last detail

Down to the last detail...

A story of environmental awareness, told through the development, production, use and disposal of BeoCenter 2

BANG & OLUFSEN

Contents

Foreword

In recent years, the focus of public interest in the environment has shifted from being solely concerned with environmental issues relating to factories towards an increasing awareness of the environmental aspects of the products themselves. Consequently, Bang & Olufsen is currently finding that interest in their products' environmental properties such as energy consumption and unwanted materials is rising faster than interest in the environmental impact of the business as a whole. We therefore regard it as our duty not merely to work purposefully and deliberately towards reducing the environmental impact of the business as a whole, but also to design our products with the greatest possible consideration for the environment.

Environmental issues of many different kinds are debated in the media. Naturally we have opinions on these issues, but to maintain a fixed point of reference and to avoid short-sighted or insufficiently comprehensive environmental solutions, we think in terms of a life- cycle perspective.

In this way we ensure that we keep focusing on the most important aspect of our products' overall service life from start to finish, even when working on specific problems.

Openness and dialogue regarding the environmental matters that can be affected circumstances Bang & Olufsen can influence are important to us. So every year we publish "To the last detail…" which you are now holding. Our object for doing so is to provide information about the environmental aspects that interest our customers and dealers most – in other words those that affect our products. We hope that "To the last detail…" will give you an idea of how our product developers consider not only the products but also the environment when developing Bang & Olufsen products.

Of course, we still prepare an environmental audit for our manufacturing process, which can be ordered by phoning our environmental department on +45 96 84 10 18.

On behalf of the Board

Torben Ballegaard Sørensen
President and CEO

Bang & Olufsen's environmental policy

Every human action has an impact on the surrounding environment. This also applies to the manufacture and use of the company's products. Bang & Olufsen works constantly to reduce its environmental impact and to establish a mutual balance between this impact and consideration of our products' operational features, economy, service life and aesthetics, so that we can count ourselves among the best in the industry. We will openly communicate our environmental profile and publish an annual environmental report. We want to contribute to global, sustainable development, and to view our activities in a life cycle perspective.

Development (idea, design and construction): this is the creative process where the product's environmental properties are defined, and it is here that we act to reduce the environmental impact in the following phases of the life cycle.

Raw materials
In our choice of materials we aim to avoid substances that might be environmentally problematic.

Production
In choosing production methods and equipment we will give a high priority to cleaner technology.

We emphasise consideration of the immediate environment, and creating a safe, healthy working environment for our employees, with a focus on improving both the physical and the psychological working environment.

In choosing suppliers we aim to ensure that they have an appropriate environmental approach and attitude. We will conduct an ongoing dialogue with suppliers on the creation of good environmental conditions in the part of the product's life cycle for which they are responsible.

Transport
We will make environmental demands of our transport providers in terms of high utilization rates and optimal use of technology for transport units.

Use
We will strive to ensure that the use of our products is perceived to be problem-free in the immediate customer environment, that the products have a long service life and that they have low power consumption when in use.

Disposal
We will strive to ensure that the product's components are suitable for recycling, and that significant items can be identified when dismantled, so that they can be processed correctly for disposal or recycling.

Eco-friendly design

At Bang & Olufsen we endeavour to design eco-friendly products. To our way of thinking environment-friendly properties are a matter of course, something that we believe the customer takes for granted and expects to be taken care of.

For Bang & Olufsen, eco-friendly design means that we carefully consider the life cycle of the product as a whole as early as the design process. During this phase we make a number of environmental demands on our products, e.g. low standby consumption and not using prohibited substances.

We perform tests that simulate dismantling for disposal after 15 to 20 years of use, to make sure the product can be divided into the proper fractions.

The purpose of all this is to achieve environmental improvements compared to previous products by incorporating the life cycle into the development of the device.

If we are to sell our products after July 2006, they must be free of lead, cadmium, mercury, hexavalent chromium, PBBs and PBDEs. The final two substances are brominated flame retardants that have typically had plastic added to them to reduce flammability. We phased out these two substances from our products in the early 90s.

The connecting cable that links the master unit with the socket unit is PVC-free. PVC is usually used for cables, since it is a material that has a good flame-retardant effect. Unfortunately it also has environmental disadvantages, since it requires separate disposal. Sometimes the PVC used in cables also has softeners added to it to make the cable soft and flexible. Some of these softeners are suspected of being hormone-disruptive. For this reason we have decided to use PVC-free cable.

