prime Minister as chairman, was set up in Finland in summer 1993. The working committee includes five other ministers besides the Prime Minister, and comprises 40 members in all from various sectors of Finnish society. The Commission is dealing progressively with the sustainability of operations in key areas.

A central issue at the Rio Conference was the inclusion of sustainable development, the environment and natural resources in all decision-making in every sector and at every level of society. The State budget proposal is the main guideline for the public sector. This Appendix to that proposal is an attempt to monitor implementation of the Rio principles.

Contents

1 The economy and the environment

Sustainable development

Sustainable development means that economic and social development is reconciled with the terms set by natural resources and their cycles in such a manner that nature and the premises for human development are preserved for future generations. It stresses systems maintaining natural life as the foundation of economic development.

Formulated as rules for using natural resources, sustainable development means that:

- reserves of nonrenewable natural resources should not be depleted more rapidly than the renewable natural resources and technologies replacing them can be developed and introduced;
- renewable natural resources are exploited within the productivity limits of nature without destroying its biodiversity; and
- the load aggravating the state of the environment may not exceed the capability of the environment to receive and neutralize it.

The most serious obstacle to sustainable development is the explosive increase in population, which may well more than double from its present 5.7 billion before growth comes to a halt. When that will happen, and how high the peak will be, are open to conjecture at present. Estimates suggest that the Earth can produce food for a population of 11 billion.

The following population figures were presented at the UN population and development conference held in September 1994. The cultivated area figure is taken from Vital signs published by the Worldwatch Institute. It was largest in the early 1980s, since when it has declined. The table assumes that the future total cultivated area will be the same as the 1990 area. In 2025 that area per capita would then be only a third of what it was in 1950.

1. World population and cultivated area per capita

	Population billion	Cultivated area ha/capita
1950	2,5	0,24
1990	5,3	0,13
1992	5,5	0,13
2000	6,2	0,11
2025	8,5	0,08

Finland has 0.62 hectares of arable land and 3.95 hectares of forest per capita. Finland has almost five times as much arable land per capita as the world on average, and the discrepancy is growing rapidly.

Finland's natural population growth will probably start to decline at the end of the millennium. Migration both to and from Finland will be affected by international trends. Accelerating desertification and other environmental degradation caused by climate change will increase migratory pressures both directly and indirectly. Climate change will also alter the structures of the world economy and trade in an unprecedented fashion.

Integration of environmental policy and other socio-economic policy in decision-making

A working connection between environmental and other socio-economic policy is the key to achieving sustainable development. By taking the environment into account in the policy-making of different fields, we can influence and preempt the underlying causes of environmental problems. Moreover, practical implementation of environmental policy can be promoted by ensuring that the decisions reached are not overly at odds with the other aims of society. Integrated environmental and other socio-economic policy also increases well-being by improving the environment and making sustainable development more readily attainable.

Many different sectoral policies, e.g. in transport, energy and agriculture, affect the environment. If sectoral policy is restricted in scope and not geared to the overall benefit of society, it will present a risk to both the environment and the economy.

All sectoral policies apply financial support systems, based on targets for areas such as regional development, competition and equality. Further, current price relations between natural resources and commodities do not reflect the values of sustainable development. It is essential that subsidies and incentives should be related to actions to promote sustainable development to avoid inefficiency and environmental problems.

Instruments

Government can improve the state of the environment:

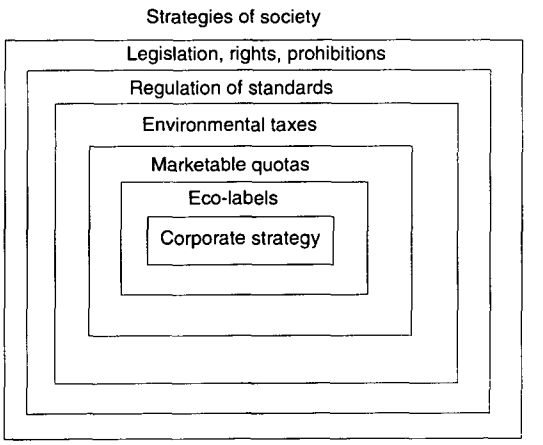
- through legislation,
- through planning and other administrative actions, e.g. the practice for assessing environmental impacts,
- through taxation, fees and assistance,
- by increasing environmental awareness and
- by promoting international cooperation.

The rights, practices and standards created through legislation, together with restrictions on emission quotas, have been the traditional means used to take environmental costs into account in economic decisions. Efforts have increasingly been made to find more flexible instruments, such as taxation, marketable emissions licences, eco-labelling and voluntary agreements.

Finland already has a wide variety of instruments for the economic regulation of environmental protection, for instance, taxes on commodities harmful to the environment, the various tax subsidies and graded taxes affecting the environment in different tax schemes, certain administrative and municipal fees, financial subsidies and deposit schemes in recycling arrangements.

The most important of the economic instruments involve tax subsidies. Central to the introduction of environmental taxes is the regulatory effect of the tax relative to its fiscal effect. When regulation works as it should, the tax does not produce revenues for the state, nor does it have any effects on the national economy other than indirectly through its impact on

Diagram 1.
Hierarchy of instruments



economic activity. When the regulatory effect is not particularly strong, the environmental tax produces revenues for the state together with opportunities to lower some other tax, while retaining the total tax burden unchanged.

The fuel tax, revised in 1993-94, has both fiscal effects and effects regulating environmental protection. The regulatory targets are particularly clear in the progression in the basic tax on transport fuels. The extra tax determined according to the carbon and energy contents of the fuel also has a regulatory effect on fuel choices in energy production. The extra tax is, however, clearly fiscal, as the tax bases cannot be set very high in Finland alone without endangering the external balance of the economy and employment.

Measures to achieve cost efficiency have to be implemented where they cause the lowest costs. Finland has already taken a step in this direction by investing in environmental cooperation with countries in Central and Eastern Europe (CEE). As the need to implement environmental policies in this way grows in the future, we shall have to look into all possible ways of arranging the necessary funding.

Excessively high environmental taxes can impair the international competitiveness of the fields hit the hardest. That is why a very rapid shift in the focus of taxation is not possible. In the long term, however, a consistent and predictable environmental policy will be converted into industrial competitiveness.

2. Environmentally related State taxes and fees, Million FIM

	1993 R	1994 B	1995 BP
Disposable drink-carton tax	36	36	36
Fertilizer tax	516	470	–
Pesticide fee	6	6	6
Electricity tax	656	70	–
Fuel tax	8 404	9 980	12 500
Oil waste tax	21	22	20
Car and motorcycle tax	1 609	1 720	3 030
Charter flight tax	111	120	–
Water protection tax	2	2	2
Total	**11 361**	**12 426**	**15 594**

R = revenue
B = budget
BP = budget proposal

2 Industry

Investment in environmental protection

Finland's total investments in environmental protection measures by industry amounted to FIM 1.8 billion in 1992. Of this sum, FIM 1.2 billion, or 66.4 per cent, was spent on the control of atmospheric pollution. Investments in water protection came to FIM 0.5 billion, or 27.1 per cent of the total, and those in waste management, soil and groundwater protection to FIM 119 million, or 6.5 per cent.

