Special Report Series

ICT and the Environment

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Report 3: *Green ICT - what producers must do*

Summary

Media coverage of e-waste and green IT issues has increased awareness about the high environmental cost of computing. Attention has largely focused on energy consumption during the use phase, and end-of-life recycling.

While important issues, if we are serious about adressing the environmental impacts of computing, we must focus attention on manufacture, where most impact occurs. If we look at energy use alone, 80% is inflicted during manufacture before a PC is turned on for the very first time. Until due attention is given to manufacture, we cannot hope to correct the situation.

Producers are in the hot seat to correct this. They make the design decisions and have profited from toxic, wasteful design, partly by externalising environmental and health costs to communities, increasingly those in developing countries. Yet they also have the greatest technical know-how to design better.

Countries such as those in the European Union have approached this problem by placing a legal duty on producers to be responsible for their products over their entire life cycle, including when they become waste. Such an approach is designed to internalise the true costs of technology and drive better design.

However, this approach is not universal, and so producers that are 'green' when in the EU27 may not necessarily be so when out of it.

This Special Report (the third in a Computer Aid International series on 'ICT and the Environment') looks at the solutions to this wasteful design and irresponsible behaviour, providing recommendations for how computer manufacturers can become truly green - through better design and by being responsible in *all* countries that they do business in; not just the wealthier ones.

Key facts and recommendations

- ICT manufacture is material- and energy-intensive. The production of each PC requires 22 kg of toxic chemicals, 240 kg of fossil fuels and 1,500 kg of water. Also 80% of life-cycle energy use is accounted for before we even switch a PC on for the first time. *Any strategy to reduce ICT impacts must necessarily focus on manufacture.*
- Manufacturers must thus lead a new resourcing paradigm. This must cover the entire product life cycle, including end-of-life, leading to longer-lasting products which are easier to repair and upgrade (and eventually recycle), are free of toxics, and that can be used–and reused–until actual end-of-life.
- Manufacturers must be responsible for their goods at end-of-life, no matter where sold. Producers should be responsible for financing end-of-life management of their goods in all countries they operate in, so that all countries can build and sustain the capacity to re-use electronics and to recycle e-waste.

Computer Aid International is a UK registered charity and the world's largest provider of professionally refurbished PCs to the not-for-profit sector in the developing world. The charity's aim is to reduce poverty through practical ICT solutions. To date Computer Aid has provided over 175,000 refurbished PCs - donated by UK employers and individuals - to where they are most needed for use in agriculture, health and education in over 100 countries.

Computer Aid International

Computers: Designed for the digital dump?

Media coverage of e-waste and green IT issues has increased awareness about the high environmental cost of computing. Environmental impacts of a computer are highly concentrated in the production phase; if we look at energy use alone, 80% is inflicted during manufacture, before a PC is turned on for the very first time.[1] However a reluctance to speak ill of computer manufacturers has resulted in the elephant in the room being ignored.

Attention has been largely focused on 20% of the energy problem, which is power consumption of PCs during use, and end-of-life recycling. Whilst these are important issues, unless and until attention is focused on manufacture, we cannot hope to correct the situation. Empirical research has shown that the production of each PC uses 22 kg of toxic chemicals, 240 kg of fossil fuels and 1,500 kg of water.[1]

Any genuine attempt to reduce the environmental costs of computing must necessarily look at the whole product lifecycle, from materials extraction in mining through manufacture and global distribution, to the use phase and end-of-life recycling.

ICT integration and miniaturisation results in products that are increasingly difficult to upgrade or disassemble for recycling, and there have been few incentives for the types of modular, repairable, easily upgraded design that would extend product life.[2]

Also, aggressive marketing that encourages us to consider our working PCs as obsolete after just one or two years' use results in artificially rapid replacement cycles.[3]

Behind the glossy veneer of electronics innovation lays a darker story, often ignored by the producers and retailers of these goods. Electronics contain valuable materials like gold and platinum that are recoverable and recyclable, but they also contain toxic flame retardants, lead and arsenic.[4] However, the most common method of disposal is landfill, where heavy metals like mercury, cadmium and lead pollute the water, soil and air.[5]

Shockingly, of the 50 million tons of e-waste generated worldwide in 2009, only 13% was recycled.[6] This cycle of waste results in unnecessary manufacture of products designed for the digital dump[7] at the expense of human health and the environment.