However, it is still only for the European market that the connecting cable of the BeoCenter 2 is PVC-free. This is because there are extremely strict requirements in the USA as regards the flammability of cables, so we have been unable to find alternatives to PVC. The European PVC-free cable does of course conform to all current flammability requirements.

We work with our suppliers on an ongoing basis to ensure that they can supply components that satisfy both the authorities' and Bang & Olufsen's own environmental requirements.

Environmental assessment of the BeoCenter 2

All products affect the environment through their consumption of resources and energy. Many of these effects are determined as early as the design phase.

So how much does BeoCenter 2 affect the environment? An environmental assessment of the product can give us the answer. The environmental assessment (or life cycle assessment, as it is also called) is a matter of looking at what happens in the life cycle of the product as a whole and not just concentrating on part of it (e.g. our own production process). By examining the product throughout its life cycle we ensure that the environmental input is concentrated where it will do the environment most good. The life cycle of a product consists of the following phases: extraction of raw materials, product manufacture, use, disposal and transport.

Characteristically, electronic products make the greatest environmental impact during the usage phase, i.e., when the device is used by the customer. This also applies to the BeoCenter 2, so in our opinon, redcing the energy consumed by our devices is very important.

Resource consumption
Consumption of resources is assessed with reference to the number of years for which the resource may be expected to be obtainable at the current rate of consumption. This means that resources that are only available in limited amounts are given a high weighting, while resources that are in plentiful supply are given a low weighting. Resource consumption is expressed in thousandths of the volume of a resource that is available to a person and his / her descendants (mPR). Materials that can be recycled on disposal are credited in the environmental assessment.

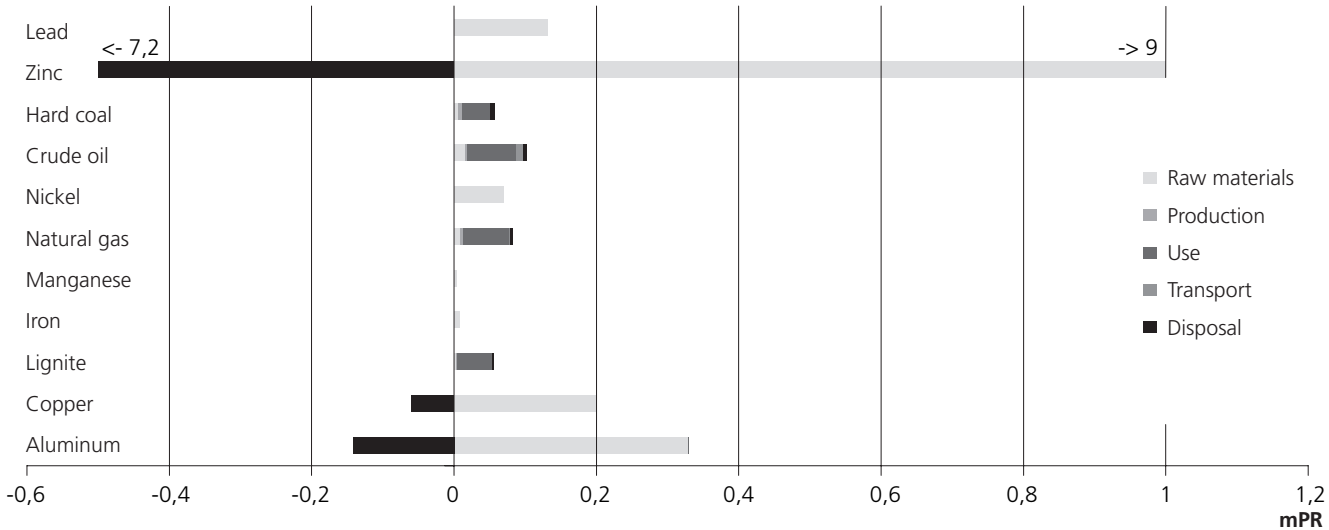
BeoCenter 2 consists chiefly of the metals zinc, aluminum, copper and lead. Copper is found in printed circuit boards and lead in soldered joints. About 20% of the total weight of BeoCenter 2 is made up of zinc, and since zinc also has a short supply horizon it is given a high weighting. Because it is easy to cast intricate components in zinc, this material was chosen for the rear cover.

