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Green Manufacturing and Management in Electronics Industry

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Ref: Greenpeace

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Environmental Issues of Products

The number of computers in India:
+/- 14,000,000 (growth: 25 % per year)

- Each one of these PCs is a TOXIC Trap

- Workers working in chip making facilities are likely to be exposed to toxic chemicals that may lead to cancer, miscarriage, birth defects etc.

- Many manufacturing sites of chips generate hazardous wastes and contaminate ground water; for every 2 gm of chip about 1260 gm of chemicals and materials are used

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Environmental Issues of Products

- EOL PCs contribute to the mounting "electronics" waste EOL PCs find their way to many Asian countries including India for Recycling where workers are exposed to toxins leading to damage to the central nervous system, endocrine disruption, interference with brain development and organ damage

- A typical computer monitor with a cathode ray tube contains 2-4 Kg of Lead, as well as phosphor, barium and Chromium (VI)

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Environmental Issues of Products

- the chip resistors and semiconductors contain Cadmium;
- Mother Boards and connectors contain Beryllium
- Printed Circuit Boards and Plastics casing contain Brominated flame retardants (e.g. PBBE)

(Source: Worldwatch Institute)

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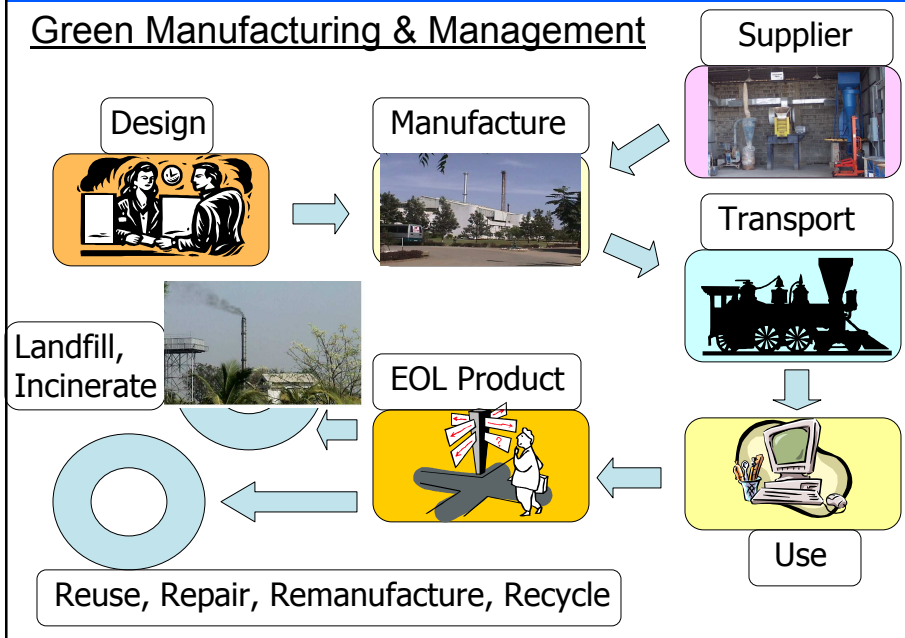

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Design for Environment:

Design

Focal Areas:

Mass reduction – Reduced consumption of resources

Reduction/elimination of hazardous substances (Cd, Pb, PBBE etc)

Reduction in consumption of energy (standby and in operation)

Recyclability (disassembly, monomaterials, pressfit, glue, welding)

Packaging Mass (elimination of PVC, PU, EPS)

Repairability and long life

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Royal Philips Electronics List of Banned Substances (CSO-BP01-2004-1)

Revision date: 2004-07-15

Articles (i.e. materials, components, subassemblies, products) delivered to Royal Philips must be free of the "Banned substances" as mentioned in this list.

