

# ENVIRONMENTAL REPORT

| OF NOKIA CORPORATION 2002 |



**NOKIA**

### | THE AIMS AND THE SCOPE OF THIS REPORT |

This environmental report is addressed to Nokia's employees, customers and other stakeholders affected by or interested in Nokia's activities. The report states Nokia's understanding of the environmental aspects and impacts of its activities, outlines a set of programs for reducing the adverse impacts, and reports actions aimed at implementing the stated policies and goals.

Nokia supports efforts to reach agreement on global guidelines for organizations' reporting of the economic, environmental, and social dimensions of their activities, products and services. Nokia reports separately on economic, environmental, and social issues. The scope of this report is limited to environmental issues. The spirit of this report is that of the Global Reporting Initiative's (GRI) Sustainability Reporting Guidelines. The information on economic (e.g. business profile) and social activities, including the safety of mobile telephones and Nokia activities in electromagnetic research, are available on the Internet at [www.nokia.com/aboutnokia](http://www.nokia.com/aboutnokia).

Nokia previously reported on its environmental activities in 2000. Nokia has moved all of its corporate reporting online and since issuing the previous report, updated information on environmental issues has been available on the corporate web site.

The business group review section is a new element compared with the previous report, underscoring the fact that environmental issues are not a separate activity at Nokia, but are integrated into all our business activities and implemented through the line organization.

The environmental data presented in this report includes energy consumption, direct carbon dioxide emissions, water consumption, waste and ozone depleting substances. This group-level report includes no systematic site-specific information. The case studies offer close-ups of stakeholder cooperation and other practical environmental work that is being carried out in different parts of Nokia.

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## | INTRODUCTION |

This report accounts for Nokia's understanding of the environmental aspects of its products and operations, its policy and strategy for counteracting adverse environmental impacts, and the systems and resources in place for implementing that policy and strategy.

Nokia's approach to environmental issues is based on life-cycle thinking covering the environmental impact of its products. Nokia's own activities focus on the design, assembly and marketing of products and account for only a small part of their total life-cycle environmental impact.

Global warming and the depletion of non-renewable natural resources make up the global backdrop of Nokia's engagement with the environment. The overriding goals are to reduce the life-cycle energy consumption of Nokia's products and to make possible an increase in the recycling and reuse of the products' materials.

Of Nokia's products, mobile phones has a short service time, while network products stay in service considerably longer. As a result, energy consumption during use is a major environmental issue for network equipment, while component manufacture accounts for the most part of the life-cycle energy consumption of mobile phones.

Environmental considerations are systematically woven into Nokia's activities through four programs that cover the entire product life cycle.

Design for Environment ensures that new products contain no restricted materials, minimize energy consumption and maximize recyclability. Supplier network management oversees the environmental impact of suppliers. Environmental Management Systems control the environmental impact of Nokia's own operations. End-of-Life Practices focus on take-back systems as well as the safe recycling of products ensuring the maximum recovery of the materials and energy that go into them.

This report recounts principles, activities and results under the four programs. At Nokia, environmental activities are integrated into business activities. This report therefore concludes with environmental reviews of Nokia's three business groups.



Sustainability is about the future, and it is about us. Our way of doing business is sustainable when it takes into account the needs of future generations. The drive for sustainability becomes effective when it is a shared global pursuit enlightened by the best available understanding of the constraints set by nature, the silent partner in all our undertakings.

It is our mission to drive a profitable and growing business, but that does not mean business at any cost. Our products and operations have an impact on two global environmental issues in particular, climate change and the depletion of natural resources. We consider these issues primarily in the forward-looking design of our products as well as in our procurement, assembly and logistics operations.

Our product designers consistently strive to reduce the life-cycle energy consumption of our products while at the same time working to increase the recyclability of the materials used in them.

We do not see carbon dioxide emissions and the consumption of non-renewable resources as separate environmental issues. They are increasingly influencing the value chains of our business. By accepting responsibility for the future we can add value to our customers, our shareholders, our employees and the global community.

Mobile communications in general offers the chance to decrease our use of raw materials and energy. For instance, electronic transaction and storage means less transportation; being easier to contact can reduce the need for travel; smaller products mean fewer raw materials and some new services do away with physical products altogether, as in the case of the answering machine.

Environmental regulation is an evolving part of our business environment. Currently, the drive to internalize external costs focuses on the materials content and recycling of electronic products. We systematically address both issues through our entire product chain from product design, supplier network management and environmental management of our own operations to end-of-life practices. With this systematic approach, we continue to adjust our operations in accordance with emerging regulations and the expectations of our many stakeholders.

As market leader and a global company, Nokia takes its responsibilities seriously. Sound environmental principles make business sense by helping minimize risk, ensuring legal compliance, and building reputation amongst stakeholders. By conducting business in a responsible way, Nokia can make a significant contribution to sustainable development, at the same time building a strong foundation for economic growth.

Jorma Ollila  
Chairman and CEO  
Nokia  
April, 2003



## | EXECUTIVE SUMMARY |

Our previous environmental report, based on the situation in 2000, stated the following target areas for our environmental management:

- Integration of Design for Environment into the product development process
- Integration of environmental aspects into supplier network management
- ISO 14001 certification of production sites
- Support for End-of-Life practices

Work in all these areas has progressed well. All Nokia production sites had certified ISO 14001 environmental management systems (EMS) by the end of the year 2000.

Our production facilities are now included in new certified regional and global environmental management systems. Nokia's Real Estate and Facilities Platform is in charge of building environmental management systems for large offices and other non-production facilities. For these facilities Nokia will not seek external certification but will instead rely on internal verification.

The environmental impacts of Nokia's own activities, such as energy and water consumption and waste, are largely the concern of real estate management. Responsibility for the collection of environmental data on these matters has therefore been assigned to Nokia's Real Estate and Facilities Platform.

Design for Environment activities are integrated in the product creation processes of the business groups. The two current focus areas are recyclability and the material content of products. Nokia is well prepared to meet the requirements of new legislation under preparation in Europe and elsewhere.

Clarification of the material content of components used in our products has been the focus for cooperation with our supplier network. We have compiled a Nokia Substance List based on regulatory requirements and reasonable facts. The list identifies substances that Nokia has banned, restricted or targeted for reduction. Component suppliers are required to report on their use of these substances. In addition, component suppliers are encouraged to make a declaration of the full material content of their products. Data from these declarations

is being collated in a Nokia material database, enabling us to proactively handle material-related questions and issues. Nokia plays an active role in EICTA work groups and the RosettaNet industry initiative both aimed at creating an e-business platform for the exchange of materials and product information between producers and suppliers.

Industry cooperation has played a very important role in communicating Nokia's End-of-Life and Design-for-Environment strategies. Together with other producers in the Electronics Coalition we have succeeded in convincing the electronics and telecommunications industry and the European legislative bodies that individual producer responsibility for the recycling of electronic equipment is environmentally the best way to maintain an incentive for continuously improved environmental product design.

In preparation for new requirements on consumer product take-back, Nokia has begun providing information on mobile phone collection points in its Internet pages. For network equipment customers, Nokia offers a turnkey take-back service. Take-back and recycling arrangements for consumer electronic products will continue to vary among countries and Nokia has accordingly continued the evaluation of different recovery and recycling options. In 2002, Nokia signed an agreement with a group of other manufacturers to cooperate on the sound environmental management of end-of-life mobile phones under the aegis of the United Nation's Basel Convention.

In 2002, Nokia was reselected as a component in the Dow Jones Group Sustainability Index (DJSI) and was selected as a component of the European DJSI STOXX index at its launch in October 2001, as well as the FTSE4Good index of social responsibility, launched in 2001.

Veli Sundbäck  
Executive Vice President  
Corporate Relations  
and Trade Policy of  
Nokia Corporation

Tapio Takalo  
Director, Head of  
Environmental Affairs

## | ENVIRONMENTAL PROFILE |

Nokia aims to reduce the environmental impact of its products over their entire life cycle. Our work is based on a continuously developing understanding of the environmental aspects and impacts of the complex process chain and extensive supplier network characteristic of the communications industry.

Our environmental strategies and activities stem from life-cycle thinking. The overarching aim is to reduce the use of natural resources and energy through improved product and process design while also providing opportunities for maximal recycling and reuse of the material content of the products.

The whole Nokia operational network is instrumental in gaining a better understanding of the life-cycle environmental impact of our products. In addition to Nokia business and research & development units, the network includes Nokia's supplier, logistics and end-of-life service providers.

The supplier network plays a pivotal role in ensuring the environmental soundness of our products. Nokia requires from its suppliers a documented environmental management system to guide and verify their environmental performance. This is also the means of verifying and developing the environmental performance of Nokia's own production sites.

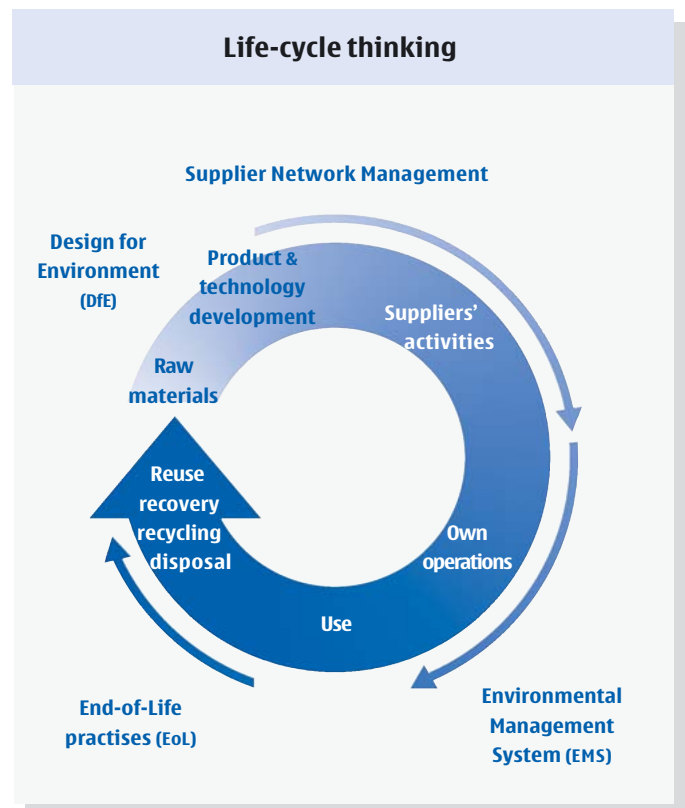
Nokia's research and development organization keeps close contact with independent research institutions. The aim is to stay abreast of advances in basic research and to identify new environmental issues with a possible bearing on Nokia's business operations. Nokia welcomes efforts to find commonly acceptable metrics for eco-efficiency and has participated in the testing of various proposed metrics.

Nokia actively participates in industry-wide efforts to find economically and environmentally sustainable solutions to life-cycle issues facing the entire information and communications industry.

### Life-cycle thinking

The life cycle of products begins with the extraction of raw materials and ends with recycling and waste treatment and the reintroduction of materials into the economic system. The environmental aspects of Nokia products are linked with

the use of materials and energy at the different stages of their life cycle. The environmental impacts are associated with resulting waste and airborne and waterborne emissions.










Nokia supports the aim of establishing reliable metrics for life-cycle eco-efficiency and we continue to study the alternative methods proposed. In 2001, we participated in two studies that used the Material Input Per Service (MIPS) method. A meaningful measurement of Nokia products could not be completed because of a lack of reliable MIPS data on hidden material flows. Nokia Mobile Phones contributed to a study to assess the environmental footprint of a mobile phone. Here again estimations were required due to a lack of data regarding the material overburdens and energy requirements for materials used in a mobile phone.

Despite some inaccuracies in the findings, life-cycle studies help to target environmental activities, including Design for Environment, at the stages of the product life cycle where improvements are most needed and can be achieved cost-effectively.