It is frequently communities in developing countries that bear these costs, as e-waste from rich countries is often illegally exported to them.[8]

Here, lower labour costs and absence of health and safety controls allows unscrupulous traders to profit from our digital dumping, while poor communities pay with their health and a destroyed environment. Not only is this a grossly unjust distribution of the waste burden, but it does nothing to reduce the volume of e-waste generated in the first place.

We can do better! The solution is green ICT design…

To end this senseless waste we are compelled to put pressure on computer manufacturers to redesign their products and production processes to better preserve the environment (Box 1).

Waste is only one part of a product's lifecycle; tackling the waste problem requires looking beyond simply end-of-pipe solutions.[9] Recycling programmes, while obviously important, will alone not reduce the generation of waste in the first place.[2] We must address the source – at design phase – as this is where decisions about hazardous substances, product durability and recyclability, and thus overall environmental impact, are made.[10]

As designers of electronics, producers must lead a new resourcing paradigm, guided by the '3R's': reduce, reuse and only then recycle:

a) ***REDUCE*** energy- and material-intensive PC manufacture: design out toxics and design in more recycled content. Improve product recoverability, so that less waste is generated in the first place.

b) ***REUSE*** more functional components in new PC manufacture, and maximise opportunities for reuse of whole appliances by making repair and upgrade simpler, to extend product life. As well as having superior environmental outcomes, there are huge social benefits to be gained from the reuse of equipment in schools and hospitals by disadvantaged and marginalised groups.

c) Make it easier to ***RECYCLE*** ICT. Do not recycle working kit, and only recycle using methods that ensure the safety of workers, communities and the environment.

Box 1: Green ICT design would:

- reduce number and volume of toxic chemicals used in PC production
- reduce number of different materials and volume of virgin materials
- increase use of reclaimed and recycled materials in PC production
- reduce energy consumption in PC production and distribution
- redesign PCs with upgrading/recycling in mind
- embrace the polluter pays principle in all countries, not just when forced to
- fund end-of-life recycling in all countries, not just Europe

And green ICT design includes *all* costs in the product price…

The *real* cost of technology includes the cost of safe treatment at its end-of-life. Recycling and safe treatment of e-waste comes at a cost. The complex composition of modern electronics makes recycling a challenge and when done safely, often expensive.

There may be opportunities to recoup costs through recovery of precious and rare metals; however, given the difficulty of separating materials in complex products, recycling usually runs at a net cost.[11] This is particularly the case for phased out materials like cathode ray tube screens, which contain hazardous leaded glass and require special treatment to protect human health and the environment.[10]

Manufacturers are the ones that have profited from electronics, partly by externalising the financial and environmental costs of their products to communities around the world; they should be the ones that pay this cost. But end-of-pipe solutions for addressing the waste load and its impact do not work. We need mechanisms in place that shift the financial and environmental burden of treating end-of-life electronics away from poor communities and address the problem at source: via the producers.

In recognition of the failure of traditional policies and programmes to reduce overall waste generation and its burden on communities, a number of governments have adopted new approaches, based on **extended producer responsibility** (EPR).

As an application of the polluter-pays principle, EPR demands continuing accountability on producers over the entire life cycle of their products, including at end-of-life, and aims to internalise environmental costs into the product price.[9]

EPR is designed to not only shift the waste burden away from taxpayers and on to producers, but also to provide financial incentives to producers to design their products in ways that reduces the environmental burden of their goods.[12]

After over a decade of careful deliberation, producers and governments in the European Union (EU) adopted the principle of EPR as the best, and fairest, mechanism to tackle the e-waste problem in Europe. This has been reflected in the Waste Electrical and Electronic Equipment (WEEE) Directive,[13] which has been implemented in more than 20 nations across the EU. EPR is now becoming the international standard, with similar legislation now being discussed in the US, Canada, Australia and elsewhere.

Within the EU, *all* manufacturers are required to be *individually* responsible for financing the end-of-life treatment of their own goods. This means that the true costs of electronics can begin to be reflected in the product price in the EU, and enables Member States to build and sustain the operational capacity to reuse equipment and to recycle e-waste over the long term.

…no matter *where* business is conducted!

While forcing producers to pay for the end-of-life treatment in the EU has helped develop domestic capacity for e-waste management, the same cannot be said for developing countries, which are struggling under the weight of dumped e-waste, exported illegally from developed countries, and also from domestic generation.[14]

To build capacity to treat e-waste, there should be implementation of EPR programmes in all nations, not just in wealthier ones. It is inherently unfair that producers should be required to exercise responsibility in the EU, but behave irresponsibly in Africa, Latin America, Asia and anywhere else with less stringent environmental and worker health and safety controls.