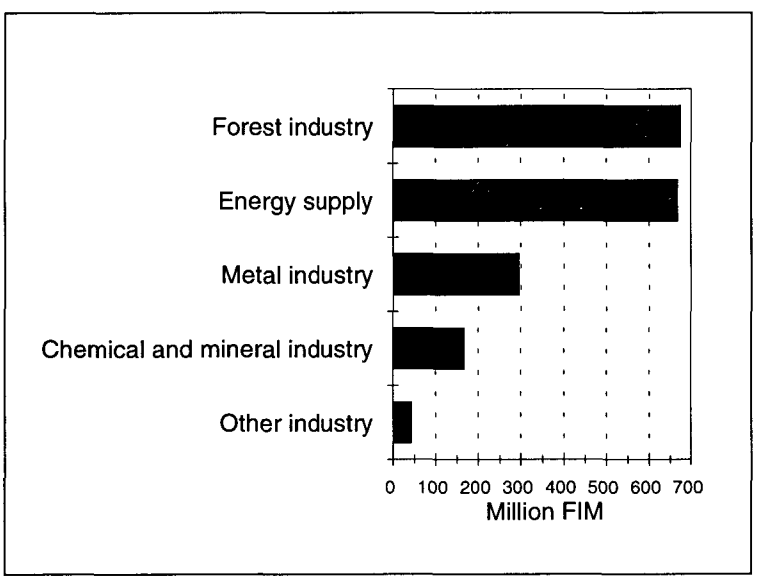
Overwhelmingly the largest proportion of air protection investments was in power plants, the bulk being for the construction of desulphurization plants. Combustion processes were improved to reduce emissions of nitrogen oxide, and particulate emissions were lowered by installing new, or converting existing, electric filters.

The biggest water protection investments were in the pulp and paper industry. In 1992, these mainly focused on improvements in bleaching processes and wastewater treatment. Efforts were made to reduce both water consumption and effluent amounts.

The most waste management investments were made in the chemical industry, where recycling and recovery of chemicals was improved, and various protection basins and silos were built.

Investments in environmental protection by industry in 1993 were probably lower than in 1992.

Diagram 2.
Investments in environmental protection by industry, 1992



Environmental technology

Finnish industry's main areas of environmental expertise lie in wastewater treatment and measuring techniques, and ways of raising the efficiency of the forest industry and combustion technology.

Demand for environmental technology on export markets will be promoted in the near future by the increasingly stringent environmental legislation of Western industrialized countries. After local authorities and central government, the main clients of enterprises supplying environmental technology will be the paper, food and chemical industries and energy production.

Industry is also investing heavily in the production of more environmentally sound consumer goods. These look likely to become quite a profitable business for firms in the future. The aim of the EU environmental audit currently in preparation is to promote the voluntary contribution made by businesses to environmental protection. The control of emissions from industrial enterprises and management of risks should then be improved by the companies' own efforts in a manner verifiable by outsiders.

In 2000, it is estimated that the value of products for environmental protection and 'environmentally sound' products on world markets will be FIM 2800 billion and on the Finnish market FIM 10 billion. New markets for environmental technology are also opening up in the countries of Central and Eastern Europe (CEE)and in the Far East. The EU assessment and eco-auditing regulations guarantee burgeoning markets for consulting services in environmental protection.

Forest industry

Despite growing output, the pulp and paper industry has consistently reduced its effluent volumes. Pulp industry sulphur emissions have declined by over 85 per cent since 1980. Expanding industry has, however, led to an increase in nitrogen oxide emissions.

The recovery rate of forest industry waste is good. Over 95 per cent of the wood waste of pulp and paper mills is used in energy generation and pulp manufacture. The bulk of the wood waste from the sawn goods and board industry serves as raw material and energy for pulp mills. Biological wastewater treatment produces large amounts of sludge, of which half can be used as energy. Waste paper and board from the mills are also recovered and reused.

Over 9 million tonnes of the just under 10 million tonnes of paper and board produced in Finland in 1993 were exported. Domestic consumption thus accounted for under 10 per cent of production. Although Finland also imported waste paper, recycled fibre amounted to a good 5 per cent of all raw materials used in paper and board manufacture.

Finns consumed 196 kg of paper per capita in 1993 and 90 kg of waste paper per capita, or 46 per cent, was collected; 55 per cent of recyclable paper was recovered.

3 Forests

Timber resources and use of forests

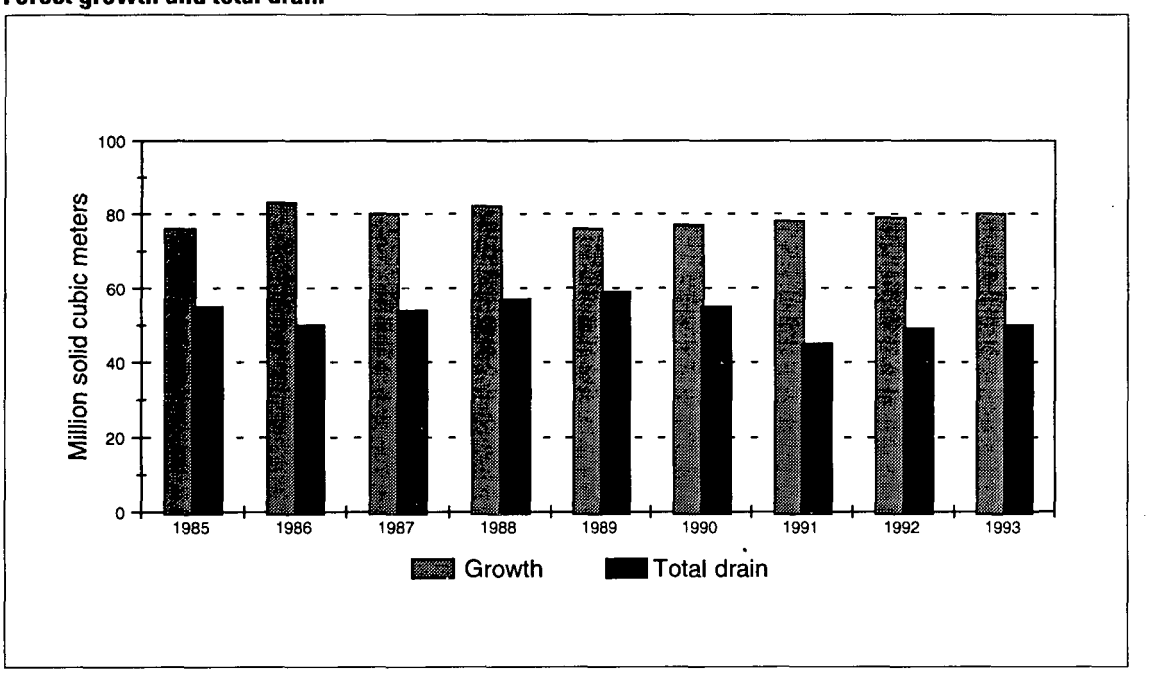
The forests are Finland's most important natural resource. In 1993, the value of forest industry exports totalled FIM 48.3 billion, and they accounted for 36.1 per cent of exports overall. As Finland's forests are renewed relatively rapidly, we are well placed to use them as required by the principles of sustainable development. At the 1993 European forestry ministers' conference, Finland undertook to engage in ecologically sustainable forestry and to protect the diversity of its forests.

Finland has just under 26 million hectares of forest land, which is 87 per cent of the total area of the country. There are more than 20 million hectares of forest soil proper, and the rest is low-productivity or waste land. The standing volume was 2010 million cubic metres at the end of 1993.

Forest growth has continuously exceeded harvesting. The total drain, which comprises waste wood and natural drain as well as net cutting, is thus clearly lower than the annual growth for pine, spruce and broadleaves. In 1993, some 45 million cubic metres of timber was felled for use by industry for general purposes, whereas growth was 80 million cubic metres. Finland's timber exploitation thus presents no danger to reserves, and in this respect we adhere to the principles of sustainable development in our forestry practices.

In Finland, unlike in other countries, private individuals constitute the largest group of forest owners. Thus responsibility for and authority regarding the state of forests are in their hands to a considerable extent. Private citizens own 56 per cent of commercial forest land, companies 8 per

Diagram 3.
Forest growth and total drain



cent and the State 32 per cent. The value of privately owned forests is greater than these figures suggest, however, as they lie in the best areas of southern Finland in terms of both yield and diversity; The State forests are mainly located in the less productive areas of northern Finland.