## ENVIRONMENTAL PROFILE

## Outline of environmental aspects of Nokia's products

	Raw materials	Component manufacturing	Own operations	Logistics	Use	End-of-Life Practices
Waste	X X X	X X X	X			X X
Use of hazardous materials	X	X X	X			
Water	X	X X	X			
Energy	X X	X X X	X	X	X X X (X)	X
Total environmental impact						

 minor impact  
 X moderate impact  
 X X considerable impact  
 X X X substantial impact  
 X X X (X) crucial impact

The amount of crosses signifies the relative importance of the life cycle phase in question. The crosses can be compared horizontally, but not vertically.

The total environmental impact bars aim at taking into account also the importance of the impacts and therefore the amount of crosses isn't necessarily equal to the size of the bar. The total impacts can be compared horizontally.

## Nokia products in LCA perspective

Energy consumption and the recycling of products at the end-of-life stage are among the most important environmental aspects of all Nokia products. Global concern about carbon dioxide emissions from the use of fossil fuels underlines the importance of energy consumption at the various life cycle stages, including the product usage stage. Concerns about the effects of carbon dioxide emissions on climate are also increasing the environmental significance of transportation and logistics, which are largely based on use of fossil fuels. Nokia is working on this question together with its logistics service providers with the aim of establishing reliable and comparable data on carbon dioxide emissions associated with logistics.

The life-cycle profiles of Nokia's main products, mobile phones and network equipment, are somewhat different. For mobile phones, the upstream stages of raw material extraction and component manufacture account for the biggest part of the overall environmental impact. For network equipment, energy consumption during use accounts for the biggest part.

A relevant difference between Nokia products is that network products contain a large proportion of metals whose processing consumes more energy than that of plastics, the dominant material in mobile phones. On the other hand, metals can be more readily recovered for reuse and recycling than plastics.



Energy consumption is the principal cause of environmental impacts during the use of Nokia products. In the disposal stage, recycling of metals and plastics and removal of potentially harmful substances from landfill waste are the central issues. Most of the environmental benefit of the end-of-life phase comes from recycling the metals. If use as source of energy is counted as recycling, most of the plastics used in our products can be recycled.

#### **Implementation of life-cycle thinking**

The implementation of life-cycle thinking consists of defining targets for improvement in the various stages of a product's life cycle. Our current focus areas are:

- Compliance with current and future environmental legislation, such as restrictions in the use of specified substances and recycling requirements
- Compliance of Nokia suppliers with Nokia's environmental requirements
- Properly managed take-back of Nokia products at the end-of-life stage
- Product information: Nokia eco-declarations already exist for new mobile phones, providing information on energy consumption, material use, packaging, disassembly and recycling.



## Nokia's vision of sustainable environmental development

Nokia is a trusted brand for personalized communication technology that enables people to shape their own mobile world. We see mobile technology as an enabler, providing a wealth of opportunities that can help create a more sustainable world. With better product design, tighter control of production processes, greater reuse of materials and proper recycling, mobile communications can help reduce the use of scarce natural resources.

This vision of a more sustainable future is linked to our stated value of respect for the individual. A world of respected and responsible individuals will be able to enjoy the benefits of the enabling opportunities of mobile communications.

Our vision is anchored in the totality of our activities. We take care of environmental affairs to ensure and enhance the long-term profitability of our company and to reduce adverse environmental impacts from our activities at the same time.

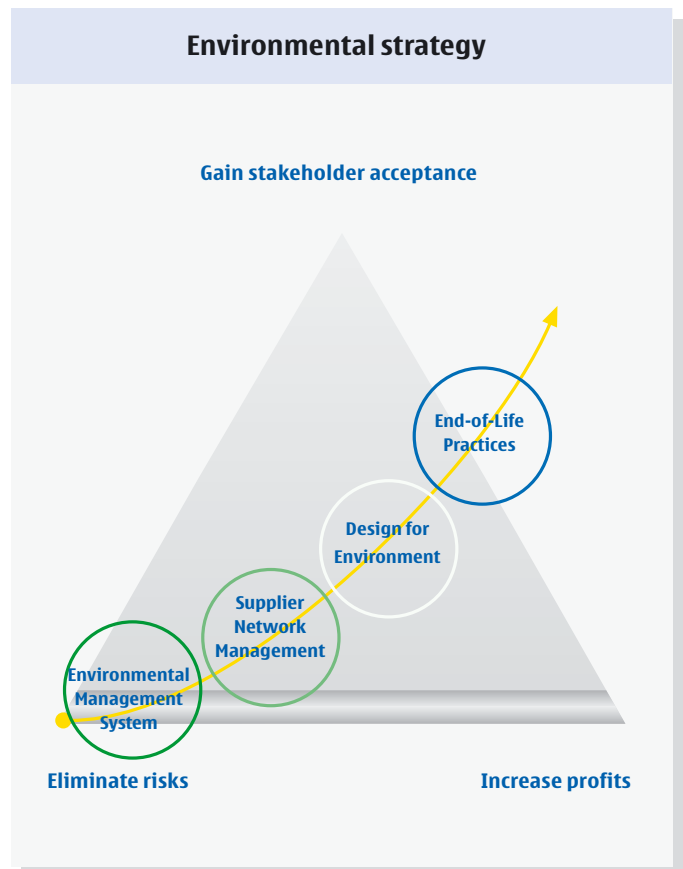
## Nokia's strategy for sustainable environmental development

Our strategy for sustainable environmental development covers the whole value chain and is implemented through four key programs – Design for Environment, Supplier Network Management, Environmental Management Systems, and sound End-of-Life Practices. With the help of these programs we strive to eliminate risks, gain the acceptance of our stakeholders and increase our profits.

Our goal is to develop advanced technology, products and services that have no undue environmental impact, consume energy efficiently and can be appropriately reused, recycled or disposed of.

We believe in life-cycle thinking, eco-efficiency and sustainable growth. Respecting the natural world is part of company life, and cooperation with all our stakeholders is at the heart of Nokia's drive for a credible environmental performance.

Many activities, which currently use large amounts of energy and raw materials, could be moved into the digital space to greatly reduce their environmental impact. Such new opportunities come hand in hand with responsibility.



The key elements of Nokia's business vision are mobility, growth and quality. Our environmental strategy interlinks with the business strategy in several dimensions:

- In our decisions and actions we take into account the fact that environmental issues are increasingly important drivers of development globally. We recognize the importance of cooperation in addressing such global issues as the use of resources and carbon dioxide emissions caused by human activity and we participate in a wide range of cooperative initiatives through industry associations and various global organizations (read more on Nokia's participation in international initiatives on p. 15–16). At the same time we strive to reduce the energy consumption of our own activities, including the need for space cooling, heating and lighting. In travel and transportation, cost-driven development has a positive environmental impact.

### | VISION AND STRATEGY |

- Solutions based on mobile technology can replace traditional methods, for example, production and transportation of goods. Replacement of physical services by digital services can also help significantly to reduce the use of fossil fuels, which is the chief cause of climate change known as the greenhouse effect.
- Mobile technology can make various transactions easier in the economy and thereby enable greater economic and social activity in society at large. The short life cycles of mobile phones and the related increase in consumption, known as the rebound effect, drive Nokia's business growth. We believe its sources of growth are compatible with sustainable growth, which does not exhaust the natural resources future generations may need. The dematerializing and immaterializing potential of mobile technology gives us the means to achieve sustainable growth. Our duty is to utilize these opportunities in a responsible manner.
- Reduction of waste is an environmental goal closely linked with quality – quality of design, quality of component sourcing, quality of assembly and quality of end-of-life practices.

#### Sustainable growth through:

##### Dematerialization

– Years ago, a portable phone that may have weighed 15 kilograms delivered just a talk-only service. Today, mobile phones weighing even less than 100 grams can provide a variety of high-speed, high-quality digital services including voice, imaging, e-mail, fax and access to the Internet.

##### Immaterialization

– Downloading a video over the Internet can save a journey to the video shop. Equally, network services can dispense with the need for a telephone answering machine.



### Commitment to sustainable development

Nokia's values and principles are the solid foundation for our business success, sound environmental stewardship and good corporate citizenship. Nokia is committed to the pursuit of environmentally sustainable development. The signing of the ICC Business Charter in 1991 attests to this commitment. For us, environmental sustainability is an integral part of corporate responsibility, which embraces economic and social as well as environmental issues.

It is our policy to achieve the goals of sustainable development by leveraging our resources including technological know-how, market position and the continuous building of competencies.

The principles of eco-efficiency as defined by the World Business Council for Sustainable Development, combined with life-cycle thinking, guide the development, production and delivery of Nokia products and solutions. At Nokia that means

- Minimizing energy intensity
- Minimizing the material intensity of goods and services
- Extension of product durability
- Increasing the efficiency of processes
- Minimizing toxic dispersion
- Promoting recycling
- Maximizing the use of renewable resources

In environmental matters, implementation of the principles of sustainable development involves:

- Integration of environmental activities into business activities
- Active and open external and internal communication
- Cooperation in environmental matters within Nokia as well as between Nokia and external stakeholders, such as suppliers, industry and society at large

### Environmental policy

Nokia's commitment to continuous improvement in environmental issues is stated in our environmental policy, published in 1994 and revised in 2002. Environmental and business management are jointly responsible for implementing the policy.

The basic principles of Nokia's environmental policy are:

- A successful business requires a solid product life cycle-based environmental performance.
- The Nokia Way means an active, open and ethically sound approach to environmental protection.
- The objective of Nokia's environmental policy is sustainable development in accordance with the ICC ([International Chamber of Commerce](#)) business charter.

### Principles of Implementation

The following principles guide and control the implementation of the environmental policy:

- The environmental policy is part of the general management process.
- Line organizations plan and implement the action programs by using environmental specialists and the best available technology.
- Action programs are based on the understanding of the environmental impacts of a product throughout its life cycle.
- Minimizing these environmental impacts requires continuous efforts and follow-up on results; it is therefore a part of our total improvement activities.

### Environmental organization

Tapio Takalo, Director, Head of Environmental Affairs, is in charge of all Nokia-wide environmental affairs. He reports to Veli Sundbäck, Executive Vice President, Corporate Relations and Trade Policy, who is responsible for environmental issues at the Nokia Executive Board level.

The environmental organization includes two Nokia-wide bodies – the Nokia Environmental Steering Group and the Nokia Environmental Management Team, which comprises representatives of Nokia's three business groups (for the business group reviews, see p. 35–37).

### | POLICIES AND ENVIRONMENTAL ORGANIZATION |

The Nokia Environmental Management Team prepares proposals on company-wide environmental issues, which are for approval by the Nokia Environmental Steering Group.

The Nokia Environmental Steering Group, chaired by Veli Sundbäck, prepares and reviews Nokia-wide action programs and gives guidelines to the three business groups and line organizations for their environmental work.

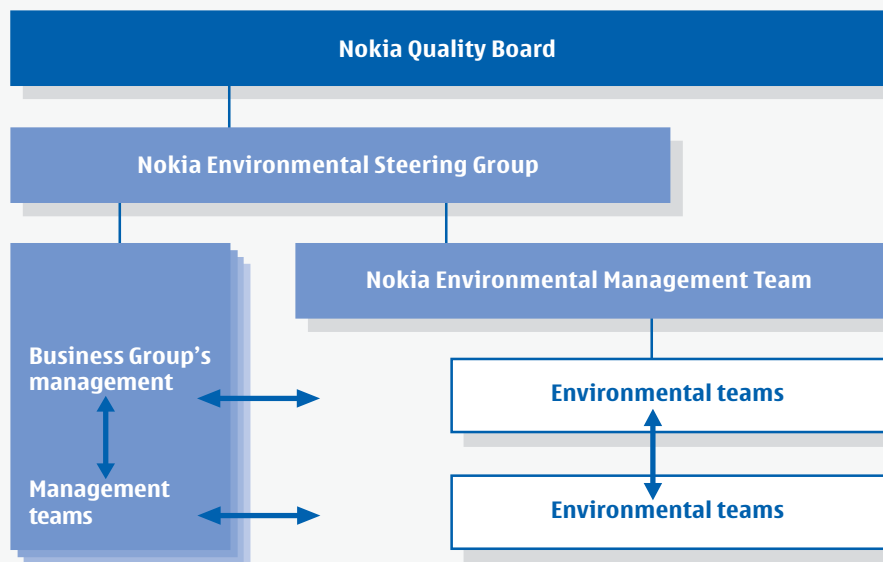
The Nokia Quality Board is the highest decision-making body in environmental issues. Its members include the Chairman and CEO of Nokia, the President of Nokia and the Presidents of the Business Groups.