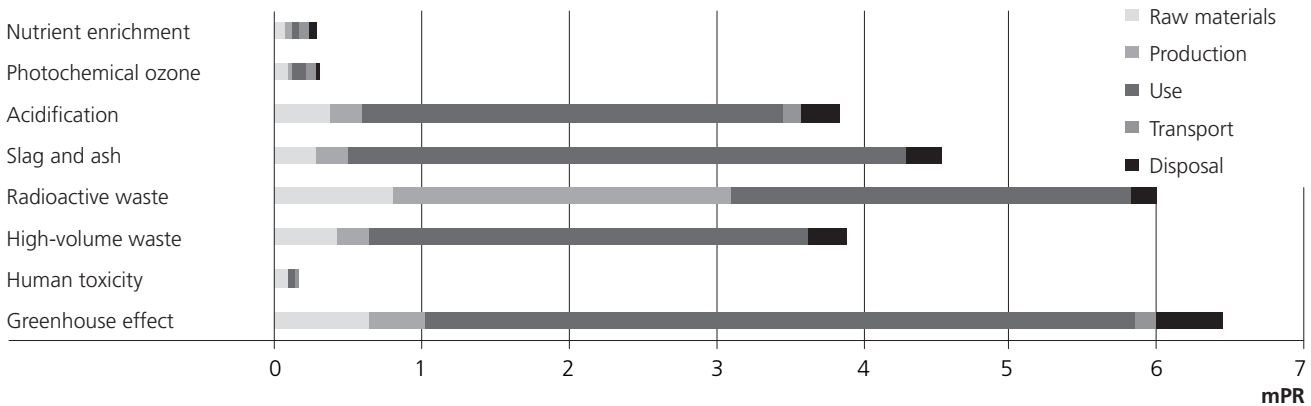
Environmental effects
The environmental impact is evaluated with reference to the objectives defined by the Danish environmental authorities for 2000. This is defined as the product's contribution in thousandths compared to the targets defined per person in 2000 (mPEM).

The main area to which BeoCenter 2 contributes is to the greenhouse effect, acidification and various forms of waste. These contributions stem chiefly from the consumption of electricity when the product is used. As an example, the usage phase accounts for almost 75% of the product's overall contribution to the greenhouse effect. Radioactive waste originates from the production of electricity in markets where nuclear power is used.

Explanations of the various environmental effects can be found in the glossary on page 14.

Consumption of resources / Environmental Impact





Working environment on the Assembly Line

As early as the product design process, assembly production technicians are involved in the project to ensure a good working environment during product manufacture and to prevent production startup problems. Some of the choices that are made during the design process are very important to the working environment. We make an effort to adapt our processes to our employees, and not the other way round. For this reason, the Production Department has worked very closely with the Research and Development Department on such matters as the location of sockets and socket types chosen for maximum suitability as regards assembly and the working environment.

The assembly lines are designed so that working postures can be varied, and the workers are instructed in ergonomics. Using a power screwdriver for assembly work may cause major stress to the arm as a result of the machine's recoil.

To prevent this, we have bought soft grip screwdrivers that substantially reduce recoil, thereby minimising shoulder and elbow problems. Instead of the traditional trolley used to transport materials between the assembly lines, we have introduced an incline so that the materials transport themselves down to the next assembly line. This makes it unnecessary to lift materials on and off the trolleys.

We have invested in an automatic tape machine because of the awkward working height on the packing line. The worker inserts the device into its packaging and guides it into the tape machine, which tapes the top and bottom at the same time.

Even if every assembly line is correctly designed from an ergonomic viewpoint, there is still a risk of monotonous, repetitive work (work leading to RSI).

Monotinous repetitive work is defined as work in which the work cycle (the time from start to finish of a product / article) is less than 30 seconds, or in which uniform movements take place for more than 50% of the period of work.

A worker should therefore not spend more than three or four hours a day on an assembly line that carries a risk of RSI. To prevent RSI, all production employees have been trained to work in a number of different assembly functions, so that they can rotate between these various functions and have a varied working day. The workers themselves plan when and how often this rotation will take place.

At least every third year an assessment of all workplaces (WA) takes place, which, in addition to purely ergonomic factors also takes into account other working environment conditions, such as noise level, chemical exposure and indoor climate.

Energy Consumption

We pay a lot of attention to reducing the power consumption of our products, especially when they are on standby. This is because the greatest environmental impact caused by our devices arises from their energy consumption during use by the customer.

Standby consumption (indicated by the little red lamp) is often regarded as a waste of resources, which was indeed the case with old devices that had high energy consumption. However, standby is a necessary if we are to activate our products by remote control. It is also not possible to operate the product in a link setup if it is switched off by hand.

BeoCenter 2 is two products in one – an audio product and a DVD.
The DVD can even be viewed in one room while you listen to radio in another.