Under 0.4 per cent of Finland's forestland is first clearcut every year and then replanted. Other silvicultural measures such as thinning and seedling management are conducted over barely 2 per cent of the whole commercially exploited area. Present cutting volumes do not in themselves present a threat to the state of our forests.

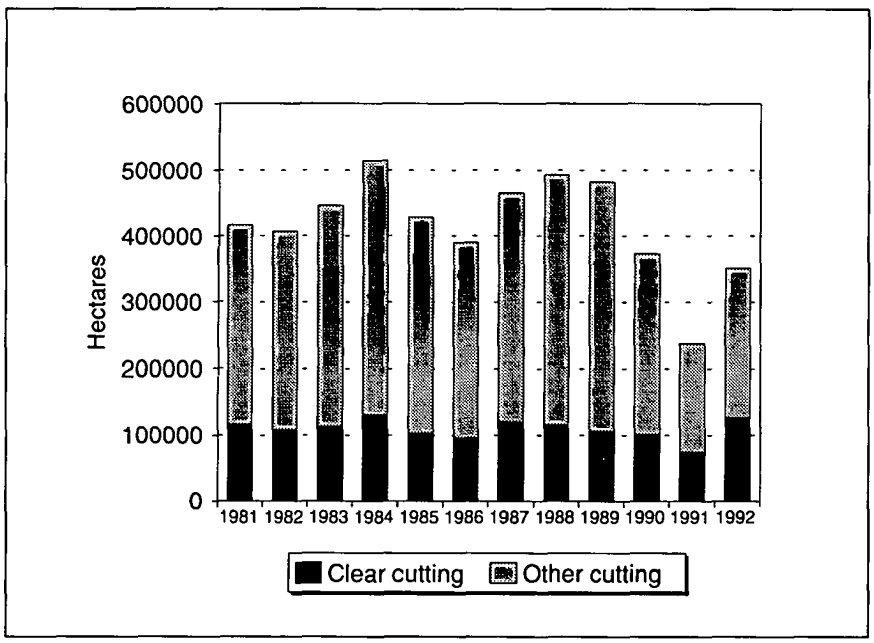
Forests as carbon dioxide sinks

Finland's forests are major carbon dioxide sinks and contribute to preventing the intensification of the global greenhouse effect. In 1993 the amount of carbon fixed in forest soil and vegetation was the equivalent of 10,100 million tonnes of carbon dioxide.

Forests fix carbon dioxide as long as they are at the growing stage. Thereafter, it is preserved in the trees, roots, humus layer and soil for decades. In naturally occurring forests and forests managed as required by sustainable development, the carbon cycle is in balance in the long term.

Thanks to their age structure and intensive forestry practices, Finland's forests are currently in a stage of vigorous growth. Stands are being augmented continuously and represent a net carbon gain. In the past few decades, our forests have acted as a carbon dioxide sink from the atmosphere to the biosphere. In the late 1980s, the annual net accumulation of carbon in Finnish forests corresponded to some 27 million tonnes of carbon dioxide; at the same time, over 50 million tonnes of carbon dioxide was released in emissions from fossil fuels.

Diagram 4.
Forest cutting



Biodiversity

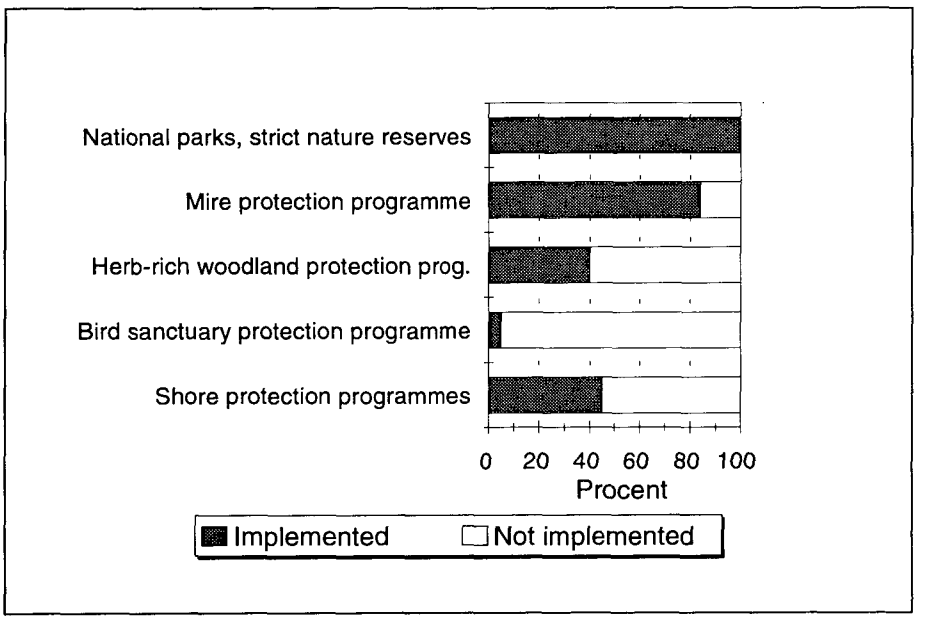
Preserving biodiversity is important for Finland to ensure that the sustainable use of natural resources will be feasible in years to come. Diverse nature adapts more quickly and more readily to rapid changes in the state of the environment. It is also important for our daily recreation needs and to attract tourists. The objective of protecting biodiversity is to preserve and, if necessary, restore the natural variation in uniquely Finnish ecosystems, biotypes, organisms and their populations.

Of the 42,000 organisms known in Finland, 17,000 were assessed in Finland in 1991; of these, 1,692 species, or one in ten, were considered endangered. Deciduous woodlands and old-growth forests are important habitats of endangered species. The diversity of forests has been reduced by the cutting down of old-growth forests, drainage, intensive forestry and excessively hygienic management practices. As a result, commercially worthless tree species, dead wood and rotten trees, which are important for the existence of endangered species, have been eliminated from the forests. To preserve their biodiversity, we need good ecological management that retains a diverse variety of growing and dead tree species appropriate for the forest type. Practices favouring forest diversity are now becoming more common in Finland. In the future, Finnish companies will increasingly be competing on environmentally aware markets with the ecologically sound production of timber. Added to which, environmental protection, recreation and game management will be given more prominence in the handling of commercial forests.

Nature reserves

Merely reorganizing the way we treat our commercial forests will not eliminate the risks posed to diversity. The only practical