Producers should also be compelled to invest in capacity building and technology transfer in developing countries. This will help developing countries begin to safely tackle e-waste generated from domestic use of electronics–as well as to begin to cope with the toxic legacy left by current trash–to at least the same standard as that enjoyed in Europe and in other countries with functioning producer responsibility schemes. That is only fair.

While some producers have stated take-back policies for their own goods in a number of non-EU developing countries, the reality is that this approach is currently too patchwork and not supported by sufficient infrastructure to provide citizens with constant and reliable means of safe disposal options.[10]

What is needed is a comprehensive EPR approach that covers *all* producers in *all* countries, guided by the same principles as in the EU. This would allow all countries to develop the operational capacity to treat their own e-waste over the long term.

Without this, we will continue to see a flow of e-waste to developing countries where producers can still externalise the real costs of their products at the expense of communities' health and the environment.

Truly green ICT manufacturers are those that are responsible in ALL countries, not just when in the EU27.

Manufacturers can only claim to be genuine about reducing the environmental costs of computing if they are acting across the full product lifecycle: designing green IT and treating the environment in developing countries as being of equal value as the environment in the EU.

This means funding end-of-life recycling in developing countries in exactly the same way that legislation already requires them to do within the EU.

Conclusion

Without a fundamental rethink of the way we design, use, and dispose of electronics, we are facing an e-waste crisis of epic proportions that hurts the poorest the most.

ICT and other electronics manufacturers are in the hot seat when it comes to addressing this: they have been able to externalise the cost of their goods for too long, and they have the technical know-how to design better products.

While some countries have implemented programmes that enforce producer responsibility for their products for their entire life-cycle, including end-of-life, this is not universal and some communities – most notably in developing countries – continue to suffer a disproportionate e-waste burden.

By following the recommendations in this report, we can begin to address this unjust state of affairs, and begin to address this very real waste crisis.

Recommendations

- ***End toxic, wasteful design:*** reduce, reuse and recycle. Producers to lead a new resourcing paradigm by designing longer-lasting products which are easier to repair and upgrade (and eventually recycle), are free of toxics, and that encourages consumers to use–and reuse–electronics until actual end-of-life.
- ***Shift the cost of toxic, wasteful design away from the environment and poor communities to ICT manufacturers.*** Producers must be forced to include the real costs of their goods through wide-ranging producer responsibility programmes that encourage eco-design.
- ***Take action now to ensure no further dumping of e-waste in developing countries.*** Enforce existing laws and treaties that prohibit export of e-waste from developed to developing countries.
- ***Make extended producer responsibility global to make the way we treat electronics at end-of-life safe and fair.*** Producers should be responsible for the end-of-life management of their goods in all countries they operate in, not just in developed countries, so that all nations can build and sustain the operational capacity to re-use electronics and to recycle e-waste.

Notes and references

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(4) UNEP 2009. Recycling: from e-waste to resources. See http://bit.ly/g7aktT (accessed Jul 2010).

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(6) BBC News 2010. Europe breaking electronic waste export ban. See: http://bbc.in/hkIV0y (accessed Nov 2010).

(7) See http://storyofstuff.org/electronics.php for an exploration of the"designed for the dump" mentality.

(8) E.g. BAN/SVTC 2002. Exporting harm: the high-tech trashing of Asia, see http://bit.ly/f1n4UJ (accessed Jul 2010), and BAN 2005. The digital dump: exporting re-use and abuse to Africa. See http://bit.ly/dXzto7 (accessed Oct 2010).

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(10) Greenpeace 2008. Toxic Tech: not in our backyard. See http://bit.ly/bypCx8 (accessed Oct 2010).

(11) Williams et al. 2008. Environmental, social and economic implications of global reuse and recycling of personal computers. Environ. Sci Technol 42: 6446-54.

(12) OECD 2001. Extended producer responsibility a guidance manual for governments. See: http://bit.ly/bdZgFG (accessed Oct 2010).

(13) Directive 2002/96/EC of the European Parliament and of the Council of 27 January 2003 on waste electrical and electronic equipment (WEEE).

(14) See, e.g. Yu et al. 2010. Forecasting global generation of obsolete personal computers. Env. Sci. & Tech. See http://bit.ly cQdsU4 (accessed Jul 2010).

Contact

Computer Aid International
10 Brunswick Industrial Park
Brunswick Way
London, N11 1JL
Web: www.computeraid.org
Phone: 020 8361 5540
Email: enquiries@computeraid.org
Registered charity no. 1069256
Registered company no. 3442679

Computer Aid International