These Nokia-wide bodies strive to ensure that the business group and unit level implementation of environmental activities is consistent with environmental policy and that cooperation among business groups is efficient.

At the business group and unit level, environmental work is integrated into normal business activities and daily environmental work is carried out in the line organizations.

All the business groups have environmental managers and specialists for areas such as sourcing, production, product and end-of-life related issues. For instance each production site has a designated person responsible for the implementation and development of the site's environmental management system.

#### Environmental organization





## | STAKEHOLDER RELATIONS |

Management of external and internal stakeholder relations runs through all Nokia operations. In this report, we discuss only those issues of stakeholder relations relevant to Nokia's environmental management and performance.

Nokia's external stakeholders comprise our customers, shareholders, suppliers and other contractors, non-governmental organizations, governments, authorities and citizens of societies in which Nokia operates. Nokia employees are the company's internal stakeholders.

Continuous communication and consultation is an integral part of the way we maintain and develop relationships with our various stakeholder groups. Information and feedback received from stakeholders is used in the continuous improvement of our activities and the reporting of these activities.

### Internal stakeholders

Nokia's environmental performance rests on the competence and motivation of its personnel. At Nokia, the environment is everybody's responsibility and an integral part of daily business. Various surveys are conducted to evaluate the commitment of our personnel on environmental as well as business and social issues.

In 2002, two new additions on environmental issues were made to Nokia's global employee opinion survey Nokia – Listening to You, with a view to measuring more accurately Nokia employees' environmental awareness:

1. "I am well aware of Nokia's key environmental programs."
2. "In my team, we have taken specific actions to support the company's environmental goals."

The results were as follows:

- Question 1: total favorable 47 per cent
- Question 2: total favorable 40 per cent

Focus group discussions have been held internally and also with external stakeholders on environmental and other corporate social responsibility issues.

### Internal environmental communication

Communication and training play a key role in translating environmental goals and guidelines into practice throughout the organization. We believe that a company that is

### Differentiation through environmental performance

"I'd like to think that the general environmental awareness at Nokia is higher than in other global companies," says Sonja Weckström-Nousiainen, Vice President, Global Human Resources Development, Nokia Mobile Phones.

"Personally I feel strongly about the environmental policies and actions of my employer company. I wouldn't feel comfortable if I was part of a company that neglected its environmental responsibility."

Weckström-Nousiainen works with human resource development and says that environmental issues come up from time to time. Recently she represented Nokia Mobile Phones in an environmental and social responsibility focus group assessing the degree of internal awareness on environmental issues.

"It's easier to promote environmental thinking when you have the backup of a large global company. On the other hand, we have to truly excel in environmental performance to rise above the industry average. For example, the public are interested in knowing about Nokia's recycling policies and compliance with new environmental directives."

Weckström-Nousiainen says that at Nokia, internal communication about environmental issues is sufficient. Locating information is easy. To further enhance the information flow, Weckström-Nousiainen says that the human resource development personnel can support environmental awareness by tailoring the appropriate messages into learning solutions and training programs.

"Each human resource professional must know the basics of Nokia's environmental action plan – and preferably a little more. Moreover, we can take on the responsibility of forwarding environmental issues through HRD actions," says Weckström-Nousiainen.



## | STAKEHOLDER RELATIONS |

recognized as being environmentally responsible is also in a better position to attract and retain employees.

Environmental issues are being integrated as a regular element into our management development programs to ensure that everybody at all levels of the organization receives up-to-date environmental information relevant to their daily tasks.

Nokia employees worldwide also have access to regularly updated environmental intranet sites and a database of environmental information. The Nokia Environmental Forum, a one-day information sharing and discussion event for environmental specialists and other Nokia people, is also organized twice annually.

Environmental issues are regularly discussed in Nokia's global in-house magazine, Nokia People, and other internal publications, as well as online in the Nokia News Service.

### External stakeholders

Nokia is engaged in a continuous dialogue with its external stakeholders to stay abreast with issues they see as important now and in the future, as well as better understand what is expected of Nokia and how this can be achieved.

With customers, this includes comprehensive, regional and worldwide brand surveys and related focus groups. Plans exist for holding new focus group discussions specifically on environmental and social issues.

Account teams of the business groups conduct customer-specific discussions with trade customers and carry out customer satisfaction surveys. For instance, an extranet information service for even more interaction with telecom operators has been set up.

During 2002, the requirements of new environmental legislation have been thoroughly reviewed by Nokia's business units and those of our suppliers, with Nokia's environmental specialists providing expertise as needed.

Nokia has sought dialogue and cooperation with non-governmental organizations on specific environmental issues. Nokia currently cooperates e.g. with World Wide Fund for Nature (WWF). Nokia also conducts dialogues with stakeholder groups in many environmental forums.

Nokia's external web site ([www.nokia.com](http://www.nokia.com)) contains extensive information on Nokia's environmental goals, principles and activities. The Ask us page has proved very popular with visitors. The most frequently asked questions relate to materials content and recycling of mobile phones.

### Nokia in Society

In investor relations, our focus is sustainable shareholder value. To underline this commitment, Nokia has successfully sought inclusion of its share in indexes that are based on evaluating our performance against various criteria of sustainable operations. In 2002, Nokia's shares were listed on the Dow Jones Sustainability Indexes (DJSI and DJSI STOXX) and on the FTSE4Good index series.

To help define our position in society overall, we have conducted studies on such issues as citizenship and commissioned behavioral research into the impact of mobile communications on society.

Nokia engages in extensive dialogue and involvement with governments and inter-governmental organizations (IGO). These include the United Nations, European Community and the International Chamber of Commerce (ICC).

In 2001, we announced our commitment to the United Nations' Global Compact principles. Global Compact aims at bringing together companies with UN agencies, labor, non-governmental organizations and other civil-society players to foster action and committed cooperation in the pursuit of good corporate citizenship. Later in 2001, Nokia also announced participation in the United Nations ICT Task Force. We believe this will help us focus our efforts in digital bridging.

Nokia's active participation in World Council for Sustainable Development projects continued in 2002.

Nokia plays an active role in many national and international industry organizations and initiatives, such as the European Information, Communications and Consumer Electronics Technology Industry Association (EICTA), Cellular Telecommunications Industry Association (CTIA), Electronics Industry Alliance (EIA), American Engineering Association (AEA), Mobile Manufacturers Forum (MMF), Global Business Dialogue on Electronic Commerce (GBDe), The National Electronics Product Stewardship Initiative (NEPSI) and

### | STAKEHOLDER RELATIONS |

The Sustainable Partnership on the Environmentally Sound Management of End-of-Life Mobile Phones.

Membership in industry associations gives us the opportunity to contribute to the development of legislation and voluntary agreements and codes of conduct. Nokia was one of the conveners and leading members of the Electronics Coalition that was successful in pushing through important amendments to the proposed European Union Directives on waste electrical and electronic equipment (WEEE) and the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS).

In connection with the sixth meeting of the Conference of the Parties to the Basel Convention in December 2002, Nokia and eight other manufacturers of mobile phones declared their intention to cooperate on the environmentally sound management of end-of-life mobile phones under the aegis of the Basel Convention. The signatories undertake to promote the sound management of end-of-life mobile phones with the aim of protecting human health and the environment, to take all reasonable steps for ensuring responsible design and manufacturing and to contribute towards product stewardship. The manufacturers develop and promote the sound management of end-of-life mobile phones in cooperation with the Basel Convention and other stakeholders, such as other UN bodies and agencies, network providers, operators and recyclers.

#### A Safe Home for Malaysian Orang-utans

One of the ongoing nature conservation projects of WWF Malaysia involves the orang-utan. Also known as the man of the forest, the orang-utan is among the most endangered Malaysian wildlife species.

The orang-utan project was launched in 1998 and aims at maintaining and improving a suitable new habitat for the species. A lot depends on research on how well the orang-utans can cope in secondary rain forests as opposed to primary rain forests.

“If the studies confirm our belief that the orang-utans can survive and prosper in secondary rain forests, then we have good grounds to further promote the conservation of these forests,” says Melinda U from WWF Malaysia’s Corporate Marketing unit. In concrete terms this means managing such forests well, putting a stop to forest fires, and avoiding fragmentation.

Nokia Malaysia is among the sponsors of the orang-utan conservation project, which is carried out in Sabah near Sukau. Apart from generating funds for the project, our cooperation with WWF aims at raising awareness of environmental issues on a local and global level.

“The project is progressing well,” says Melinda U. “As a general rule, WWF Malaysia only uses collaborators that are genuinely committed to the conservation of nature. We’re not in the market for green washing companies, but seek out organizations with progressive thinking and a genuine interest in doing something positive for the environment.”

Nokia Malaysia encourages its staff to get involved in the actual project work. Employees can visit the project site and see for themselves what the challenges of rainforest conservation are. Moreover, WWF’s Malaysia project aims at enhancing the degree of public awareness about environmental issues.

Nokia in Malaysia and WWF Malaysia have organized joint projects in the past. A couple of years ago in Malaysia, Nokia produced a limited edition of mobile phones with WWF covers. For every deal made, a certain percentage of the price was donated to WWF.

### Good for the producer, the consumer and the environment

Tom Parker of Interel has worked for the Electronics Coalition that came together in 1998 to work on the proposed EU directives on Waste Electrical and Electronic Equipment (WEEE) and the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment (RoHS).

Nokia was one of the founders of the Electronics Coalition, which identified four key areas of concern in relation to the proposed directives:

- Producer responsibility
- Industry responsibility for historic waste
- Responsibility for free riders and orphan products. (Orphan products are products whose producer is no longer in business; free riders are companies that evade producer responsibility for example through entering and leaving the market quickly.)
- Looking at substance legislation from a sound scientific perspective

When the first ideas for the directives were circulated back in 1998 the majority of the industry argued that there should be flexible producer responsibility providing for either individual or collective responsibility, depending on the circumstance or, for example, the type of product in question.

Parker says the companies in the Electronics Coalition understood that if you make a company responsible for the recycling and material content of its own products, the company has an incentive to go back and rethink how it could reduce recycling costs through better product design.

“Nokia understood right from the beginning that if there were a free choice between collective and individual responsibility, the large majority of companies would choose collective responsibility, leading eventually to a situation where there would exist no driving forces for better design,” Parker notes.

The Electronics Coalition was successful in first of all forming consensus around individual producer responsibility within industry. Then the coalition played a central role in convincing the European Parliament that this was the right approach to take. Once the parliament had accepted the coalition’s position, a lot of work went into convincing the other institutions, the Council and the European Commission. The European Parliament and the Council reached final agreement in November 2002 that for consumer products, producer responsibility should be on an individual basis.

Tom Parker stresses that if good and environmentally responsible product design is rewarded through lower recycling costs, then it ultimately becomes interesting for the consumer to buy products that are better for the environment.

“What we are confronted with in many cases today is that those products that are better for the environment are the more expensive ones and a lot of consumers cannot therefore afford to choose them even if they want to. The ultimate objective is that those products that are easier to recycle and better for the environment are cheaper. In this way, there is a benefit for the producer, for the consumer and for the environment.”

### Legislation should encourage Design for Environment

Representing the UK constituency of Yorkshire and the Humber Region, Robert Goodwill was elected to the European Parliament in 1999. As a member of the Parliament's Committee on the Environment, Public Health and Consumer Policy, he worked for key amendments in the proposed WEEE and RoHS directives.

Goodwill backed individual producer responsibility for recycling of electric and electronic equipment and was instrumental in pushing through the exemption of spare parts from the ban on lead and other substances detailed in the RoHS directive. Nokia worked for individual producers responsibility through the Electronics Coalition, while the exemption of spare parts from the scheduled substitution of lead and other restricted substances is of considerable importance for economically and environmentally sensible maintenance of network equipment with their long lifespan.