Diagram 5.
Implementation rate of protection programmes



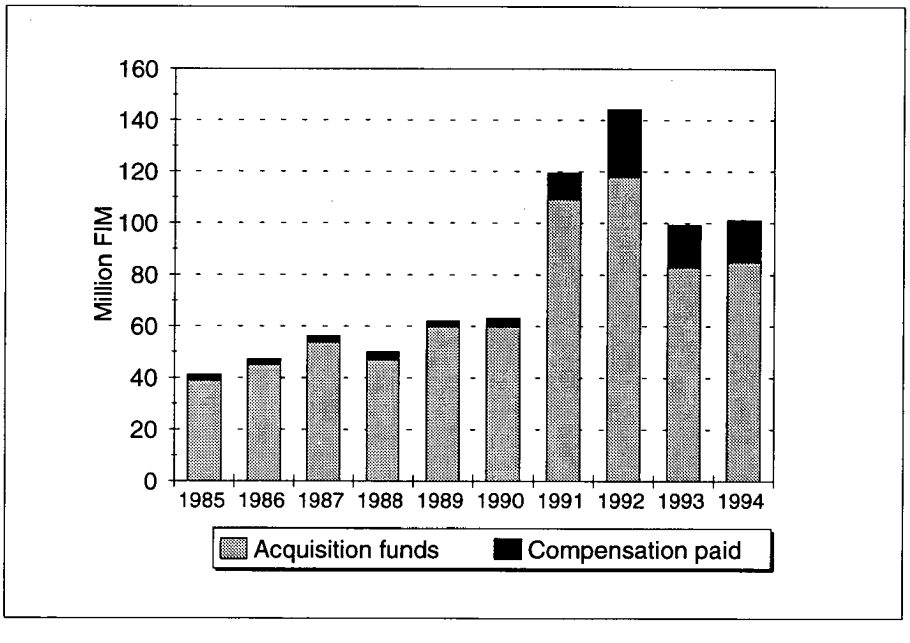
way to preserve a suitable habitat for all species is to leave enough forests in a natural state in different distribution areas and across the country. The main objectives of nature conservation are the preservation of biodiversity with the needs of present and future generations and research in mind. To this end, nature reserves in which indigenous nature will be preserved untouched have been established in Finland. Features currently in particular need of protection are herb-rich woodlands, eskers, shores and old-growth forests in private ownership.

Protection of old-growth forests got under way in 1993. At the moment, 26,500 hectares of old-growth forests on State land have been protected in southern Finland. Private forests in southern Finland have been surveyed, and 8,600 hectares were found to fulfil the criteria of old natural forests. Procedures to protect them were put in hand in 1994.

Finland's nature reserves are heavily concentrated in northern Finland. South of Lake Oulujärvi, a mere 0.25 per cent of the country's forests have been protected, and of these only a third can be considered primeval forests. Nature reserves have also been established on waste and low-productivity forest land, so they do not provide a very representative sample of Finland's forest nature. 20,000 hectares of private land with a total purchase value of over FIM 2 billion have been placed under protection programmes ratified by the Government but not yet implemented. Protected shores account for FIM 1 billion of this.

During the last ten years, funds allocated for the acquisition of nature reserves and compensations paid to landowners have totalled almost FIM 800 million. With the current annual funds of FIM 100 million the implementation of protection programmes already approved will take until 2010. Such slow implementation of the programmes is financially damaging to the owners of the areas to be protected.

Diagram 6.
Funds for acquiring nature reserves and compensation paid for protected areas



4 Energy

Use of energy

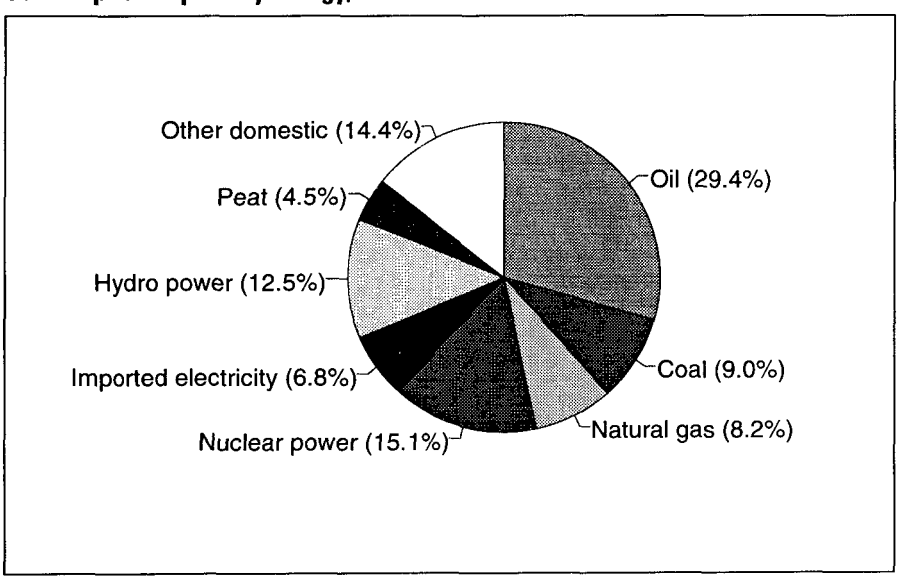
The stucture of Finnish energy consumption has remained roughly unchanged for the last ten years. Combined consumption of fossil fuels, i.e. oil, coal and natural gas, accounts for some 47 per cent, nuclear power and imported electricity jointly for 22 per cent, and domestic energy sources altogether for 31 per cent.

Finland's domestic energy sources comprise various renewable natural resources - though it should be added that peat renewal can take thousands of years - and certain materials recovered from residues and waste.

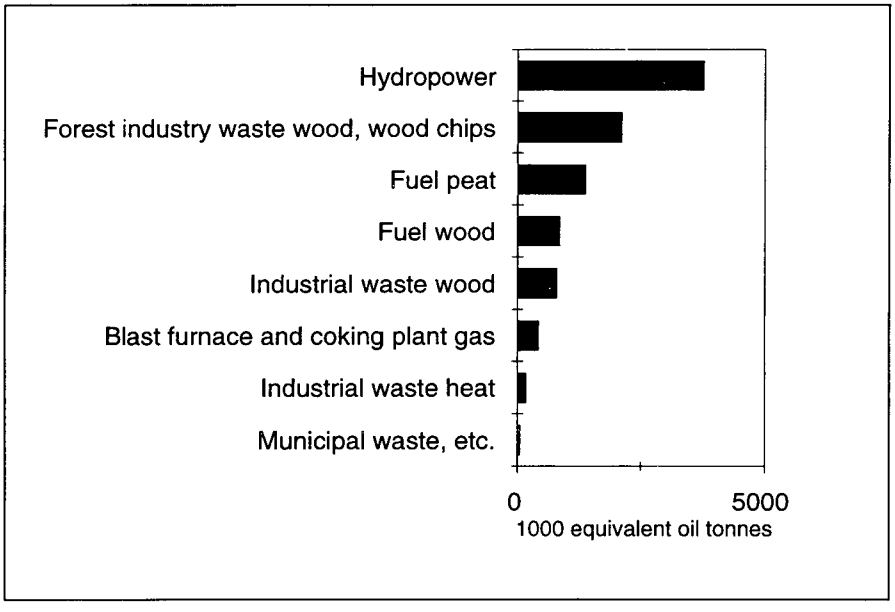
The report on energy policy submitted to Parliament by the Government in autumn 1993 took the view that sustainable development means ensuring that energy production and consumption remain within the limits dictated by the carrying capacity of the environment and the long-term sufficiency of our natural resources. It also calls for the use of safe, efficient and economical energy systems which generate less pollution.

In connection with the 1994 State budget, Parliament amended the fuel tax, enacting a new tax on all primary energy sources according to their energy content. A tax was also levied on fossil fuels according to their carbon content, though this tax is not collected on wood, wind power or waste used for energy production. A separate tax was levied on peat, depending on its carbon content, and an additional basic tax on nuclear power and imported electricity.

Diagram 7.
Consumption of primary energy, 1992



Digram 8.
Sources of domestic energy, 1992



The Government has approved an energy conservation programme aimed at ensuring more efficient end-use of energy by cutting specific consumption in various sectors by 10-15 per cent between 1990 and 2005.

In April 1994, the Council of State decided on measures to promote the use of bioenergy. The aim is to increase consumption by at least a quarter (i.e. 1.5 million tonnes oil equivalent) by 2005.

Finland uses a higher proportion of biofuels in total energy consumption than other industrial countries. Over 17 per cent of the energy need is met using wood and peat. However, a much higher yield of energy raw material could be gained from our forests, peatlands and cultivated land.