Substances	Declaration threshold ppm (mg/kg) *	Legal date entry into force
Cadmium and –compounds	20	Immediately
Mercury and –compounds	2	Immediately
Lead and – compounds	1000	1 July 2006
Lead and – compounds in outer sleeves of cables according to proposition 65 legislation, USA	300	Immediately
Hexavalent Chromium (Cr 6+) and compounds	1000	1 July 2006
Asbestos (all types)	10	Immediately
CFCs, Chlorofluorocarbons	1	Immediately
HCFCs, Hydrogenated chlorofluorocarbons	1	Immediately
Halons	1	Immediately
CHCs, Chlorinated hydrocarbons,	1	Immediately
Methyl Bromide	1	Immediately
HBFCs, Hydrobromofluorocarbons	1	Immediately
1,1,1-Trichloroethane	1	Immediately
Carbon tetrachloride	1	Immediately
Dichloromethane (CH_2Cl_2)	1	Immediately
Trichloroethylene (C_2HCl_3)	1	Immediately
Perchloroethylene (C_2Cl_4)	1	Immediately
PCBs, polychlorinated biphenyls	10	Immediately
PCTs, polychlorinated terphenyls	10	Immediately
PCP, Pentachlorophenol and its salts and esters	10	Immediately
Polybrominated diphenyl ethers (PBDEs)	1000	Immediately
Polybrominated biphenyls (PBBs)	1000	Immediately
Ugilec 141 (monomethyl tetrachlorodiphenyl methane)	10	Immediately
Ugilec 121 (or Ugilec 21) (monomethyl dichlorodiphenyl methane)	10	Immediately
DBBT (monomethyl dibromodiphenyl methane)	10	Immediately

Product packaging must be free from the above-mentioned substances AND the following:

Substances	Declaration threshold ppm (mg/kg) *	Legal date entry into force
PVC and PVC blends	1000	Immediately
Sum of Heavy metals (Cd, Hg, Cr(6+) and Pb)	100	Immediately

Note:
For Product Division (PD) additional banned substances and specific exemptions on above list, see appendix to this Royal Philips Electronics list of Banned Substances.

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List of substances*

List of Category I substances
- Asbestos (all types)
- Benzene
- Beryllium and compounds (Be)
- Cadmium and compounds (Cd)
- DBBT (monomethyl-dibromo-diphenylmethane)
- Dibenzofurans
- Dioxins
- Halogenated hydrocarbons like CHCs, CFCs, HCFCs according to the UD-D 1767 standard
- Mercury and compounds (Hg)
- Polybrominated biphenyl ethers (PBBEs)
- Polybrominated biphenyls (PBBs)
- Polycyclic aromatic hydrocarbons
- Polychlorinated biphenyls (PCBs) & Polychlorinated terphenyls (PCTs)
- Polyvinylchloride (PVC and PVC blends in packaging materials for consumer end products)
- Radioactive substances
- Ugilec 121 (or Ugilec 21: monomethyldichloro-diphenylmethane)
- Ugilec 141 (monomethyltetrachloro-diphenylmethane)
- Vinylchloride (monomer)

List of Category II substances
- Acrylonitrile (monomer)
- Antimony and compounds (Sb)
- Arsenic and compounds (As)
- Azo dyes
- Chromium(VI) compounds (Cr-VI)
- Cobalt and compounds (Co)
- Cyanides
- Diethylamine & dimethylamine
- Epichlorohydrine (monomer)
- Formaldehyde (monomer)
- Halogenated organic compounds (other than mentioned in Category I restricted substances)
- Hydrazine
- Lead and compounds (Pb)
- Metal carbonyls
- 2-methoxy or 2-ethoxy-ethanol, and 2-methoxy- or 2-ethoxy-ethyl acetate
- N,N-dimethylacetamide (DMA) & N,N-dimethylformamide (DMF)
- Nitrosamide & Nitrosamine
- N-methylacetamide (NMA) & N-methylformamide (NMF)
- Organic tin compounds (Sn)
- Pentachlorophenol & Phenol (monomer)
- Per Fluorinated Compounds, PFCs
- Phthalates (all)
- Picric acid
- Selenium and compounds (Se)
- Tellurium and compounds (Te) & Thallium and compounds (Tl)
- Toluene
- Xylenes

List of Category III substances
- Boron and –compounds (B)
- Hydrofluoric acid (HF)
- Hydrochloric acid
- Nitrates
- Nitric acid & sulphuric acid
- Nitrogen oxides (power stations/boilers)
- Nitrogen oxides (processes)
- Phosphates
- Phosphoric acid
- Rare earth metals (lanthanum and heavier)
- Sulphur oxides (processes)
- Transition heavy metals (e.g. Ag, Ba, Cr, Cu, In, Mo, Ni, Pd, Sn, Ti, V, W, and Zn)
- VOCs (=Volatile Organic Compounds, like acetone, cyclo-hexanone, isopropyl alcohol, methanol, methylethylketone, and styrene)

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Green Flagships

Digital radiography
FCR Elara systems provide significant improvement in image quality while preserving the images' natural appearance. Simplification and customization of workflow according to individual requirements allows technologists to spend a maximum amount of time caring for patients. Compared to its predecessor, FCR Elara reduces energy consumption by 41% in normal use and 42% in standby. Plus, it weighs 17% less and uses 15% less packaging.