Goodwill says individual producers responsibility encourages environmentally beneficial product design. When the producer knows that he is in the end responsible for the recycling of his product, he has an incentive to make a product that can be recycled.

"If you had a solely collective scheme you'd find that the manufacturers wouldn't have any reason at all to come up with products that are easy to recycle."

Also, it makes sense for producers to build more durable and better products with valuable materials, such as copper, if they know the scrap value will be accruing to them rather than somebody else.

According to Goodwill, the outcome on the WEEE directive was a good compromise. Manufacturers who design their products to be more recyclable will be able to benefit from that at the end of the product's life by either having lower costs of recycling or recouping the materials in those products.

On the RoHS directive, he says, the exemption of spare parts to existing equipment was a very sensible solution.

"It would be crazy to throw away a perfectly good piece of equipment, be it a washing machine or a mobile network base station, just because no replacement circuit board was available meeting the new requirement for lead-free solder."

The extended transition period for devices with long service life was the only feasible solution. It would not be economic for the manufacturers to develop new lead-free spare parts for existing devices because the demand would be too low.

Goodwill stresses that products that don't perform don't actually help anyone from the green point of view. If a product fails, people will throw it away and buy another one.

"If you have to use inferior technologies or materials because of eco-legislation, that isn't green at all because all that happens is that product life is reduced and people throw them away."

## | NOKIA-WIDE ENVIRONMENTAL PROGRAMS |

### Management principles

Nokia applies global operating standards for business practices, transfer of technology and management systems throughout its business units. These standards are applied when establishing a new site in any country. Nokia has a large number of contract manufacturers who share the company's technology and expertise. The company encourages its contractors to adopt Nokia guidelines insofar as they are applicable, taking into account local requirements.

Nokia's basic principle is that environmental matters are integrated into our normal daily business. During 2002, two environmental score cards were developed to support integration of environmental matters into business management, one for corporation-level operations and another for Nokia Mobile Phones operations. The scorecards, which were put into use in 2002, are a significant management tool for the measurement and evaluation of performance internally.

Environmental specialists belong to the line organizations of each of Nokia's business units and their role is to support management in the inclusion and execution of environmental considerations in areas including product development and manufacturing, supply-chain management, real estate management, legal compliance and risk management. Activities aimed at improving our environmental performance are managed through four Nokia-wide programs: Design for Environment (DfE), Supplier Network Management, Environmental Management Systems (EMS) and End-of-Life Practices (EoL).

### Research & Development

Nokia Research Center monitors emerging environmental issues and encourages development work within Nokia's business groups. End-of-Life solutions and energy systems have been among the recent focus areas along with the continued testing and development of various End-of-Life alternatives.

Work on Design for Environment solutions has also moved to the business group level as well as the development of lead-free soldering. The business groups have made good progress in the development of alternatives to materials soon to become restricted, including lead, other heavy metals and halogenated flame retardants.

### Design for Environment

Design for Environment (DfE) is based on analyzing the life cycle of a product from the extraction of materials all the way to its disposal at end of life. The overall aim of design for environment (DfE) is to make the product more environmentally efficient.

Nokia has a network of DfE specialists supporting our product programs. The role of this network is to educate product designers in how to take into account environmental issues and be environmentally responsible.

Nokia's current overall DfE priorities are:

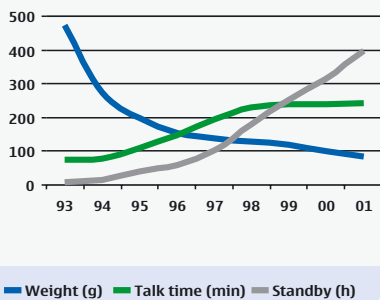
- Energy efficiency of the product
- Clarifying product material content
- Quantity and type of materials used in the product
- Designing the product for efficient use, reuse and recycling

Different product life-cycle profiles present different DfE challenges. The product creation process and product life of mobiles phones are both short, while the production creation process and product life for network equipment are substantially longer. In addition, service and maintenance, including the replacement of components, play a much more prominent role for network equipment than for mobile phones.

Mobile phone industry studies show that charger energy use is the most significant use-phase energy issue. Nokia is committed to reducing charger energy consumption and has signed the EU's voluntary Code of Conduct on Efficiency of External Power Supplies of the year 2000. Signatories are committed to achieving a significant reduction in the no-load power consumption of their power supplies over the next few years.

## | NOKIA-WIDE ENVIRONMENTAL PROGRAMS |

### Product eco-efficiency



The energy costs of a network are an important issue for the operators, driving development towards energy-efficient solutions. It is important to evaluate the energy consumption in the right context. The whole network gives the consumer a lot more in terms of service than a single piece of equipment, say a base station. The latest mobile networks consume more energy in absolute terms than earlier networks, but energy consumption in relation to capacity and services provided has decreased.

Modularity is an important design principle for network equipment. For example, if the plug-in units of a base station can be changed without changing other hardware, then environment impact of the base station throughout its life will be reduced. A preference for software solutions over hardware solutions in system design promotes eco-efficiency, as the environmental impact of updating software is smaller than that of updating hardware. Remote manageability and reduced need for maintenance improve energy efficiency and reduce costs.

### Nokia is an innovation driver

T-Mobile Germany is the leading mobile operator in Germany with over 23 million customers. Dr Klaus Rick, Head of Environmental Affairs at T-Mobile, is responsible for the draft of a "3G Greenbook" intended as a shared next-generation sustainability roadmap for the mobile communications industry.

For Nokia, T-Mobile is a major customer with collaboration comprising both network systems and mobile phones.

Rick says reduction of energy consumption is the most important environmental issue for T-Mobile in both network systems and mobile phones. By improving the energy efficiency of network and terminal equipment, mobile communications can have a favorable impact on the global balance of carbon dioxide emissions. The other major issue concerns the restriction and substitution of hazardous substances.

As energy consumption is also the single largest cost category for network systems, environmental and business considerations pull in the same direction. Cooling of hardware is one critical point. According to Rick, Nokia supplies excellent technical instructions for the use phase of systems equipment but additional information would be useful on such issues as cooling, joining methods and dismantling tools.

Nokia's Design for Environment focus areas for network equipment include modularity, remote control and maintenance. Energy efficiency and increased recyclability are the overarching goals. Rick believes these are important sustainability issues for the whole industry. He says a Design for Recycling guide based on feedback from recyclers would be most useful for system designers. The mounting and joining of hardware has a direct bearing on ease of end-of-life dismantling and recovery of materials.

Rick stresses that environmental issues pertaining to mobile devices are not a concern for operators only. The drivers are the market and the global carbon dioxide issue. Charger stand-by power consumption is the main energy issue. According to Rick, Nokia has introduced significant improvements, but he believes the chargers could be made even more intelligent, eliminating stand-by energy consumption entirely.

"The total stand-by and charger energy loss amounts to a lot of energy and is an issue for the whole industry," Rick says.

He praises Nokia's packaging solutions and says Nokia phones are well designed for dismantling. He is also confident that Nokia can handle the replacement of lead and other substances due to become restricted.

"I have had the opportunity to learn about Nokia's efforts in audits, discussions and at conferences and can honestly say that Nokia is well ahead of the main stream. Nokia is an innovation driver not only technically but also in environmental quality."



## | NOKIA-WIDE ENVIRONMENTAL PROGRAMS |

### Material content

The material composition of electronic equipment is predominantly an upstream issue for all Nokia products, that is, it focuses on supplier network management. The Nokia Substance List and the material database that is being compiled are proof of our determination to ascertain the material content of the parts and components contained in our products.

It is important to know the material content of a product, as this enables effective design solutions. Our material database is an effective tool in identifying product content and will be crucial for Nokia in meeting future legislative requirements.

Sound DfE provides for environmentally efficient disassembly and recycling at the end of a product's life. For all products, the use of recyclable materials is the key DfE principle. For mobile phones, getting the phones back is essential for recycling. Inclusion of more environmental information in the consumer package is one possible DfE solution aimed at increasing take-back volumes.

### Recyclability

The Nokia Mobile Phones Design for Environment Team has developed two tools for evaluating the recyclability and disassembly of products. The first tool was created to evaluate the disassembly and material selection of products in the early phase of product programs to be able to spot possible places for improvement as early as possible. The other tool was developed for a more detailed analysis of product recyclability. This tool takes into account the effects of material selection, and also the effect of the construction of a product. There are detailed instructions built in the recyclability tool on how to conduct the analysis. There are also examples of the recyclability of various material types e.g. metals, ceramics and plastics (pure or mixed) as well as various component types or modules such as PWB, connectors and LCDs.

Using this tool the theoretical recyclability percentages for Nokia phones have been estimated to lie between 65% and 80% of the mass. Unlike some recyclers, Nokia excludes energy recovery from its calculations. After adding 10% energy recovery, as allowed by WEEE, we would reach 75–90% recyclability.

### Participation in research projects

Nokia's business groups have been actively involved in a range of end-of-life research activities during 2001–2002. Nokia Mobile Phones has investigated electromagnetic shielding and recyclability in collaboration with TEKES, the Finnish National Technology Agency. Nokia is participating in a project led by TNO Industrial Technology to develop a designer software tool for the measurement of the cost of product disassembly and recyclability as well as the environmental factors involved.

Nokia Research Center has been active in the EU-funded 'Smart Materials for Active Disassembly' research project led by Brunel University. Nokia Research Center and Tomra Systems have developed, together with the Helsinki University of Technology and the University of Art and Design in Helsinki, a prototype machine to collect and pre-separate end-of-life phones prior to further recycling.

In another project, Nokia Research Center and the Helsinki University of Technology, the Finnish School of Watchmaking and the University of Art and Design Helsinki have developed a process for the disassembly of mobile phones by means of a heat-activated mechanism involving no contact. The mechanism compares favorably to manual dismantling.

**i** Unplug your charger or turn off plug switch when the charger is not charging your mobile phone.

#### Design for Environment supports recycling

Nokia's first 3G mobile phone, the Nokia 6650, is designed for recyclability. Thanks to a significant material content survey, the different substances that go into the Nokia 6650 can basically be traced to the component level and handled in the appropriate way at the end of the product life cycle.

The Nokia 6650 was developed in cooperation among several teams. In addition to the product R&D team, operations, marketing and sales, logistics and environmental teams were involved. External suppliers, recycling service providers and an accessory team were other participants in the project.

"The initiative to develop an environmentally sound mobile phone came from program management and product marketing," says Technology Manager of environmental affairs Minna Lindholm of Nokia Mobile Phones, Salo, Finland. "The product program was an internal initiative, proactively begun and not prompted by any external requirements."

Cooperation has been smooth. Product development of the Nokia 6650 piloted several tools that are now available for other product programs. Thanks to a study of the material content of the phone, battery and charger, the material content of phones using the same components as the Nokia 6650 can now be estimated easily. The material content was duly compared with the Nokia Substance List. Being able to trace the different materials to their components, makes it easier to ensure compliance with Nokia's internal requirements. The Nokia 6650 product program also involved developing the readiness to adopt a lead-free solder process. The ban on lead in electronic equipment will be actualized on 1st July 2006 in EU.

Recycling costs for different logistic and recycling alternatives were calculated by using information on the material content and the cost of its recycling. The cost of manual disassembly and crushing were then compared with the help of Nokia's Design for Disassembly (DfD) tools.