International trends will dictate any strengthening in the market standing of bioenergy. A far-sighted technology policy and tax controls are also needed. Environmental policy, reliable energy supply, regional development considerations and the impact on employment all argue for action to make bioenergy more competitive.

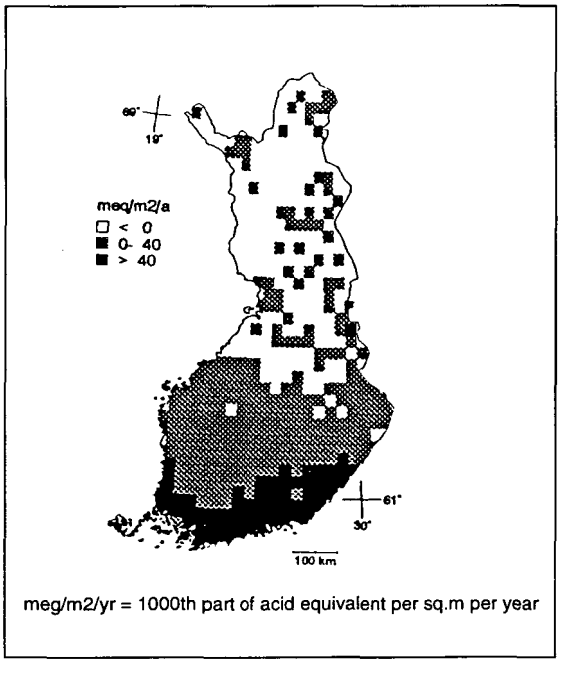
Atmospheric pollution and acidification

Both Finland's own emissions into the air and transboundary airborne pollution pose a threat to Finnish nature and, in the long term, endanger sustainable use of natural resources. It is only recently that restrictions on emissions have been introduced aimed at reducing the impact of sulphur and nitrogen compounds, and of ozone and heavy metals released into the lower atmosphere. There continues to be widespread deposition in excess of the critical load, which causes environmental damage. The most dangerous acidification

resulting from this deposition threatens organisms in small waterbodies, forest lakes and trees on poor quality land. So far, Finland's forests have not been very widely damaged by acid deposition, but over the long term there is a danger of disturbing the workings of micro-organisms in the soil. Diagram 9 shows the need to reduce sulphur deposition in 1990, judged by the critical load on lakes and forestland. The calculation unit is a 1000th part of acid equivalent per square metre per year.

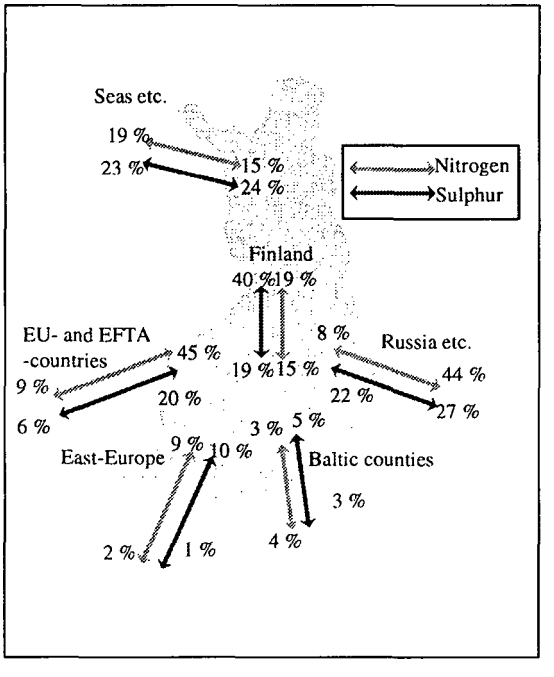
In 1992, only 19 per cent of acid sulphur deposition and 15 per cent of nitrogen deposition came from Finnish sources; 40 per cent of total sulphur emissions, but only 19 per cent of nitrogen emissions, remained in Finland, 22 per cent of sulphur deposition derives from Russia, Belorus and the Ukraine, and 45 per cent of nitrogen deposition from EU and EFTA countries. Russia and its neighbours are the recipients of 44 per cent of Finland's nitrogen emissions and 27 per cent of our sulphur emissions.

Diagram 9.
Need to reduce sulphur deposition



meg/m2/yr = 1000th part of acid equivalent per sq.m per year

Diagram 10.
Origin of sulphur and nitrogen deposition in Finland and movement of emissions from 1992.



Sulphur dioxide emissions

International conventions signed by Finland call for a radical decrease in various emissions into air by the energy industry during the '90s. By signing the international sulphur protocol in 1985, Finland committed itself to cutting its sulphur emissions 30 per cent on the 1980 level by 1993, and also stated that it would halve its 1980-level emissions by 1995. A reduction of more than 70 per cent had been achieved by 1992. This was made possible by changes in the structure of energy production, less use of heavy fuel oil and cuts in the sulphur content of fuels, combined with improvements in processing technology.

In 1991, the Government also decided to draw up a 10-year programme aimed at cutting sulphur dioxide emissions 80 per cent on the 1980 level. Finland committed itself to the same goal in 1994, in the second international sulphur protocol signed in Oslo. Current emissions are probably below maximum, but unless new action is taken, they will certainly rise.

Emissions of nitrogen oxides

In the case of nitrogen oxides, Finland engaged, in the 'Sofia Protocol' of 1988, to stabilize emissions at the 1987 level (270,000 tonnes of NO2) by 1994. The Government also announced that it would reduce emissions of nitrogen oxides 30 per cent on the 1980 level by 1998. Growing traffic volumes and energy use increased emissions of nitrogen oxides in the '80s, but the early '90s again saw a decline in emission figures because of the recession, improvements in power plant processing technology and growing use of catalytic converters in cars.

Diagram 11.
Sulphur emissions in Finland (1980 = 100)

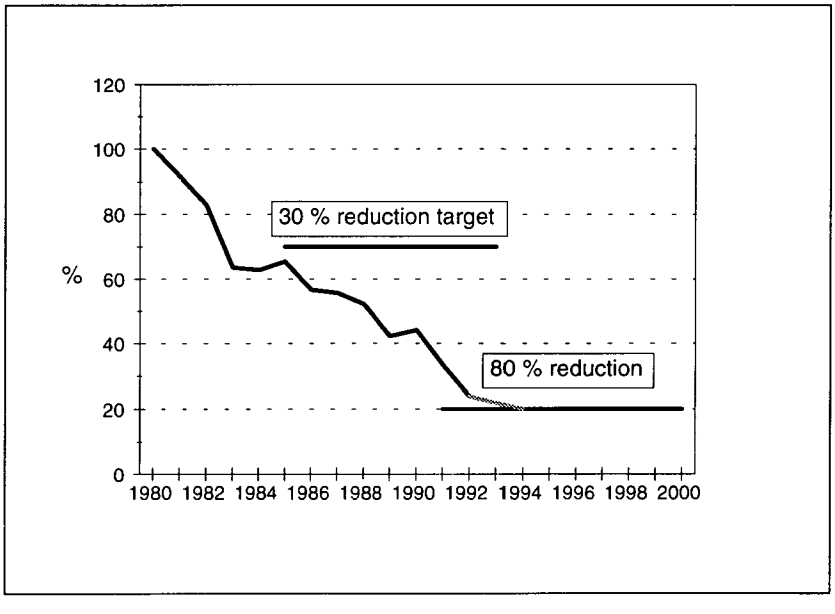
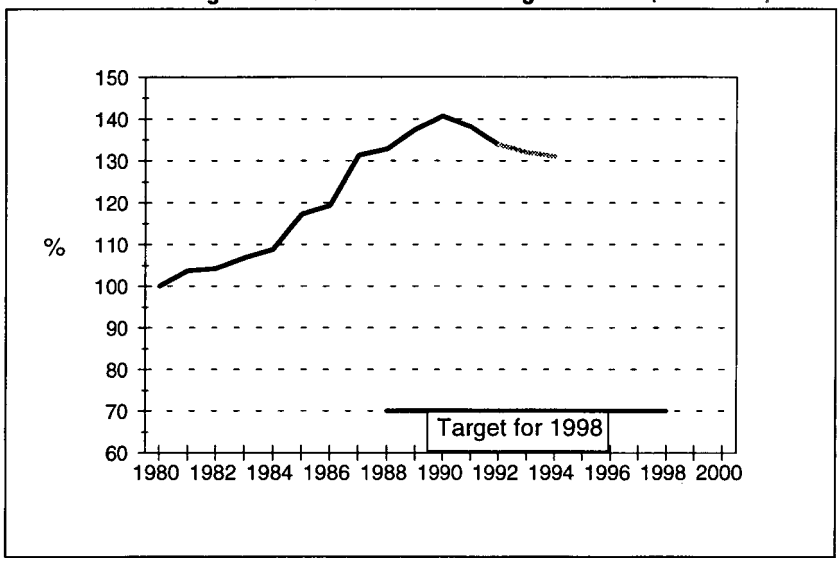


