low-impact IT

what is it?

One of the most important aspects of sustainable computing is making computers last longer. Big software companies bring out new software that almost always requires more processing power than its predecessors, and therefore requires more powerful hardware, so tends not to work well on older computers. This results in criminally short lives for most computers. They can be recycled / made to last longer by a combination of a) a bit of tinkering, and b) using free / open source software and operating systems, which tend to require less processing power.

First, a bit of history, to show the scale of the problem, and the spectacular rise in numbers of computers. At first, only large companies, universities and government agencies had the resources to buy and maintain large mainframe computers. With the development of the microchip, the personal computer appeared in the 1970s and became affordable for the ordinary person, although you still had to build them from kits. Developments such as the mouse and the graphical user interface were pioneered at Xerox PARC in Palo Alto, USA and by 1977 these innovations could be seen in the Apple II and its competitors. IBM introduced a PC to the market in 1981, running Microsoft's MS-DOS operating system. With their huge distribution network, they quickly attained world dominance and to this day IBM 'clones' have around 95% of the global market, with the remaining 5% being Apple (Macs – the designer's favourite).

The World Wide Web appeared in 1992, allowing people to hyperlink pages of information, and with the laying of fibre-optic cables in the late 90s, it became possible to deliver content such as video, real-time chat and 3D. This century has seen the deployment of wireless networks allowing mobile computing to become a reality, and now the computer is shrinking to the size of a mobile phone. All these innovations have propelled a much wider adoption of PCs / smartphones in people's work and social lives.

Ubuntu is a popular Linux distribution.

Much of the world's computer waste is sent to countries like Ghana, where tens of thousands of people trawl through dumps to extract components, exposed to toxic chemicals and smoke from plastics burnt to recover metals.

what are the benefits?

With well over 2 billion PCs in the world, and rising rapidly, their short lives point to a massive environmental disaster. The huge amounts of water, minerals and electricity required to manufacture computer chips mean that the earth's resources are being depleted unnecessarily. Recycling slows down this process. Some machines are stripped down to their raw materials in India and China and sold back to manufacturers, but it's more efficient to recondition and donate or sell cheaply to the developing world, opening up computer education and the web to people who can't afford a new PC. The same applies to disadvantaged children in the West.

Computer owners tend to upgrade every 3-4 years on average. Some are sold second-hand and some dumped in landfill, as they're perceived as having no function beyond their time of currency. Not only is this a waste of good electronic components and precious materials, but over time these same things create highly toxic run-off than can infiltrate the water table. Even if they're sold on, it requires new resources, manufacturing, transport and all the associated pollution problems to produce new computers.

Reuse is a far better option. The majority of users utilise only 20% of a computer's functionality. By replacing broken components and installing free / open source software, many computers can become fully functional for many more years at very little cost. These can be good first machines for children as well as elderly people unaccustomed to computing. Another major use is to turn them into servers that can hold your data at a secure and/or remote location and act as a secure gateway to the internet.

what can I do?

Most importantly, don't chuck your old computer away. You can have a go at revamping it yourself, with the aforementioned tinkering/open source, or you can give it to specialist companies who recycle them, often for the developing world (see our links page).

If you're tinkering, you need to learn what the standard components are inside a computer. The motherboard has various slots for memory and external devices such as the power supply, hard disk and graphics / audio cards. Once you've been shown, it's very easy to hook up all the components – similar to sticking Lego blocks together when you were a child – a task achievable within 10 minutes as they all use slot connectors. You might require a pair of thin-nose pliers to adjust the jumpers for the hard disk, but no other tools are necessary.

If some item is not working you can find replacements for little or no cost by cannibalising family and friends' old machines or buying parts at local computer fairs. It would be unusual to pay more than £30 for a complete set of components and devices to get you up and running. Individual components are sold for £3-£5 each at fairs. You also have to install the correct type of RAM for the processor you have (there are tables available to look up) and install as much as you can, as it will help the machine and software to run faster.

You can find the manual for any computer model online, so you can familiarise yourself with it and have a go at repairing it if required - or take it to a local repair shop. It's usually not necessary to buy a new computer.

Raspberry Pi mini-computer.

So that's the tinkering part. The second part is free software. If you try to install a newer version of the Windows operating system on an old machine it may well not work due to the hardware not being powerful enough to run the software. Microsoft Windows updates require you to buy a licensed copy of the software, and often necessitate the purchase of a new machine to cope with the bloated complexities of each new version. They also terminate tech support for each version after a few years, which 'encourages' users to buy newer versions for the added support. A simpler solution is to erase the hard disk and install a Linux operating system, which will put far less demand on the hardware. It's important to select the appropriate version of Linux that will run well on your hardware. Debian is good for older machines, Ubuntu for a familiar interface, and Fedora for simplicity and flexibility on machines with higher performance processors. You can download them free online. The advantage is that they're backward compatible and will run on old machines. Better still is a full set of free / open source programs that will run on these operating systems. You can download Linux Ubuntu, plus office suite, graphics editor, DTP package and web design programs all for free. The equivalent cost would be several hundred pounds for the same type of software running on Windows.

If you go to our free & open source software page, there are links to tutorials on switching to free / open source operating systems and software. They're accessible to non-geeks, and you can post queries if you get stuck.

The development of smaller, less power-hungry processors has meant that microcomputers now provide an alternative to traditional computers. These are small (credit-card-sized) computers that run Linux, and versions of most free software. Raspberry Pi is the best known of these, built by the Raspberry Pi Foundation charity.

resources

- see lowimpact.org/low-impact-it for more info, advice, links & books, including:
- Baroudi & Hill, *Green IT for Dummies*
- Guy Hart-Davis, *the Healthy PC*
- Gareth Halfacree, *Raspberry Pi Beginners Guide*
- *computeraid.org: refurbishing computers for aid*
- *bit.ly/3irS5eW: green IT facts & figures*
- *therestartproject.org: fixing computers*