The total annual energy consumption of the BeoCenter 2 is 54 kWh, which is equivalent to a 60 W bulb burning for 40 days. This 54 kWh assumes that BeoCenter 2 is on standby for 18.5 hours and in turned on for 4.5 hours each day. When the device is on, it consumes about 22 W, depending on the power sources used. When on standby, consumption is 1.5 W.

The standby consumption of BeoCenter 2 complies with the voluntary agreement on the reduction of standby consumption of audio products which we have entered into with the European trade organization and the EU Commission. This agreement specifies a maximum standby consumption of 3 W for 2004.

Nor do we intend to leave it at that. We are still working on making further reductions in standby consumption in future generations of BeoCenter 2.

Disposal of BeoCenter 2

From the year 2005, all EU countries must collect and process all electrical and electronic waste. During processing the devices will be divided into their different material components, so that valuable and scarce resources are recycled for new materials, and environmentally problematic fractions can be disposed of properly.

As BeoCenter 2 contains a wide range of resources, requirements have been imposed during the design phase to ease of separation on disposal, so that most of the materials in the product can be recycled. We carry out a disassembly test to simulate what happens when a product is disposed of. We use it to find out whether it is possible to separate the device into its different fractions. The results of thetest are then used in designing new products.

Most of BeoCenter 2 is made up the metals zinc, aluminum and iron. These metals are sorted into their different types, and if necessary compressed to form units to be melted down at a smelting works or foundry for recycling.

The second largest element is PCBs. The batteries are removed, and then the rest of the PCB goes to a smelting works where copper and other precious metals such as gold and silver can be recovered. Copper can also be recovered from the cables.

Plastic is only used for small components in the BeoCenter 2, like PCB holders. It is not economic to recycle these because of their size. Instead, they will be left with the PCBs and will therefore be burned with the rest of the organic PCB materials.

Material content

The material content of the BeoCenter 2, broken down by weight.

Metals ■ PCBs ■ Plastic ■ Glass ■

Glossary

Greenhouse effect:
Heating of the earth's atmosphere caused by greenhouse gases absorbing heat radiation rising from the earth's surface towards outer space.

Hazardous waste:
Waste that needs to be taken to special treatment plants because of its environmentally hazardous content.

Acidification:
A reduction of the pH level in the ground or lakes as a result of emissions of substances that act as acids in the environment.

Photochemical ozone creation:
The creation of ozone and other gases in the atmosphere from volatile organic compounds such as solvents.

Recycling:
Either by recovering materials used for reuse or by utilising the energy through incineration.

Recycling:
When the product or material is used in precisely the same form (as for example in the case of beer and soft drink bottles).

Human toxicity:
The toxic effect of a substance on people exposed to the substance through inhalation, skin contact or consumption, e.g. with food or liquids.

Nutrient enrichment:
The leaching of nutrientsinto the aquatic environment.

Persistent toxicity:
Substances that do not easily break down in the environment, and can thus exist in concentrations with a potentially toxic effect.

Radioactive waste:
Waste from nuclear power plants. Taken to special depots for radioactive waste.

Slag and ash:
Residual products from the incineration process at coal-fired power stations and waste incineration plants.

High-volume waste:
Household waste, etc. taken to rubbish dumps. Characterized by the fact that it contains no substances hazardous to the environment and only creates a problem by virtue of the space that it takes up.

Eco-toxicity:
A toxic effect that changes the structure or function of ecosystems.

BeoCenter 2 Technical Specifications

Master unit:	Type no. 2801
Dimensions W x H x D / Weight	37 x 15 x 23 cm / 4.3 kg
Cabinet surface:	Aluminum
Remote control:	Beo 4 recommended
Socket unit:	Type no. 2811
Dimensions W x H x D / Weight	54 x 16 x 6,5 cm / 3 kg
Cabinet surface:	Black
Power consumption:	Typically 22 W (standby < 2 W)
Audio:	
RDS FM-receiver:	60 radio stations with naming facility
Digital output:	Linear PCM, MPEG-2, AC-3, DTS®
CD naming:	Naming facility for 200 CDs
Playback:	DVD-video, Video CD, CD-A, CD-R, CD-RW, CD-MP3
Signal-to-noise ratio:	Typically 105 DB, A-weighted in audio function
Video:	
Formats:	RGB, S-video (Y-C), CVBS (combined video)
DVD region:	Depending on country
Color system:	PAL / NTSC depending on regional setting
Analog copy protection:	Depending on DVD standard