Diagram 12.
Emissions of nitrogen oxides in Finland and target for 1998 (1980 = 100)



The committee set up to consider ways of reducing emissions of nitrogen oxides stated in spring 1990 that it was possible to achieve a reduction of only some 15 per cent in emissions by technological means. The protected 30 per cent cut thus calls for new approaches to energy use and traffic restructuring. The target therefore looks unlikely to be reached, though emissions are expected to decline appreciably during the present decade.

Greenhouse gases

The mean temperature of the earth is currently expected to rise about four degrees by 2100 unless there are radical changes in greenhouse gas emission trends. Experts consider that, even if it were possible to halt growth in emissions, it would not be possible to entirely prevent further global warming.

Finland signed the UN Convention on Climate Change in 1992 at the Conference on Environment and Development in Rio de Janeiro. This aims at the "stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. Such a level should be achieved within a time-frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner."

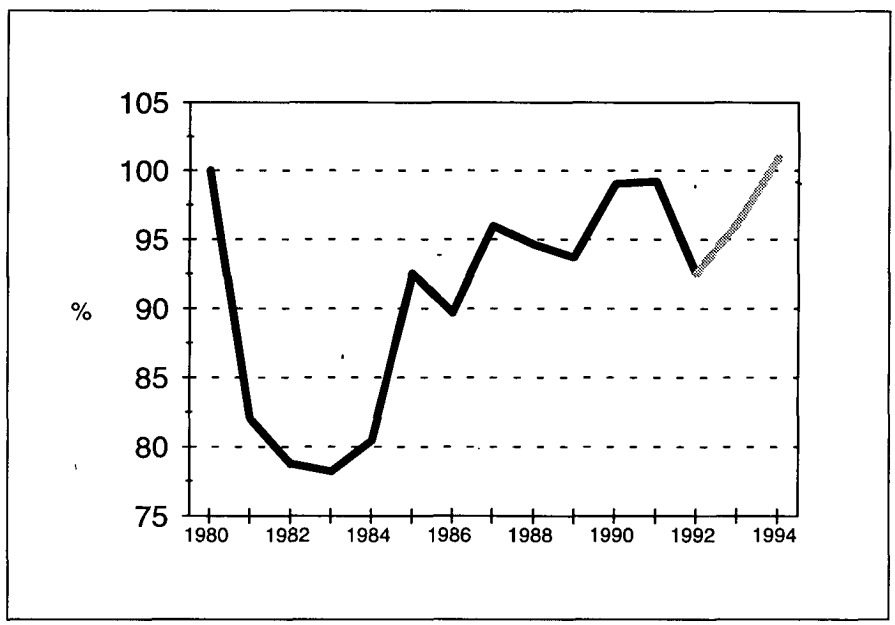
Initially, the aim is to halt further growth in greenhouse gas emissions by the year 2000, and then to regain the 1990 level.

For Finland, the most important greenhouse gases are carbon dioxide emissions from energy production, which account for about 55 per cent of the total. Other important gases are methane, nitrous oxide and chlorofluorohydrocarbons, i.e. CFCs.

The process of replacing energy production technology is a very slow one, so the carbon dioxide emissions being produced in 2000 will largely derive from production capacity that already exists or is now under construction. Electricity imports will also affect production capacity needs, energy use and emissions in the year 2000.

Carbon dioxide emissions are thought to have started rising sharply in 1993-1994 with the revival of major industries. Growing exports in turn mean higher energy consumption, inevitably leading to more carbon dioxide emissions, as the Finnish export industry is very energy-intensive. Electricity imports will have to be replaced by domestic production once present delivery agreements run out. This will add to domestic carbon dioxide emissions at the end of the '90s, at least insofar as the supplementary energy needed is not bioenergy.

Diagram 13.
Carbon dioxide emissions from fossil fuels in energy production and consumption (1980 = 100)



5 Transport

Traffic volumes started falling in the early '90s after several years of expansion. In the '80s, passenger traffic rose 30 per cent and goods traffic 20 per cent. The volume of public transport remained practically static, but its relative contribution to total passenger traffic fell. In the early '90s, the figure was only 20 per cent.

Goods traffic declined over 10 per cent in 1990-92, and road transports - at 67 per cent of the total - by nearly the same amount. Rail transports increased somewhat. The emission limits on passenger cars, vans and heavy vehicles have been tightened appreciably in the '90s in order to reduce the harmful environmental impact of road traffic.

Thanks to changes in fuels use, lead emissions from gasoline-fuelled cars and sulphur emissions from diesel vehicles have plummeted in the early '90s. The new, cleaner fuel grades are also reducing nitrogen oxide, hydrocarbon and carbon monoxide emissions. On the other hand, an appreciable reduction in emissions of nitrogen oxide, in particular, will require catalytic converters in private cars and new engine types in heavy vehicles, something that can only be achieved as older vehicles are replaced by new ones. Such replacement of the vehicle stock will take over ten years, but by the end of the '90s nearly all gasoline-fuelled cars should have catalytic converters. Particulate emissions will decrease after 1995, when restrictions on heavy diesel vehicles come into effect. Carbon dioxide emissions will decrease only if fuel consumption also decreases, and otherwise these emissions cannot be reduced by technical means, so future trends will depend directly on trends in traffic volumes and structures.

Diagram 14.
Trend in public transport and car use (1985 = 100)