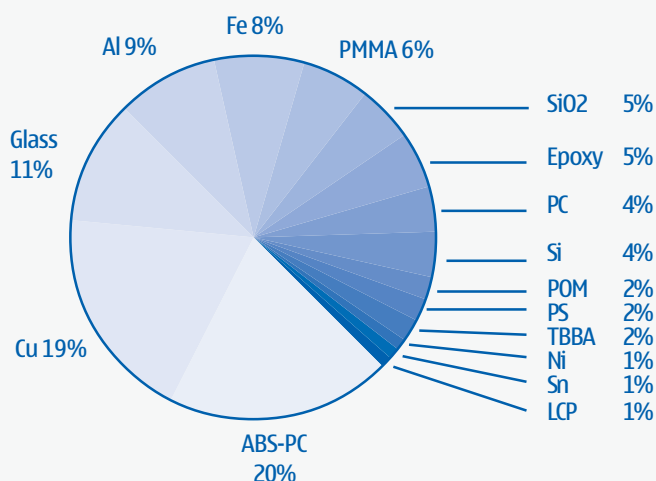
All the tools piloted and developed during the project are available and are part of the toolbox for other product programs. "Design for Environment is an integral part of all Nokia Mobile Phones product programs. However, we should put more effort into communicating these issues," says Lindholm. "This can be best done through training and more information sharing. It always helps when we can identify positive cost effects."

There remains work to be done. At the moment the material content of the accessories is being investigated, as it is the use of halogen-free printed wiring boards (PWB) and components in Nokia products.

**i** Treat you phone well and according to instructions in the user guide to avoid the need to exchange it prematurely.

## | NOKIA-WIDE ENVIRONMENTAL PROGRAMS |

### What is a mobile phone made of?



<b>ABS-PC</b>	Acrylonitrile Butadiene Styrene /Polycarbonate
<b>Cu</b>	Copper
<b>Al</b>	Aluminium
<b>Fe</b>	Iron
<b>PMMA</b>	Polymethyl methacrylate
<b>SiO2</b>	Silicon Dioxide
<b>PC</b>	Polycarbonate
<b>Si</b>	Silicon
<b>POM</b>	Polyoxymethylene
<b>PS</b>	Polystyrene
<b>TBBA</b>	Tetrabromobisphenol A
<b>Ni</b>	Nickel
<b>LCP</b>	Liquid crystal polymer
<b>PET</b>	Polyethylene Terephthalate

### Nokia Substance List

Based on regulatory requirements and other factual considerations, the Nokia Substance List is a tool for supply chain management and Design for Environment. The list identifies substances that Nokia has banned, restricted or targeted for reduction, and is divided into two sections, Restricted Substances and Monitored Substances.

**The Restricted Substances** section identifies those substances that are banned or limited in certain applications in our products or packaging.

**The Monitored Substances** list identifies substances that Nokia expects to eventually reduce or phase out, either totally or in certain applications. Nokia suppliers using substances on the Monitored Substances list are strongly advised to investigate alternative solutions.

We also require our suppliers to provide a full product material declaration for each product type supplied. However, we understand that this is a new and demanding learning and development process for the entire supply chain, and we are cooperating actively in industry associations to achieve an industry-wide approach to material declaration.

## | NOKIA-WIDE ENVIRONMENTAL PROGRAMS |

## Supplier Network Management

Nokia designs and manages its products with a view to their total life-cycle environmental impact. A large part of the environmental impact of Nokia products arises from the activities of its suppliers. Sound supply chain management is important since Nokia increasingly purchases supplies from around the world.

The global Nokia Supplier Requirements, reviewed in 2002, include requirements on environmental management.

During the review period, the global sourcing organizations attached to Nokia's business groups were trained to apply the requirements in their daily work. During the training it was stressed that the requirements should be communicated to the suppliers through personal contact and if necessary through training.

Supplier audits verify the suppliers' understanding of and compliance with the requirements, which are part of the sourcing process. Environmental audits are part of Nokia's normal supplier assessment, and our supplier auditors are specifically trained to conduct the environmental part of the supplier section assessment. Furthermore, there are specific environmental audits focused on suppliers that could potentially pose environmental risks. Nokia's environmental specialists have been in charge of training Nokia personnel and have participated in supplier audits and training as needed. The basic principle is that a supplier must reach the required level through its own efforts. Nokia can, however, provide training and advice if so requested.

The life-cycle perspective comes in with the requirement that our suppliers should apply the Nokia requirements to their own suppliers. This is supported by supplier audits that can involve verification of the supplier's suppliers.

Increased outsourcing of product design can be expected to affect the interpretation of the supplier requirements. It is important that the environmental management system covers the design process and not only manufacturing. This involves ensuring that design contractors apply the same rules on the use of materials as Nokia does. Nokia's materials database is the key tool, which has been compiled from information delivered by our suppliers.

A study conducted by Nokia Mobile Phones in 2001 indicates

that a substantial majority of our suppliers were prepared to declare the material content of the products they deliver to Nokia.

## Restricted substances

The most important current issue for supplier management concerns the phasing out of substances banned in the EU's Restriction on the use of certain hazardous substances (RoHS) directive. Nokia is using a tool known as the [Nokia Substance List](#) to ensure that suppliers do not use restricted substances.

Nokia supports the efforts of its suppliers to find acceptable alternatives to restricted substances, of which lead is the most important. Schedules are being agreed with our suppliers for the phasing out of lead. The position of our two main business groups differs somewhat on this issue. While Nokia Mobile Phones mainly works with large global suppliers, Nokia Networks procures a much larger range of components from a much larger number of suppliers.

As new directives come into force, the whole supply chains need time for transition. In 2002, Nokia's mobile phones contained, in addition to lead, cadmium and traces of chromium VI. Network equipment contained in addition to lead, traces of chromium VI and small amounts of mercury and cadmium. RoHS-listed flame retardants are not used in Nokia products.

A dialogue has been initiated with our suppliers on the requirements of the EU's Waste electrical and electronic equipment (WEEE) directive. Nokia will be responsible for financing part of the collection, treatment and environmentally sound disposal of equipment sold under the Nokia brand. The material content of the components and sub-assemblies delivered by our suppliers directly affects the recycling of Nokia's products, including treatment of harmful substances and recovery of valuable substances.

Nokia is a main sponsor for the industry's joint RosettaNet initiative to develop e-business tools for exchange of product information between producers and suppliers. Exchange of material content information will be integrated into exchange of business-related product information, such as response to orders. Prediction of demand will also become easier, which is of great significance to both suppliers and Nokia.

### Nokia's Global Supplier Requirements on Environmental Management

**EMS:** The Supplier shall have a documented Environmental Management System to ensure effective planning, operation and control of environmental aspects. This Environmental Management System shall satisfy the requirements of ISO 14001 or other internationally recognized standards. Continuous improvement efforts shall be addressed within the Environmental Management System.

**Design for Environment:** The Supplier shall consider environmental aspects in all phases of product development, e.g. with specific Design for Environment tools or defined checklists. Choices made during this phase shall reduce or eliminate negative impacts on the environment. All reasonable attempts should be made to reduce or eliminate hazardous constituents from the product and pursue the use of recyclable materials.

**Raw Material Content:** The Supplier shall record the raw material content of products supplied to Nokia, and provide end-of-life treatment recommendations for such products. These records shall be available to Nokia upon request.

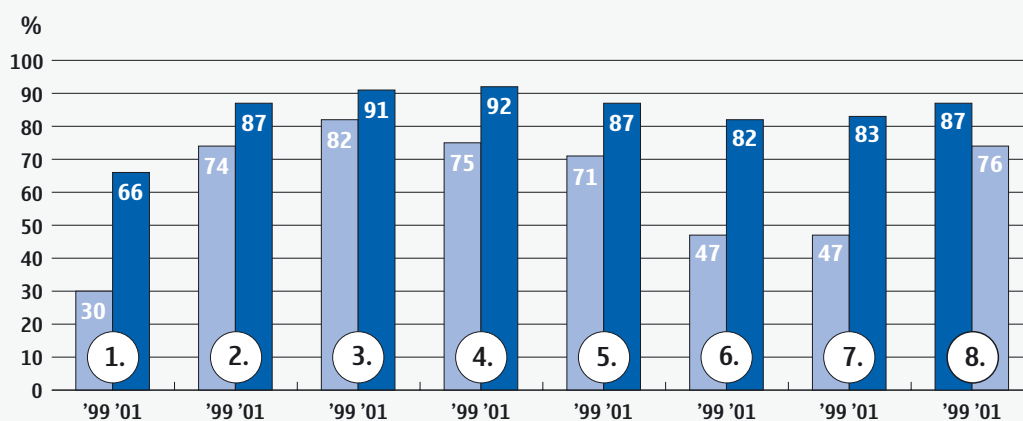
**Legal Compliance:** The Supplier shall be knowledgeable of environmental legislation and applicable regulations and provide evidence of compliance with such regulations.

**Programs for Improving Environmental Performance:** The Supplier shall identify significant environmental impacts associated with its operations, and implement continuous improvement programs to address them. These programs shall cover the efficient recycling and/or disposal of waste materials and improving treatment and control of waste emissions affecting air, water and soil. The Supplier shall be able to provide supporting evidence.

**Suppliers' Environmental Performance:** The Supplier shall evaluate its subcontractors' and suppliers' performance and set necessary environmental improvement targets. If a subcontractor is used for waste disposal the Supplier shall determine if that subcontractor is correctly authorized and licensed through on-site inspection or third party certification.

## | NOKIA-WIDE ENVIRONMENTAL PROGRAMS |

## Nokia Mobile Phones supplier environmental questionnaire | yes answers



## 1.

Is your company environmentally certified by an internationally acknowledged certification agency?

## 2.

Does your company have an environmental management system (EMS) or plans to be certified in < two years?

## 3.

Does your company have an environmental policy?

## 4.

Does your company have a procedure to document, track and action environmental laws and regulations that apply to the operations of your company?

## 5.

Does your company have a procedure to document its significant environmental activities?

## 6.

Does your company set environmental criteria for your suppliers?

## 7.

Does your company use a documented design system (DfE) that considers environmental aspects when selecting materials or new design solutions?

## 8.

Is your company prepared to declare the material content for products delivered to Nokia?



### Suppliers improve their performance

As a follow-up to a 1999 baseline study, Nokia Mobile Phones conducted a new study on the environmental performance of its suppliers in 2001. Nokia's supplier requirements, including environmental requirements, had been revised in 2000. The 2001 study had three targets:

- Follow-up on the 1999 study
- Inform suppliers of the revised supplier requirements
- Ascertain how well suppliers were meeting these requirements.

The study was conducted in the form of self-assessment. The suppliers were sent a questionnaire based on the revised environmental requirements. As a result, the questions were not 100% consistent with the 1999 questions, but as every question had an equivalent in the 1999 questionnaire, the replies were comparable.

The response to those questions, which remained the same were very encouraging. In 1999, 30% of all Nokia Mobile Phones suppliers had a certified environmental management system and 74% of the rest indicated that they would achieve the certification in two years' time. That would total up to 82% in 2001. In 2001, 66% of suppliers already had a certified EMS and 87% of those that had not achieved it yet said that they had plans to certify within two years. Overall, there was evidence of great improvement, although not all promises had been fulfilled within the estimated time-frames.

Other parts of the questionnaire dealt with environmental policy, environmental criteria set by the supplier for their suppliers, and the existence of a documented design system accommodating environmental aspects. Replies in all these areas showed a major improvement compared with the 1999 study; in some supplier categories the amount of companies implementing environmental practices had doubled during these past two years.

The question that proved the most interesting was:

"Is your company prepared to declare the material content of products delivered to Nokia?" In 1999, 87% of suppliers had answered yes, but in the new study the number had dropped to 76%. In the final analysis this was considered the most promising result. It showed that the suppliers had really understood what was required and still such a large amount were prepared to comply with the request. And even if 24% of the suppliers had answered that they were not prepared to declare the material content, in practice no one has so far declined if so asked.

All in all the response to the questionnaire showed that the level of environmental activity at our suppliers has increased markedly during the two years between these two studies. The companies have understood that environmental requirements are a part of everyday business and are willing to do their best. Some suppliers have approached Nokia to make sure that they have understood the requirements properly and Nokia specialists have given them environmental training when requested. This ensures continuous improvement and reliability of results.

### | NOKIA-WIDE ENVIRONMENTAL PROGRAMS |

#### Environmental Management Systems

Nokia uses certified Environmental Management Systems (EMS) as a management method for controlling and improving the stages of the product life cycle covered by its own operations. ISO 14001 certification of all production site EMS was completed by the end of 2000.