Designed for real world use
Our HeartStart FRx Defibrillator is designed to be easy to use, rugged and reliable for first responders. Weighing in at just 1.4 kilograms – 28% lighter than its predecessor – the FRx Defibrillator is the solution for treating Sudden Cardiac Arrest from ventricular fibrillation in environments and conditions too demanding for many other defibrillators.

Medical Systems
Philips Medical Systems is a leader in breakthrough technology and in realizing environmental innovations. By integrating EcoDesign into the product creation process, designers can target the environmental impact of the full product circle, from design through production and end-of-life. The end result? Environmentally sound design and innovation for the healthcare market.

The latest innovations in MR
We're changing the way the world looks at magnetic resonance, creating higher-quality images and expanding the breadth of applications. The Panorama 1.0T open MR system's open design ensures patient comfort, while our innovative SmartGrad+ feature increases operator efficiency by 20%. This system weighs 30% less than the competition and uses 14% less energy.

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Domestic Appliances and Personal Care

Philips Domestic Appliances and Personal Care has long been at the forefront of making packaging out of recycled material. We have taken significant steps in this area and also focus on reducing the weight of our products.

Relax and revitalize

Our Innergize treats the needs of busy consumers looking for solutions to revitalize. Combining tanning, infrared warmth as well as natural scents and sounds, the Innergize creates a relaxing experience and a sense of well-being. After use it can be folded up to a compact size and stored away easily thanks to its lightweight design. The Innergize is 43% lighter and uses 3% less energy than its predecessor.

Smart Choice

Consumers can enjoy the best sound quality in the most straightforward and easy to use phone, our DECT 525. This telephone consumes 54% less energy and uses 14% less packaging than the average of our commercial competitors. It's also 23% lighter and improves recycling and disposal 12%. And we have eliminated cadmium, lead and mercury from this phone.

Breathtaking natural pictures

The FlatTV 37PF7320A offers superior picture quality with the latest LCD technology and Pixel Plus. This 37-inch LCD TV uses 29% less energy and 24% less packaging than our closest commercial competitor. Plus, this TV is lead-free and complies with stringent EU legislation.

Pumping up productivity and performance

The compact 190S6 LCD monitor meets the highest international safety and ergonomic standards. Users experience optimized viewing thanks to the monitor SmartBright feature. This 19-inch monitor is 12% lighter than the average weight of the closest commercial competitors. With its energy saving performance averaging 17% less, this LCD monitor offers the lowest total cost of ownership. Ahead of legislation, this LCD monitor is cadmium, mercury and lead free.

Touch your music and photos

With the GoGear HDD 1420 you can effortlessly enjoy your world of MP3s and WMA music and pictures. The Micro Jukebox uses 47% less energy and is 10% lighter than the average of closest commercial competitors. And it's already lead-free.

Consumer Electronics

Typical contributions of energy consumption during the useful life of consumer electronics products range from 70-90% of total environmental impact. To reduce the impact of our products, the EcoDesign procedures at Philips Consumer Electronics require Green Flagship products to be 10% more energy efficient than the competition. It's about taking EcoDesign to a higher level, dealing with environmental impacts at the outset during the product creation process and, thereby, driving innovation.

Full details on Green Flagships can be found on page 73.

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Unlike any other

Our new S2 and S10 starters are the most reliable, safe and environmentally friendly starters in the world. They contain no hazardous substances and offer a 40% longer lifetime than the average of the closest commercial competitors. Unlike other starters on the market, Philips starters do not contain radioactivity inside their glow switch for ignition.

Lighting

Philips Lighting continuously explores ways to maximize energy efficiency to lower CO_2 emissions and energy costs. We work to improve product lifetime and reliability to reduce waste and maintenance disruption. Plus, we are setting the pace in mercury reduction, as well as in lead-free and radioactive-free products.

Small and bright

This TV projection lamp may be smaller than its predecessor, but it offers increased light output. In comparison, this UHP lamp uses 30% less energy and 50% less packaging and improves lifetime 25%, compared with its predecessor.

Thinking small so our customers can think big

Mini MasterColor® lamps are ideal for accent and display lighting in specialty retail, hospitality and architectural outdoor applications. Breakthrough technology means better light quality, longer life and better energy efficiency than standard halogen lamps. The Mini MasterColor 20W lasts twice as long and uses half the energy consumption, compared to standard halogens used in the same application.