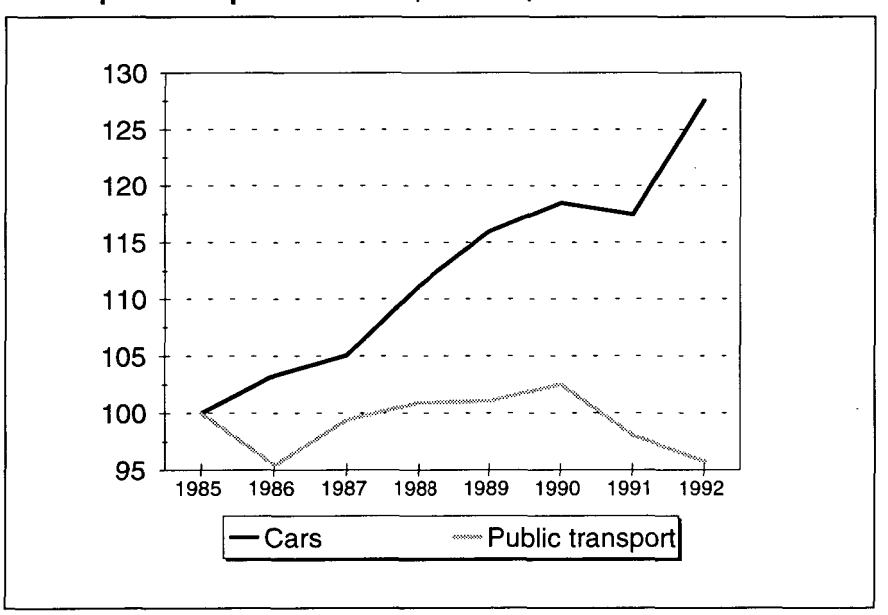
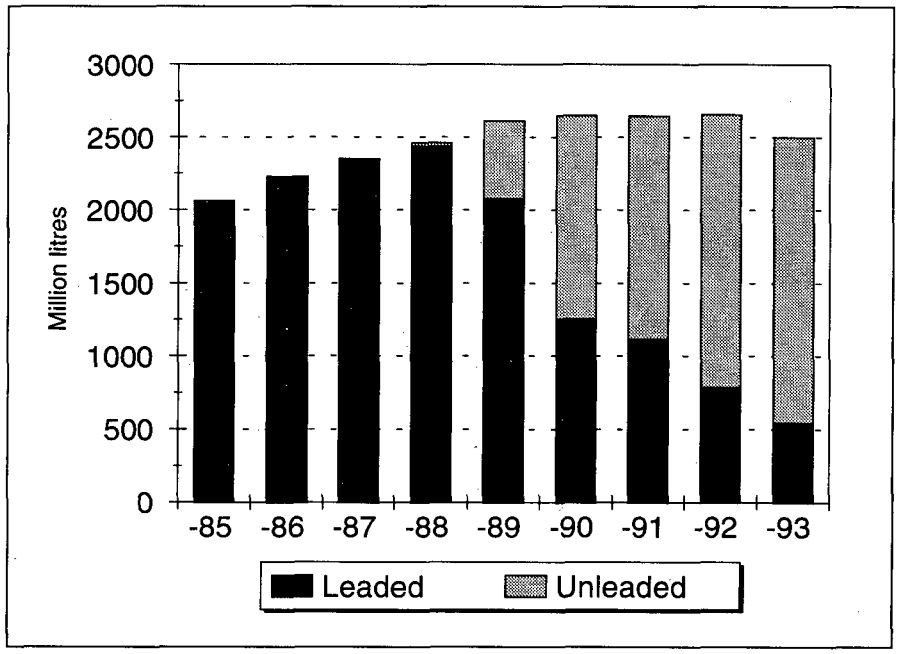
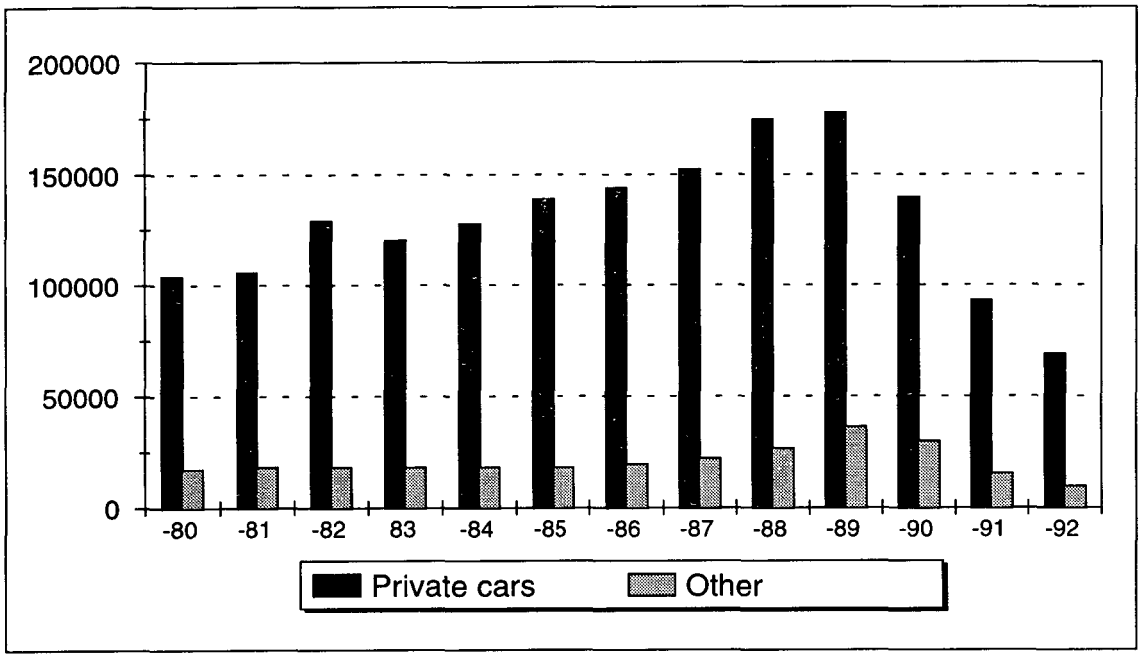


Diagram 15.
Gasoline sales



The most important increase in traffic volumes in the immediate future is expected to take place in transit traffic between Finland and Russia. The volume of road traffic from Finland to Russia rose tenfold between 1991 and 1993. Northern Europe is also coming to be a new market area extending far beyond the old 'Nordic' concept, in which Finland holds a much more important position. Integrating Finland into global traffic networks and European raw material chains will mean developing all the various forms of transport and the links between them. Much more attention must be given in future to the economic potential and environmental impact of transit traffic. In railway transports, Finland's role as an intermediary for traffic from both East and West is likely to be an important one at the end of the decade. Renewal of the tracks between Helsinki and St Petersburg and the Savo line (through east-central Finland) is thus justified for both environmental and economic reasons.

Diagram 16.
Newly registered cars



6 Agriculture

Environmental impact

A good three million hectares of Finland's land area, or 9 per cent, is farmland. Farm output derives mainly from animal husbandry and more than 80 per cent of the total arable area (2.5 million hectares) is devoted to growing grass, fodder and feed grain, and to cattle pasturage. About 10 per cent of the cultivated area is used to grow cereal crops and the rest for vegetables and root crops.

In the last few decades, it could be claimed that an excessive amount of fertilizers and pesticides was used on this land, relative to the actual need for crops. Agriculture has a particularly dramatic impact on water eutrophication because of the phosphorus load it generates. Nearly half of the phosphorus load on the country's waterbodies and a third of the nitrogen load derive from farming.

The phosphorus and nitrogen load from agriculture is currently greater than that produced by industry and communities combined, which has been greatly reduced in recent decades. Indeed, the main focus of water pollution control is shifting to attempts to reduce environmental pollution from farming. According to a target set by the Government in 1988, the phosphorus load from agriculture was to be cut by a third 1995, and the nitrogen load was to be radically reduced.

Species that thrive in a farm environment enrich the otherwise limited overall range of species in the northern coniferous zone and the ecosystems thus formed reduce the diversity of natural habitat types. Greater mechanization in the interests of efficiency, growing use of chemicals, drainage of arable land and more specialization have led to the formation of much larger uninterrupted field areas. Pasturage has also declined, and both meadows and wastelands have been turned into fields or planted with trees. The variety of landscape that used to be typical of the Finnish countryside, and little details such as patches of forest, field borders and open waters, are disappearing. As a result of loss of habitats, some 300 animal and plant species that used to be part of the rural scene are now under threat.

Environmental subsidies

Finnish membership of the European Union is a crucial factor in the future of farming here and will essentially influence the production methods used. In the Union, farmers play a triple role, as producers of foodstuffs, landscape managers and the sustainers of rural communities. The support system for agriculture will change dramatically, making environmental protection one key basis for the grant of farm supports.