The main goals in EMS are decreasing energy consumption and waste, backed up by employee training in these areas. EMS is expected to bring significant environmental improvements and cost savings. EMS involves setting targets for continuous improvement in environmental aspects of our operations. For example, setting targets for reduce energy consumption at individual production sites. The results of environmental activities are reviewed on a regular basis, plans are updated and new goals set for improvement. Integration of environmental issues into daily business management has advanced favorably.

As of 2001, Nokia Networks has a global certified EMS that covers all production sites, including those of joint ventures. The system sets the same targets of eco-efficiency for all the facilities. EMS is managed at plant level by the quality and environmental team, which belong to the line organization.

Nokia Mobile Phones has a regional EMS for production facilities in Europe, other production facilities have a plant-level EMS. Each plant defines the significant environmental aspects of its operations and is responsible for producing improved results. Internal benchmarking of the nine EMS in place began in 2002. The first focus areas were the internal communication of environmental issues and development of site-specific metrics. Nokia's quality organization is in charge of managing the EMS.

In terms of floor space, offices and R&D facilities account for a larger share of Nokia's real estate than the production facilities. In view of this, the EMS approach is being extended to cover large offices and other non-production facilities. As a pilot project, the EMS of our Tampere R&D site was ISO 14001 certified in October 2000. Our Singapore Regional Head office was certified in 2001.

Nokia's Real Estate and Facilities Platform is in charge of building global EMS for large offices and R&D facilities. The project started in Finland in 2002 and will be completed in two stages, with experience gained in Finland and utilized in building EMS for large facilities globally. The systems will be internally verified.

#### Impact of own operations

The building of EMS has involved analyses of aspects of our operations that might have an adverse impact on the environment.

Creating EMS has brought concrete results. Focus on energy consumption and the reduction and sorting of waste has increased our efficiency and produced savings. Environmental training and review of health and safety matters form part of the basis for the continuous improvement required by the EMS.

Analysis confirms that energy consumption is one of the most important environmental aspects of Nokia's production. The main environmental impacts of energy consumption are airborne emissions from energy production at power plants that supply Nokia with the electricity and heating energy it uses. In addition to energy bought from utility companies, some Nokia sites use natural gas and small amounts of oil. (Energy consumption data by region and type of energy is reported on page 38 of this report.)

From a global perspective, emissions of carbon dioxide and other greenhouse gases are regarded as the most important adverse environmental impact of energy consumption. This report gives data on our direct carbon dioxide emissions by region (p. 38).

The building of environmental management systems for large offices and R&D facilities will offer a new opportunity to evaluate energy saving options. Nokia's electricity consumption was 528 GWh globally in 2002 (532 GWh in 2001). One small conventional 60 MW power plant could in theory produce all that energy. In Finland, Nokia's electricity consumption was 245 GWh, which corresponds to 0.3–0.4% of the total electricity consumption by Finnish industry in 2002.

Solid waste, in particular packaging waste, is another environmental aspect of Nokia operations. Careful study of waste streams, sorting of waste into different recyclable fractions and new packaging solutions have achieved a big reduction in the volume of waste at all our sites, with increased reuse and recycling of packaging in the material flows between Nokia and its suppliers accounting for a large part of this reduction.

To decrease the environmental impact of our operations, the sorting of waste requires infrastructure for the collection and recycling of the different waste fractions. In certain countries, this infrastructure is advanced and working, while in some others it is still in the early stages of development. Nokia's goal is to reduce all waste fractions to a minimum, especially those destined to end up untreated in landfill.

At Nokia sites, materials currently suitable for recycling include cardboard, paper, metals, plastics, electronic waste and glass. Some sites also collect biowaste/food for composting. Reuse of equipment is encouraged through internal reuse of PCs and other IT equipment.

Air emissions from Nokia facilities are small. Volatile organic compounds (VOC) arise from the use of solvents in the soldering process. Nokia is working to minimize the use of solvents causing VOC emissions.

Water at Nokia sites is mainly used for sanitary and catering purposes, with only small volumes used in the production processes. As a result, total water consumption at a plant depends on the number of employees. We seek further to reduce the use of water through installation of new water-saving armatures when buildings are renovated.

Environmental training has been given to all Nokia production personnel in connection with EMS building. Personnel whose tasks involve the handling of substances that constitute a risk to the environment have received special training as part of the EMS process.

**i** Recycle the packaging of your mobile phone.



## | NOKIA-WIDE ENVIRONMENTAL PROGRAMS |

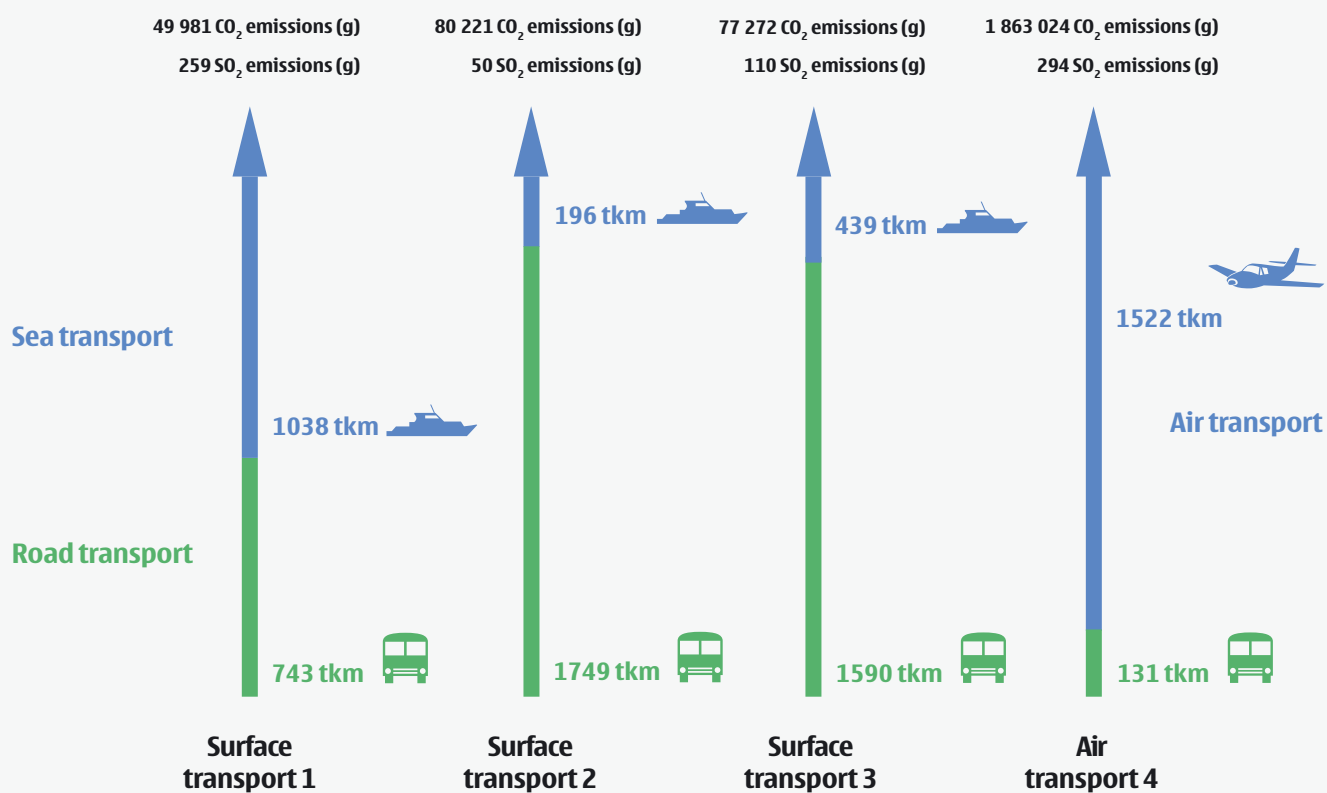
**Transportation of products**

Transportation is the most prominent environmental aspect of logistics. Transportation of components from suppliers to Nokia's production sites and of products to customers has an environmental impact through the emission of greenhouse gases from the combustion of fossil fuels.

Recognizing the importance of the greenhouse emissions issue, we are intensifying cooperation with our transportation and logistic service providers. Together with them, we are developing methods for reliably assessing the impact of logistics on the life-cycle environmental impact of our products. Notably, costs are an effective environmental driver in transport; effective transport solutions reduce both the cost and the impact on the environment.

**An example of transportation alternatives**

## ROSENDAL



## VANTAA

## | NOKIA-WIDE ENVIRONMENTAL PROGRAMS |

**Environment is built in logistics cooperation**

Cooperation between Nokia and Danzas, the world's leading provider of logistic services, goes back a long time. It is covered by a frame agreement. In addition to providing logistics services like air, road and sea transport, Danzas takes responsibility for Nokia's specified drop-off points and logistics centers, known as hubs.

As Nokia's logistics supplier, Danzas is required to have documented environmental management systems (EMS). The EMS built and being built at Danzas are set to the same level as those of Nokia production plants.

Danzas activities in the Nordic and Baltic states as well as in Austria, Germany and the Netherlands are ISO 14001 certified. Work aimed for certified EMS is to be continued and successively taken into use globally.

The foremost environmental aspect of Danzas' operations is the consumption of fossil fuels in the various modes of transportation used in outbound logistics from the hubs. Consumption of fossil fuels causes carbon dioxide emissions that are understood to be linked with global climate change known as the greenhouse effect. The current focus of cooperation with Nokia is establishing a reliable figure for the total of carbon dioxide emissions during the outbound logistics stage of the life cycle of Nokia products.

Emission aggregates can be calculated on the basis of transportation mileage, tons and loading rates reported by Danzas. Environmental manager Ellinor Nordenström of Danzas Nordic, Baltic and CIS stresses the importance of working for continuous improvement.

"We carefully analyze our options for minimizing carbon dioxide emissions. It is our daily work to decide which kinds of airplanes, which kinds of ships and which kinds of trucks will be used to best serve the customer. We put demands on our suppliers to work for continuous improvement, to employ better trucks, trucks running on alternative fuels, for example."

Air and sea freight is the responsibility of environmental and quality manager Jouni Sormunen, who works for Danzas AEI Intercontinental Oy at the Helsinki airport. He has experience in the successful piloting of a model for calculation of emissions caused by airfreight. To get the whole picture, emissions caused by other modes of transportation used need to be included in the calculation.

Ellinor Nordenström says this involves going beyond averages to establish the actual multi-modal split, that is, the distribution of emissions among the different modes of transportation. This can only be done in cooperation with a large globally operating service provider.

Land-based transport is the responsibility of environmental manager Arja Huotari, who works for Danzas ASG Eurocargo Oy in Helsinki. She says that Danzas is currently evaluating the possibility of developing a model for calculating the multi-modal emission splits together with VTT, the Technical Research Center of Finland. Such a model would enable Nokia to provide reliable reports on the environmental impact of the logistics of its products. "Based on our information about Nokia's material movements, we will be able to propose environmentally better solutions. The earlier in the process we come in, the better are our possibilities of choosing the best alternatives. This calls for close cooperation."

While looking for ways to reduce the environmental impact of customer logistics Danzas works to improve its own environmental performance. This includes careful planning of travel by personnel, reduction of energy consumption and the evaluation of sources of energy on environmental grounds, as well as minimizing and sorting waste.



### Collection of environmental data

Nokia's Real Estate and Facilities function is responsible for the collection of environmental data from all Nokia sites with over 10 000 square meters in area. This arrangement makes sense as most of our environmental data pertains to real estate operations.

Environmental data collection at the Group-level comprises water and energy consumption and waste and Ozone Depleting Substances (ODS). Aggregate Nokia figures are broken down into regional totals and for energy into totals for different types of energy. Comparisons to net sales are used as metrics for environmental data. Out-of-trend changes in comparisons to previous years are due to changes in measuring methods and the resulting improvement in the quality of the data.