More light, longer life

Our MASTER PL line of compact fluorescent lamps offer the lowest mercury content in the industry, are energy efficient and reliable. The MASTER PL-C 2pin lamps improve lifetime 33% and contain 54% less hazardous substances, compared with the average of our closest commercial competitors. And their glow switches are free of radioactivity.

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Supplier

<u>Green Purchasing</u>: ?

Focal Areas:

Compliance – Reduced Risk

Substances – in process and in product

Eco-Efficiency – Resource Consumption

Recirculation of Packages

Environmental Management System

(Supplier Sustainability Audits) ?

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Green Manufacturing:

Manufacture

Focal Areas:

Energy Consumption

Water Consumption

Hazardous Substances

Waste Reduction (Hazardous and non-hazardous Waste)

Emission Reduction (Lead, solvents, decomposition products)

Mass Balance

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Sustainability policy

The Philips Sustainability Policy is a core element for the operations of the entire Philips organization. Sustainable development is a priority for the Board of Management, which has formulated guidelines for sustainable performance. This policy and resulting action programs are regularly reviewed and updated to meet stakeholder needs.*

Philosophy

Since Philips was founded in 1891, it has worked to improve social equity and environmental quality, proving that responsible business is good business. Operating this way, the company has been able to improve economic prosperity for itself, its stakeholders and society at large. With its tradition of integrating economic, environmental and social issues, Philips understands that sustainable development is one of the most challenging issues facing the world.

Commitment

Philips adheres to the Business Pledge for Action adopted by the world business community at the 2002 Johannesburg World Summit for Sustainable Development:

- Sustainability is the opportunity we embrace.
- Responsibility is the standard by which we should expect to be judged.
- Accountability is the obligation we assume.
- Partnership is the pathway we pursue.

Therefore, Philips will:

- Develop meaningful technology driven by the needs of society.
- Behave responsibly, living up to the Philips values, brand promise and General Business Principles.
- Continue to *build and maintain* trust through transparency and accountability.
- Depend on and work with stakeholders inside and outside the company.

Policy

- Philips maintains and strengthens a culture of sustainable entrepreneurship, in line with its sustainability policy.
- Philips invests in its employees and creates a work environment that enables them to reach their full potential.
- Philips optimizes its innovations, business strategy and operations by setting financial and non-financial targets and maintaining constructive relationships with stakeholders.
- Philips expects its business partners to be committed to sustainable development.
- Philips is active in the community, supporting initiatives to improve people's lives, and is focusing on education and healthcare, particularly for the underprivileged.
- Philips measures and verifies its sustainability performance and publishes results annually.
- Philips engages governments, non-governmental organizations (NGOs) and companies to explore new businesses and emerging markets to improve quality of life.

Gerard Kleisterlee Jan Hommen Arthur van der Poel Ad Huijser Gottfried Dutiné

* Sustainability is defined as "meeting the needs of the present generation without compromising the ability of future generations to meet their own needs." Sustainable development – which is considered the path to sustainability – is the simultaneous pursuit of economic prosperity, environmental quality and social equity. Companies that pursue this path are known as sustainable entrepreneurs.

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EcoVision 2002-2005

Environmental action program

Product improvements

Philips product developers follow EcoDesign principles and focus on one or more of the following Green Focal Areas

	Mandatory target	Recommended target
EcoDesign[1]	Level 6 on maturity grid	Level 8 on maturity grid
Green Flagship products[2]	One per product division per year	One per business per year
Packaging	Maintain performance	10% reduction
Supplier management[1]	Level 6 on maturity grid	Level 8 on maturity grid

Process improvements

	Mandatory target	Recommended target
Energy	10%	20%
Waste	20%	30%
Water	15%	20%
Emissions to air and water		
Restricted substances (category I)	70%	90%
Hazardous substances (category II)	30%	50%
Environmentally relevant substances (category III)	15%	30%
Packaging	Maintain performance	10% reduction
Supplier management[1]	Level 6 on maturity grid	Level 8 on maturity grid
ISO 14001 certification	All manufacturing sites	All facilities