It is estimated that EU membership will bring an increase in contract farming for the food industry and a decrease in grain growing. Animal husbandry and grassland farming have better prospects for retaining their production capacity. The amount of land standing fallow will decrease once the size of farm subsidies is made independent of arable area. Agricultural output is expected to follow a new course, aiming at greater product variety less harmful to the environment.

The total amount of various environmental subsidies in Finland's case come to ECU 270 million a year, or about FIM 1.7 billion. The EU's contribution to funding this is ECU 135 million, or 50 per cent, leaving the remaining ECU 135 million to be financed out of the State budget. The accession agreement negotiated by Finland also requires national support to northern

areas to be allocated in a way that promotes conservation of the environment.

Environmental protection measures in agriculture are based on a special programme for rural areas drawn up by the Ministry of Agriculture and Forestry and the Ministry of the Environment, which combines Government measures to reduce the harmful impact of farming. Farming methods less harmful to the environment, such as reduced use of fertilizers, are also being promoted through a handbook sent out to all farmers. The old fertilizer tax intended to reduce the harmful environmental impact of farming was abolished in the summer of 1994, as part of the process of adjustment to EU membership.

The aim of environmental subsidies to agriculture is to place production on a sustainable basis, while also preserving the preconditions for farming in the long term. The load on surface and ground waters and on the air will be reduced, harmful effects of pesticides will be decreased, biodiversity will be made a major concern, and the manmade landscape will be more carefully managed. About one third of all farms are already covered by voluntary environmental management plans, and in future these will be integrated into subsidy systems for environmental and landscape conservation currently being drafted. There should be environmental management plans for all farms by 1998.

Another goal of environmental subsidies is to guide production methods so as to ensure that the goals for environmental protection in agriculture are achieved, while also turning out pure, high-quality products. Most of the support, or nearly 80 per cent, comprises basic subsidies. These are paid according to a regionally graduated system, being highest in the areas where agriculture is most dominant and where the environmental problems are therefore greatest. These areas are mainly in southern Finland. The basic subsidy is paid throughout the country for the environmental management programme for individual farms, for efforts to reduce use of fertilizers and plant protectants, and for measures connected with fallowing. In the southernmost support area where 'mountain support' is not paid, the farmer also engages to create ditch banks and protective strips, and to take action to establish plant cover, manage landscape and preserve biodiversity.

Marketable eco-benefits

As a result of deregulation of international trade and imports of foreign farm products, Finnish agriculture will have to compete specifically with the high, guaranteed product quality that it can offer. The average heavy metal intake of people in many industrial countries is 2-5 times the Finnish level. Concentrations of soluble lead and cadmium in Finnish farmland are also well below those in most other industrial countries. The fact that Finnish fertilizers use an extremely pure form of raw phosphate is one reason why Finnish soil contains so little cadmium. Finland also uses rather few pesticides, compared with several Continental countries, where consumption is many times higher. In addition, 80 per cent of the pesticides used in Finland are herbicides, which decompose rapidly in nature.

As well as this ecological advantage, Finland has a relative advantage in any attempts to exploit the environmental 'edge' of its farm products commercially: our ability to document the properties, origin and production phases of our products.

The importance of agriculture as the source of renewable energy and industrial raw materials will increase in the long term. The competitive potential of these non-food products will increase once the industrialized world starts adding the costs of harmful environmental effects to the prices of nonrenewable raw materials. Plants where the energy economy of farming and processing and the environmental impact are most advantageous are ideally suited to such non-food purposes.

7 Identifying sustainable structures

In terms of the environment, EU membership means both a new channel for watching over Finland's interests and a strengthening of our relative competitive edge. The environment programme adopted by the EU in 1992 declares that sustainable development respectful of the environment is the Union's main goal. Sectors with impact on environmental quality which are particularly subject to EU scrutiny are industry, energy supply, transport and communications, agriculture and tourism. According to the subsidiarity principle, decisions on environment policy, too, should be taken as close as possible to the people concerned, that is, by definition at the national level.

Finnish values favour responsible consumption and protection of the environment. In terms of natural resources and the environment, structures that support sustainable development can be found in many sectors in Finland. They include sustainable forestry that ensures biodiversity, pulp and paper making using closed circulation systems, the sawmill and joinery industry and other industries relying on a high level of environmental techniques and the best available technology. The full potential for eco-farming and food production is as yet unexploited.

Decision-making on environmental and other socio-economic policies can be integrated, thus ensuring that decisions are more effectively implemented without increasing the costs involved. Environmental management, environmental impact assessment and integrated environmental and economic accounting collect together the information needed to take decisions. For this purpose data compilation and material on the environment must be upgraded to this end. There is a growing need in decision-making for indicators and key parameters that demonstrate the level of sustainable development achieved.

Most important agreements on the conservation of natural resources and the environment binding on Finland

Agreement	Aim	Implementation
Climate change UN Framework Convention on Climate Change, Rio de Janeiro, 1992.	To stabilize concentrations of greenhouse gases in the atmosphere at a safe level. Initial aim to halve growth in greenhouse gases by 2000 and reachieve the 1990 level.	Came into effect on August 1, 1994.
Substances that deplete the ozone layer in the upper atmosphere Montreal Protocol, 1990.	To stop use of the substances.	Use of halons prohibited first, as of January 1, 1993.
Sulphur emissions Oslo Protocol, 1994.	The long-term objective is to ensure that sulphur depositions do not exceed the critical loads in each area. The first step is to reduce the excess by 60 per cent by the year 2000. To this end, Finland engages to reduce sulphur emissions 80 per cent on the 1980 level by 2000.	The emission reduction target is expected to be achieved during 1994.
Emissions of nitrogen oxides Protocol concerning Control of Emissions of Nitrogen Oxides on their Transboundary Fluxes, Sofia 1988.	In the protocol, Finland engages to freeze emissions of nitrogen oxide at the 1987 level by the end of 1994. In the declaration, Finland announced its intention to reduce its emissions by 30 per cent on 1980 levels by 1998.	In 1992, emissions of nitrogen oxides had fallen about 5 per cent on the 1987 level.
Volatile organic compounds (VOCs) International protocol, Geneva 1991.	To cut emissions of volatile hydrocarbons by 30 per cent on 1988 levels by 1999.	The agreement has not yet taken effect, but Finland has ratified it.

Agreement	Aim	Implementation
Biological diversity Biological Diversity, Rio de Janeiro 1992.	The Convention took effect in December 1993. In Finland, attainment of its goals means taking biodiversity into account in all economic and other activities and when assessing the environmental impact of other projects. The Convention calls for more research into and monitoring of biodiversity.	A national report assessing the state of biodiversity in Finland was submitted at the end of 1994. An action programme is now being drawn up to safeguard biodiversity.
Protection of the Baltic Helsinki Convention 1974 Helcom recommendations 1980- Ministerial declaration 1988 Convention on the Protection of the Marine Environment of the Baltic Sea Area 1992.	Aims include reducing the nutrient and heavy metal load on the Baltic and nondegradable or toxic substances by 50 per cent by 1995.	Targets will be integrated into national legislation and programmes, into Water Court decisions on individual cases and will be pursued through economic instruments.

Tilastokeskus
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Finland's Natural Resources and the Environment

Appendix 3 of the Government proposal for the 1995 budget

SVT

Environment 1995:1B

Finland's Natural Resources and the Environment is an offprint of Appendix 3 of the Finnish Government's 1995 budget proposal. It presents the salient features of sustainable development from Finland's point of view and the principles of economic and environmental interaction. It also reviews trends in the main sectors of the economy as they affect the environment. These sectors are industry, forests, energy, transport and communications, and agriculture. Finally, a list is given of the main conventions on the protection of natural resources and the environment to which Finland is a signatory.

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