The collection system and metrics are under further development. Environmentally relevant analyses of data are being developed at many Nokia sites. This includes the analysis and monitoring of the recycling rate of waste produced in our own operations.

### Risk management

Nokia is adopting a common and systematic approach to management of all kinds of risks across all of our businesses, platforms and processes. The Nokia Risk Policy approved by the Nokia Board provides the basic guidelines of what risk and risk management means in practice for Nokia. Risk management is not a separate process or action but a normal business and management daily practice and is a normal management capability. All people in Nokia are responsible for identifying, raising to the attention of others and managing any risks firstly in their own area of responsibility and then in areas of the business that could affect Nokia as a whole.

**i** Return used phones, batteries, chargers and other accessories to a collection point for recycling.  
[www.nokia.com/aboutnokia/environment](http://www.nokia.com/aboutnokia/environment)

### End-of-Life Practices

End-of-life Practices (EoL) are aimed at the collection of equipment at the end of its service life with a view to recovering its material and energy content as well as ensuring the safe treatment of substances that may cause harm to people or the environment if not disposed of properly.

The focus areas of our EoL development work are:

- Recyclability of our own products through DfE
- Monitoring and comparison of recycling systems
- Monitoring and development of recycling processes in cooperation with recyclers

After the WEEE directive entered into force, Nokia and other electronic producers are responsible for financing part of the collection, treatment and environmentally sound disposal of equipment sold under the Nokia brand. Nokia is preparing for this responsibility by improving the recyclability of its products through sound DfE and by participating in the development of take-back schemes. Design decisions on the material content and structural design of the products have a direct bearing on their recyclability and ease of disassembly.

Reclamation of materials from electronic waste offers economic and environmental benefits. Precious metals in particular are commercially valuable. At the same time, proper treatment of substances that may cause harm during treatment or on disposal is of the essence. We have therefore formulated criteria for our approved EoL service providers.

The WEEE directive allows different take-back and recycling arrangements in different countries. We have studied different alternatives in a number of pilot projects.

Nokia Networks has offered its customers a recovery and recycling service, including site disassembly, transportation, selection of and contracts with authorized recyclers since 1999.

Nokia's Internet site [www.nokia.com/aboutnokia/environment](http://www.nokia.com/aboutnokia/environment) gives consumers information about their nearest mobile phone and accessories collection point. Information is of great importance in motivating consumers to hand their phones back.

Under Nokia's basic take-back system, authorized repair shops have the readiness to take back mobile phones from individual consumers. Large consignments are handled by



## | NOKIA-WIDE ENVIRONMENTAL PROGRAMS |

Nokia's local service points, which also take back equipment from business-to-business and network customers. In addition to this basic system, there are various national and local arrangements complying with national or local recycling systems. Nokia has entered broad-based cooperation on the management of end-of-life mobile phones under the aegis of the UN Basel Convention to promote, among other things, environmentally sound take-back of end-of-life mobile phones.

**Recycling recovers value**

There were 380 million mobile phones put on the market in 2001. They contained approximately 100–200 tons of lead, which is about the same amount of lead as is contained in about 1 000 starter batteries. These 380 million phones correspond to about 40–50 000 tons of waste, which is a small fraction of the estimated 150 million tons of electronic waste generated every year.

In 2001, Nokia's market share of mobile phones was 37 per cent, corresponding to 18 300 tons of phones, which could be carried by a medium-sized vessel. If the take-back rate of those phones were 10 per cent, the total would amount to 5 000 tons, which would constitute rather a small quota for even one recycler.

In a typical recycling process the product is shredded and metals and plastics are separated. Precious metal refining and copper smelting are used to recover the metals. The recovered value of the precious metals in the PWBs is considerable. In countries where commercial companies handle recycling, competition has considerably reduced recycling fees.

As far as mobile phones are concerned, plastics and materials attached to metals can be utilized as fuel in the metal recovery processes. The recycling rate of plastics remains low. One reason is that recovered plastics are often contaminated with impurities that can cause problems in the molding process. It is a more general EoL input to DfE that product design should avoid the use of substances, whether metals or plastics, which can cause disturbance in the various recovery processes.

**Mobile phones yield valuable raw materials**

In a recycling process a mobile phone gets a new lease on life. About 65–80 per cent of the material content of a mobile phone can be recycled and reused. In addition, recyclers recover energy by using the plastics as fuel. This can raise the total recovery rate up to 90 per cent.

A mobile phone or accessory deposited in a recycling bin is shredded. It is common for the crushed phones to be collected from several small recycling facilities for delivery to a smelter by land and sea. The trucks and boats transporting the electronic scrap then carry processed metals on the return trip, maximizing the use of capacity. The crushed material includes metals, plastics and ceramics. The loads are analyzed, and the price of the mixture is estimated. The prices of gold, silver and palladium as well as platinum and copper have a big influence on the total price.

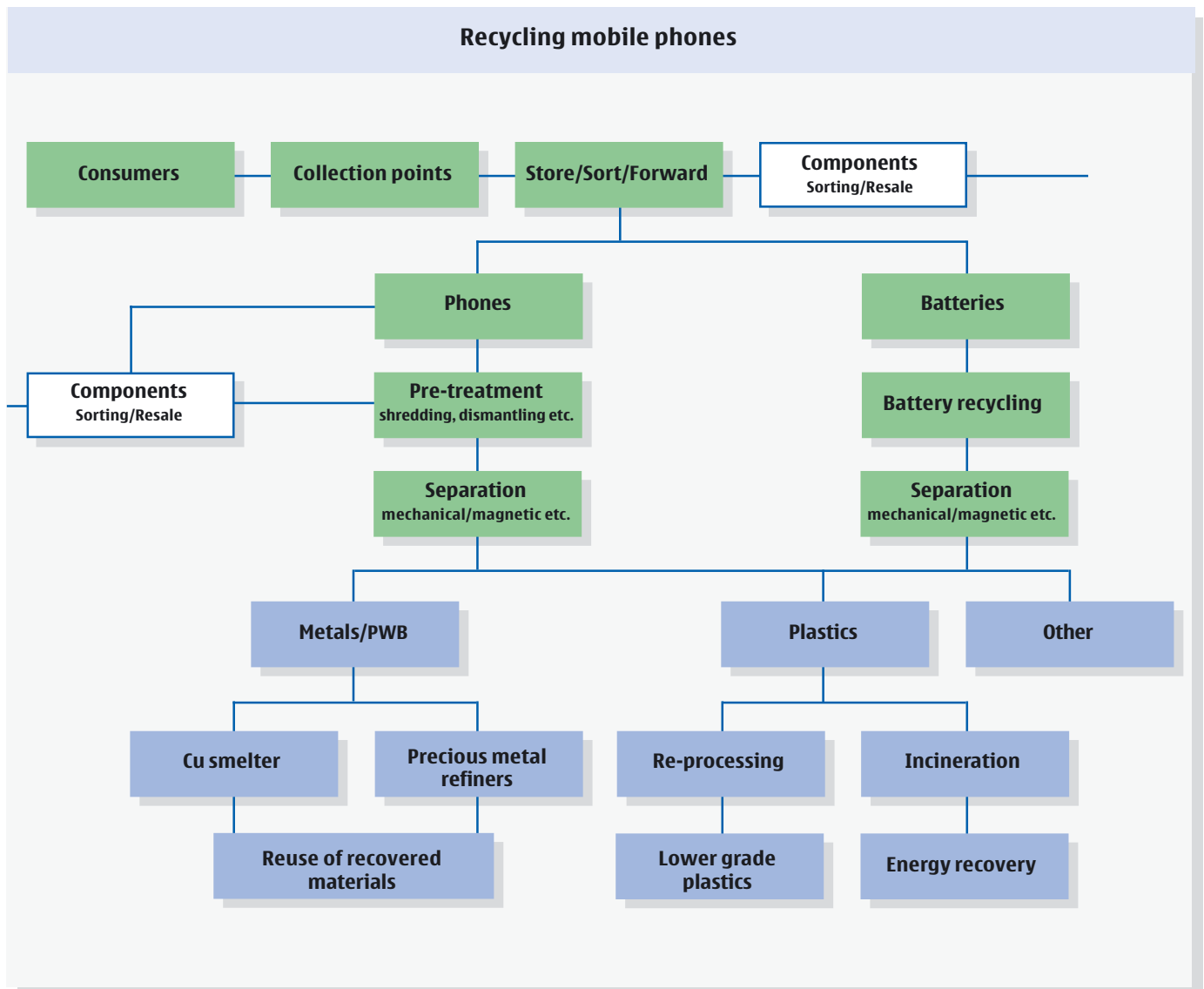
Plastics are still considered as side flow. Recycling infrastructure has not been fully developed yet. Also, collected plastics often include impurities like stickers, glue, paints or incompatible plastics, and cannot therefore be reused in demanding processes. However, plastics can be recycled to make for instance plastic benches or fences. Due to their high thermal value, most plastics are currently used as fuel replacing, for example, oil. Some plastics are still landfilled.

The metals contained in a mobile phone can be successfully recycled. The first stage of recovery is separation of the shredded metals into different fractions. Aluminum, ferrous metal and copper fractions are sold to metal refineries. In the refinery, metals are smelted and purified and necessary alloying elements are added. The finished metal ingots can be sold again for production of new parts.

Printed wiring boards are treated in the copper smelter. In the process, copper and precious metal fractions are smelted and then taken for anode casting and electrolytic refining, which separates copper from the rest of the materials. The remaining precious metal sludge containing gold, palladium and platinum is sent to precious metals plants for recovery.

The metals are sold directly to customers or through metal exchanges. About 40% of the raw materials used by the metal industry are recycled materials. Recycling of metals saves 60–90% of the energy required for mining and dressing metal from ore. The metals from mobile phones can end up, for instance, in copper roofs or ski bindings.

| NOKIA-WIDE ENVIRONMENTAL PROGRAMS |



NOKIA is committed to carrying out its business in a responsible way. We focus our efforts on all aspects of Corporate Social Responsibility including environmental activities stemming from life-cycle thinking. This means reducing the environmental impact of our products over their entire life cycle. Everyone in the company is involved in this as everyone has an influence on environmental performance.

### Nokia Mobile Phones



Our goal is to be the industry benchmark in environmental performance, integrating environmental thinking into our strategy and operations, and making the environment everybody's business.

Life-cycle thinking covers all the environmentally significant impacts of a product from cradle to grave, and provides the framework for actions and targets.

We will continuously improve the material content and energy efficiency, as well as the recyclability of our products. For example, Design for Environment practices in our product development will enable the delivery of products exceeding upcoming EU-requirements before they come into force.

We will also continue our efforts in developing sound end-of-life treatment practices and our world-class supply network.

A certified Environmental Management System is being applied at every Nokia production site. Our challenge is to reduce the amount of waste and energy consumption in our operations and to involve every Nokia employee.

We see the future of mobile phones and the environment as follows:

1. The mobile phone is fast becoming the centerpiece of personal communication, allowing us access to an ever-widening range of services. Today, we are expanding from voice services to services driven by data and multimedia.
2. Mobile phones have fast improved in terms of their environmental performance and this development will continue. This is due, for example, to a decrease in raw materials and improved materials and energy efficiency. More mobile phones will therefore mean less burden for the environment.
3. Correct end-of-life treatment for mobile phones, together with society, is one of our main environmental issues. A mobile phone is valuable even at the end of its life. At Nokia, we have already gained very good experience, for example, in Asia working together with forward-thinking service providers and local governmental organizations.

To summarize, we see our role as providing multi-functional, safe and environmentally sound personal communication devices, which are recycled in a proper way. In this way, we can offer consumers in every market the possibility to use new, top-quality mobile communication applications and services with confidence.

Matti Alahuhta  
President  
Nokia Mobile Phones

#### Nokia Networks



Our intent is to be an industry leader in environmental performance, making environmental affairs an integral and well-defined part of Nokia Networks' processes. Firstly, it is our intention to phase out restricted materials from our

products by the end of 2005 as well as implement consistent global practices for the take back and recycling of obsolete electrical and electronic equipment from our customers.