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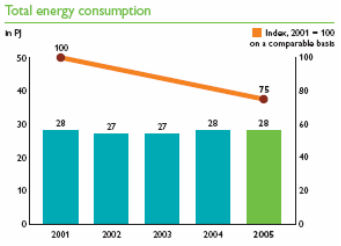
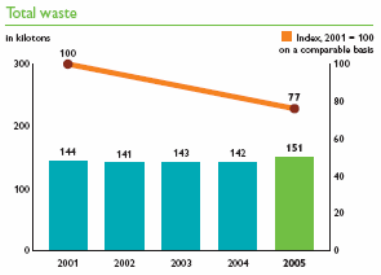
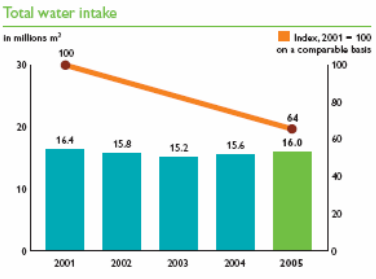
2006-2009







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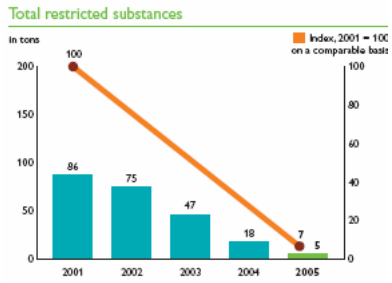

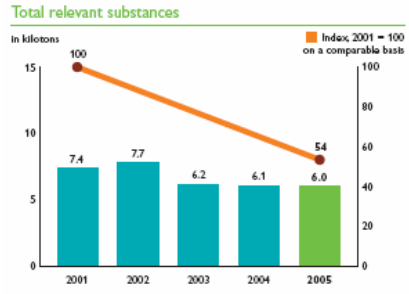

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EcoVision III (2006-2009)

Improvements	Targets
Product improvements	
Yearly target set on number of Green Flagships: 2006	35
Process improvements*	
Global Warming Potential (CO_e equivalents)	
Energy reduction (direct CO_e)	5%
PFC reduction	31%
Other greenhouse gas reductions	4%
Water	7%
Total waste	7%
Restricted substances: benzene emissions	100%
Restricted substances: mercury emissions	83%
Restricted substances: CFCs/HCFCs	94%
Other restricted substances (excluding CFCs from cooling systems)	100%
Hazardous substances: PFC emissions	31%
Hazardous substances: lead	100%
Hazardous substances: toluene	100%
Hazardous substances: xylene	100%
Other hazardous substances	100%

* Total reduction targets in absolute terms, against the base year 2005

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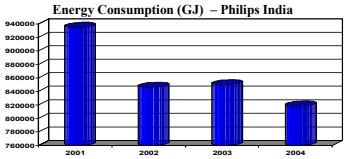
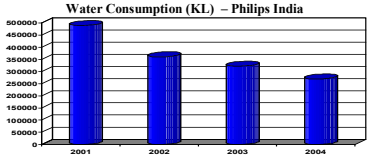
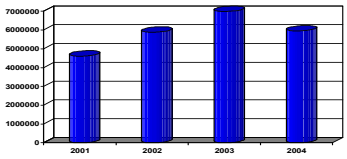
Energy Consumption (GJ) – Philips India



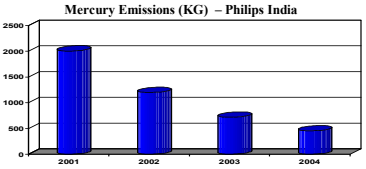
Water Consumption (KL) – Philips India



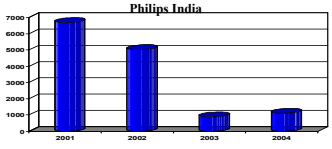
Waste Generation (KG) in Philips India



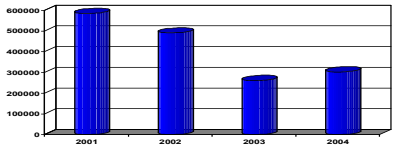
Mercury Emissions (KG) – Philips India



Cat II (EGE, Toluene, Xylene, Sb, Pb) Emissions (KG) – Philips India



Cat III (VOCs, SOx, NOx etc) Emissions (KG) – Philips India



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Green Supply Chain (Logistics):

Transport

Focal Areas:

Compliance

Optimization

Handling of goods at transfer points

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Use:

Major Issue:

Energy Consumption

Maintenance

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End of Life Product:

E-Waste

Recycling, Repair & Reuse, Remanufacture

Incineration / Land-fill

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In Essence

"Green Manufacturing and Management" is about

Designing products using Design For Environment Principles,

manufacturing them with eco-efficient processes,

delivering them to the customer with the least environmental impact and

applying "Cradle to Cradle" or similar approaches for handling EOL products.