

### 3.5 BEST WAYS FOR GREEN PC

The hardware aspect of Green IT deals with the architecture and design of IT hardware, the manner in which it is procured and operated. The operational energy consumption is a major issue for computer manufacturers. The impact a good, energy optimum design can have on the overall energy consumed by a piece of hardware over its entire life has to be studied with utmost care. A purpose-built computer chip, or an efficient laptop battery design has potentially greater impact in reducing carbon emissions over its lifetime than its operation would have.

Following is a more detailed description of these IT hardware assets of an organization:

Data servers: deals with the physical machines and the specific buildings in which they are housed. These servers have both wired and wireless networks and other corresponding communications equipment associated with them that are directly emitting carbon.

End-user computers: laptops, desktops, their capacities, operational efficiencies, and their disposal need to be discussed from their P-O-D viewpoint. While the efficient design and manufacturing of these end-user devices remains the purview of the hardware manufacturers, the efficient operation and disposal is with the user organization.

Mobile devices: the mobile devices and associated hardware, their batteries including the recharging mechanism and disposal of the batteries and the policies and actions when the devices become outdated. The mobile devices P-O-D is heavily affected by the **user's** attitude. Thus, a sociocultural issue is an important contributor to the carbon behavior of these devices.

Peripherals: printers, photocopiers, shredders, and so on. These electronic gadgets are of immense interest in Green IT due to their large numbers and overuse. These devices has more operational waste and the carbon associated with the eventual disposal of these fast moving items.

The carbon emissions from each of these Green IT hardware group mentioned above is affected by its procurement, operations, and disposal (Green P-O-D) phases in its lifecycle. Procurement focuses on well-designed, low-carbon emitting data servers or monitors, buying it from a green supplier and using the most efficient means of packaging and transporting the equipment. Operation is the ongoing use of hardware in an efficient and effective manner. Attitude of the end-user, affected usually by visible metrics, plays a significant part here. Disposal of IT equipment requires utmost care. The Green P-O-D phases are practiced based on the policies of the organization.

### 3.5.1 Best practices for Green PC

The following are some of the tips to accomplish green PC:

#### **Buy energy efficient hardware:**

New offerings from major hardware vendors include notebooks, workstations, and servers that meet the EPA's Energy Star guidelines for lower power consumption.

Multicore processors increase processing output without substantially increasing energy usage.

Also look for high efficiency (80%) power supplies, variable speed temperature controlled fans, small form factor hard drives, and low voltage processors

### **Use power management technology and best practices:**

Modern operating systems running on Advanced Configuration and Power Interface (ACPI)-enabled systems incorporate power-saving features that allows to configure monitors and hard disks to power down after a specified period of inactivity.

Systems can be set to hibernate when not in use, thus powering down the CPU and RAM as well.

Hardware vendors have their own power management software, which they load on their systems or offer as options.

There are also many third-party power management products that can provide further flexibility and control over computers' energy consumption.

### **Use virtualization technology to consolidate servers:**

The number of physical servers can be reduced, and thus the energy consumption, by using virtualization technology to run multiple virtual machines on a single physical server.

Because many servers are severely underutilized the savings can be dramatic.

### **Consolidate storage with SAN/NAS solutions:**

Just as server consolidation saves energy, so does consolidation of storage using storage area networks and network attached storage solutions.

The Storage Networking Industry Association (SNIA) proposes such practices as powering down selected drives, using slower drives where possible, and not overbuilding power/cooling equipment based on peak power requirements shown in label ratings.

### **Optimize data centre design:**

Data centres are huge consumers of energy, and cooling all the equipment is a big issue.

Data centre design that incorporates hot aisle and cold aisle layout, coupled cooling, and liquid cooling can tremendously reduce the energy needed to run the data centre.

Another way to "green" the data centre is to use low-powered blade servers and more energy-efficient uninterruptible power supplies, which can use 70 percent less power than a legacy UPS.

Optimum data centre design for saving energy should also take into account the big picture, by considering the use of alternative energy technologies and catalytic converters on backup generators, and from the ground up, by minimizing the footprints of the buildings themselves.

Energy-monitoring systems provide the information you need to measure efficiency.

### **Use thin clients to reduce GPU power usage**

Another way to reduce the amount of energy consumed by computers is to deploy thin clients.

Because most of the processing is done on the server, the thin clients use very little energy.

A typical thin client uses less power while up and running applications than an Energy Star compliant PC uses in sleep mode.

Thin clients are also ecologically friendly because they generate less e-waste.

There's no hard drive, less memory, and fewer components to be dealt with at the end of their lifecycles.

### **Use more efficient displays**

Replace the old CRT monitors with LCD displays. This can save up to 70 percent in energy costs.

Not all LCD monitors are created equal when it comes to power consumption.

High efficiency LCDs are available from several vendors.

### **Recycle systems and supplies**

To reduce the load on already overtaxed landfills and to avoid sending hazardous materials to those landfills, old systems and supplies can be reused, repurposed, and/or recycled.

This hand-me-down method allows two workers to get better systems than they had, while requiring the purchase of only one new machine.

Old electronics devices can also be reused by those outside the company.

Much electronic waste can be recycled, the parts used to make new items. Things like old printer cartridges, old cell phones, and paper can all be recycled.

### **Reduce paper consumption**

Another way to save money while reducing your company's impact on the environment is to reduce your consumption of paper.

This can be done by switching from a paper-based to an electronic workflow: creating, editing, viewing, and delivering documents in digital rather than printed form.

Send documents as e-mail attachments rather than faxing.

When printing is unavoidable, you can still reduce waste and save money by setting your printers to use duplex (double-sided) printing.

### **Encourage telecommuting**

The ultimate way to have a greener office to have less office.

By encouraging as many workers as possible to telecommute, you can reduce the amount of office space that needs to be heated and cooled, the number of computers required on site, and the number of miles driven by employees to get to and from work.

Telecommuting reduces costs for both employers and employees and can also reduce the spread of contagious diseases.