During 2002, we continued to pursue focused environmental efforts in three core areas. This work is guided by our environmental intent, strategy and implementation plans.

In the supplier interface we have trained around 300 people in auditing and assuring supplier environmental compliance. In parallel, we have continued to communicate Nokia Environmental Supplier Requirements, particularly focusing on our 150 largest suppliers, and in our new purchasing agreements, we have clauses reflecting RoHS and WEEE directive requirements. In preparation, we have conducted a survey on the use of so-called RoHS materials. We have also started systematic communication with our suppliers on the specifications, time schedules and requirements we have regarding possible material substitutions.

Our own manufacturing and product development has proceeded according to plan and we have made considerable headway in transitioning towards a lead-free manufacturing process. The challenge of replacing lead and the other banned substances is compounded by the fact that network equipment contains a large range and number of components, parts and subassemblies. Our target is to have lead-free mass production capability by the end of 2005. This means that during 2003 we will continue to enlarge our product scope in the piloting of lead-free manufacturing and the design of RoHS compatible products. In order to reach this target, many of our suppliers will need to be capable of delivering RoHS-compliant components well ahead of legal deadlines.

In our product development process, we continue our efforts to sharpen environmental requirements and guidelines. This includes the global implementation of mandatory environmental requirements of products developed by or delivered to Nokia Networks and the compiling of a Nokia-wide material-content database, which will make any future material restrictions easier to deal with.

In the area of product take-back and recycling, we continue to offer a comprehensive service to our customers, orchestrating the take-back and recycling of their obsolete electronic and electrical equipment.

By embedding needed activities to the action plans of Nokia Networks and thus involving our whole organization we are moving towards being an industry leader in environmental performance and making environment everyone's business.

Sari Baldauf  
President  
Nokia Networks

## Nokia Ventures Organization



At Nokia Ventures Organization, as with all of Nokia, environmental activities are integrated into normal day-to-day business processes. Design for Environment activities are integrated into the product creation processes of Nokia Internet Communications and Nokia Home Communications and the units have created their own environmental steering processes to ensure smooth and efficient implementation.

Nokia Internet Communications has verified that its contract manufacturers are ISO 14001 certified. An environmental steering team with representation from across the unit has also been added to make quarterly reviews of the progress. The unit has completed the Reduction of Certain Hazardous Substances (RoHS) assessment with its contract manufacturers and has incorporated a RoHS checklist into the sourcing process. Additionally, the organization has carried out the process for all phases of the Product Life Cycle Management process. By early 2003, plans are to have a supplier environmental audit and assessment process in place.

At Nokia Home Communications, it has also been verified that both the production sites and the logistics services providers employed by the unit have been an ISO 14001 certified. Additionally, the business unit has ensured, by the verification process conducted by regular audits, that materials sourced for the manufacturing of products do not contain banned substances via RoHS. Design for Environment planning and execution is incorporated into the product programs. By early 2003, regular audits of the unit's business processes will be a continuous activity and Design for Environment checkpoints for both technology platform and product engineering program milestone checklists will be added.

New Growth Businesses is developing new businesses outside the natural growth paths or current focus of existing Nokia businesses. It is a focal point for Nokia's internal innovation flow and the unit has incorporated a sustainability checkpoint – both environmental and social – in the Nokia venturing process. The venturing process provides a reference for all the essential services and tools, enables the set-up of a successful new business and speeds up venturing. Further plans include the definition of DfE checkpoints in venturing process milestone checklists and the inclusion of end-of-life responsibility requirements in all agreements with suppliers and service providers.

Pekka Ala-Pietilä  
President, Nokia  
President, Nokia Ventures Organization

## ENVIRONMENTAL DATA

Energy	2000 GWh	2000 GJ	2001 GWh	2001 GJ	2002 GWh	2002 GJ
<b>Electricity</b>	<b>412</b>	<b>1 483 200</b>	<b>532</b>	<b>1 914 480</b>	<b>528</b>	<b>1 901 516</b>
Americas	81	291 600	105	378 720	106	382 230
Asia-Pacific	48	172 800	92	330 120	88	316 328
Europe & Africa	283	1 018 800	335	1 205 640	334	1 202 958
<b>District heat</b>	<b>104</b>	<b>374 400</b>	<b>116</b>	<b>415 800</b>	<b>104</b>	<b>376 189</b>
Americas	0	0	0	0	0	0
Asia-Pacific	0	0	0	0	0	0
Europe & Africa	104	374 400	116	415 800	104	376 189
<b>Gas</b>	<b>34</b>	<b>122 400</b>	<b>40</b>	<b>144 720</b>	<b>57</b>	<b>206 215</b>
Americas	1	3 600	6	20 520	5	18 515
Asia-Pacific	4	14 400	4	13 680	18	65 318
Europe & Africa	29	104 400	31	110 520	34	122 382
<b>Oil</b>	<b>14</b>	<b>50 400</b>	<b>6</b>	<b>21 384</b>	<b>0</b>	<b>792</b>
Americas	9	32 400	2	8 820	0	320
Asia-Pacific	2	7 200	1	4 716	0	472
Europe & Africa	3	10 800	2	7 848	0	0
<b>Total</b>	<b>564</b>	<b>2 030 400</b>	<b>693</b>	<b>2 496 384</b>	<b>690</b>	<b>2 484 713</b>
Americas	91	327 600	113	408 060	111	401 065
Asia-Pacific	54	194 400	97	348 516	106	382 118
Europe & Africa	419	1 508 400	483	1 739 808	473	1 701 529

Direct CO <sub>2</sub> emissions	t CO <sub>2</sub>	t CO <sub>2</sub>	t CO <sub>2</sub>
<b>Total</b>	<b>10 400</b>	<b>9 800</b>	<b>11 600</b>
Americas	2 600	1 500	1 100
Asia-Pacific	1 300	1 500	3 700
Europe & Africa	6 500	6 800	6 800

Water	m <sup>3</sup>	m <sup>3</sup>	m <sup>3</sup>
<b>Total</b>	<b>754 000</b>	<b>1 138 000</b>	<b>1 163 000</b>
Americas	229 000	516 000	388 000
Asia-Pacific	267 000	286 000	427 000
Europe & Africa	258 000	336 000	348 000

Waste	tn	tn	tn
<b>Total</b>	<b>26 200</b>	<b>24 600</b>	<b>24 600</b>
Americas	9 200	6 900	6 900
Asia-Pacific	3 200	3 200	3 200
Europe & Africa	13 800	14 500	14 500

<b>Recovery rate</b>	<b>67%</b>	<b>76%</b>
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Use of ODS	ODP kg	ODP kg	ODP kg
<b>Total</b>	<b>20</b>	<b>45</b>	<b>59</b>



## | ENVIRONMENTAL DATA |

	2000	2001	2002
Net Sales	EURm	EURm	EURm
Total	30 376	31 191	30 016

## Environmental data in relation to net sales

Energy consumption	GJ/EURm	GJ/EURm	GJ/EURm
	67	80	83
Direct CO <sub>2</sub> emission	tons/EURm	tons/EURm	tons/EURm
	0.34	0.31	0.39
Water consumption	m <sup>3</sup> /EURm	m <sup>3</sup> /EURm	m <sup>3</sup> /EURm
	25	37	39
Waste	tons/EURm	tons/EURm	tons/EURm
		0.84	0.82
Use of ODS	ODP kg/EURm	ODP kg/EURm	ODP kg/EURm
	0.001	0.001	0.002

Nokia uses no ODS in its products or production. The reported ODS figures are due to ODS contained in fridges and refrigerators.

Data collection covers Nokia's production sites and large offices.

## | DEFINITIONS AND ABBREVIATIONS |

### **Base station**

Fixed transceiver (transmitter and receiver) equipment used for communicating with mobile phones in a mobile network. A base station may cover one or more cells or a part of a cell of the network.

### **Dematerialization**

An environmental term, which means that fewer materials are needed to create better products. Mobile phone manufacture is a good example of this: years ago, a portable phone that may have weighed 15 kilograms delivered an indifferent talk-only service. Today, mobiles weighing even less than 100 grams can provide a variety of high-speed, high-quality digital services including voice, text messages, fax and the Internet.

### **DfE**

Design for Environment systematically integrates environmental considerations into the design of products, processes and services.

### **EICTA**

European Information and Communications Technology Industry Association combines the objectives of its predecessors, ECTEL and EUROBIT.

### **EMS**

Environmental management system

### **EoL**

End-of-life

### **GRI**

Established in 1997, the mission of the Global Reporting Initiative is to develop and disseminate globally applicable Sustainability Reporting Guidelines for voluntary use by organizations reporting on economic, environmental, and social dimensions of their activities, products and services.

### **Hazardous waste**

Waste, or combination of wastes, which because of its quality, or physical, chemical or infectious characteristics may cause or significantly contribute to an increase in serious irreversible, or incapacitating reversible illness or pose a substantial present or potential hazard to human health, safety or to the environment when improperly treated, stored transported, used or disposed of, or otherwise managed.

### **ICC**

International Chamber of Commerce

### **Immaterialization**

A term used to describe how technology could supplant the need for physical products by replacing them with services. For example, downloading a video over the Internet can save a journey to the video shop. Equally, network services can dispense with the need for a telephone answering machine.

### **ISO 14001**

International Organization for Standardization's standard for environmental management systems including specification and guidance for use.

### **LCA**

Life-Cycle Assessment is an objective process for evaluation of the environmental burdens associated with a product, process or activity by identifying and quantifying energy and materials used and wastes released to the environment. LCA is a tool for evaluation of opportunities for environmental improvements.

### **LCD**

Liquid Crystal Display

### **Life cycle**

The life cycle of a product begins with the acquisition of raw materials and includes processing of bulk materials, production of engineered materials, manufacture, use, retirement, disassembly and disposal of residuals produced in each stage.

### **PWB**

Printed wiring board

### **Rebound effect**

The increase of consumption linked to the reduction of limits to use a technology. These limits might be monetary, temporal, social, physical, linked to efforts, spatial or organizational.

### **RoHS**

Directive of the European Union on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS).

### **VOC**

Volatile organic compounds. VOC is associated with odors and production of low-level ozone. Low-level ozone is harmful to animal and plant life and a major constituent of photochemical smog.

### **WEEE**

Directive of the European Union on waste electrical and electronic equipment (WEEE).

## FORWARD-LOOKING STATEMENTS

It should be noted that certain statements herein which are not historical facts, including, without limitation, those regarding:

- the timing of product deliveries;
- our ability to develop and implement new products and technologies;
- expectations regarding market growth and developments;
- expectations for growth and profitability; and
- statements preceded by "believe," "expect," "anticipate," "foresee" or similar expressions are forward-looking statements.

Because these statements involve risks and uncertainties, actual results may differ materially from the results that we currently expect.

Factors that could cause these differences include, but are not limited to:

- developments in the mobile communications market including the development of the mobile phone replacement market and the timing and success of the roll-out of new products and solutions based on 3G technologies;
- demand for our products and solutions;
- development of the mobile software and services market in general;
- the availability of new products and services by operators;
- market acceptance of new products and service introductions;
- intensity of competition and changes in the competitive landscape
- the impact of changes in technology
- general economic conditions globally and in our most important markets
- pricing pressures;
- consolidation or other structural changes in the mobile communications market;
- the success and financial condition of our partners, suppliers and customers;
- the management of our customer financing exposure;
- the success of our product development;
- our success in maintaining efficient manufacturing operations and logistics as well as high product quality;
- our ability to source quality component production and R&D without interruption and at acceptable prices;
- our continued ability to have access to the complex technologies involving patents and other intellectual property rights included in our products and solutions
- inventory management risks resulting from shifts in market demand
- fluctuations in exchange rates, including, in particular, the fluctuations in the euro exchange rate between the US dollar and the Japanese yen; and
- the impact of changes in government policies, laws or regulations

as well as the risk factors specified on pages 11 to 18 of the Company's Form 20-F for the year ended December 31, 2002 under "Item 3.D Risk Factors."