

## Green Computing Solution Set April 2018

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1. Attempt any three of the following:
  - a. What are the steps involved for Measuring of carbon footprint?

**A carbon footprint is defined as:** The total amount of greenhouse gases produced to directly and indirectly support human activities, usually expressed in equivalent tons of carbon dioxide (CO<sub>2</sub>). In few organizations, *carbon footprint* might mean that everything is tallied—sourcing materials, manufacturing, distribution, use, disposal, and so forth.

Measuring of carbon footprint is time consuming job. Following steps can be used for it.

### **Step 1. Define the boundary for your carbon footprint**

We need to monitor the carbon footprint process year by year, so it is very important to have some rules to follow about scope of work to be done. Our primary objective is to reduce the emission of carbon, if we fail to define the carbon footprint boundary can inhibit comparisons against benchmarks and could also undermine meaningful monitoring of performance.

**Step 2. Decide which emissions will be included under scope:** Scope refers to the emission types captured in a carbon footprint.

### **Step 3. Define your carbon footprint period**

A carbon footprint is typically measured across an annual period. When choosing our period for measurement it is best to think of other reporting cycles which can be used as the set time-frame.

### **Step 4. Use a practical approach to collect annual data**

Once we have defined our boundary and the type of emissions we are going to capture, we'll then need to collect data on all elements that we are going to measure carbon emissions for (i.e. electricity and gas usage, vehicle mileage, waste volume etc.)

### **Step 5. Calculate footprint**

After we have collected all our relevant annual data the task is then relatively simple. You need to use a carbon footprint calculator or carbon conversion factors to calculate our organizational carbon footprint.

There are many carbon footprint calculators on the internet that can be used for free.

- b. How hardware deployments can affect the environment?

There are a number of ways that specific hardware and hardware deployments can affect the environment. We can reduce cost for hardware is to simply buy less equipment.

**Taking the Steps, Gaining the Rewards:** The Nashville's Vanderbilt University and the state of Oregon have begun datacenter virtualization projects and expect to save millions of dollars by the time the projects are finished.

Vanderbilt's Information Technology Services organization is using server virtualization to reduce its energy use to save money and less damage to the environment.

**Use What You Have:** Every time before purchasing new equipment, once again go through our old inventory and old dump electronic elements. If we found something that can be reused and renovated with energy efficiency, first do that.

We can take an older computer and turn it into a thin client for the processing and storage duties are conducted at the server, as the client just needs enough power to be able to display what is going on at the server. A thin client uses 15 watts of energy instead of the 150 watts that workstations use on an average. If we are doing so our energy bill will be ten times less than what it is now.

c. **Write a note on Equipment Disposal.**

If the waste electronic materials dismantled properly then many of the parts of that can be reused and if not then may cause problem to environment.

**The Business of Recycling**

The process of recycling e-waste material is very complicated. First, the metals and plastics must be separated, and then the circuit boards are shredded to separate the aluminum, iron, and copper from the valuable precious metals, such as silver. If not handled properly, uncontrolled burning, disassembly, and disposal are causing environmental and health problems, including health effects among those who extract precious materials.

**The Recycling Process**

E-waste processing generally involves first dismantling the equipment into these different components:

- Metal frames
- Power supplies
- Circuit boards
- Plastics

**Doing It Right**

There is not exact procedure is followed for handling e-waste, but many countries doing it far better way. It is needed to have some standard procedure for it, but due to variations in material used in components and also because difference in laws about environment, it difficult to opt for standard procedure. There is always scope for improvement in using the methods to handle E-waste.

**The European Union:** Europe is doing fantastic job in case of e-waste handling. In the 1990s, some European countries banned the disposal of e-waste to landfills. As a result a new industry is formed for E-waste processing.

**The United States:** The United States is one the top country for consumption of many things such as energy. However, not so fast in case of handling e-waste.

d. **What are the steps taken by JAPAN for managing their own e-waste problem?**

The Japanese have made great steps in managing their own e-waste problem.

**Life Cycle:** The Japanese look at the product's end of life as another stage in the product's life cycle. Japan's own WEEE laws took effect in 2001, and the taking back, dismantling, and reuse of materials has become an integral part of the supply chain to create new products. For instance, glass from old televisions is reused in new televisions. Plastic is also reused. This helps Japanese companies meet reuse standards.

**Waste Management:** Japan's created a Japanese Home Electronics Recycling Law. In it, manufacturers were warned to prepare for collection and recycling by 2001. Many manufacturers decided to pool their resources with the Japanese government to open a pilot recycling project. The pilot plant was an opportunity to gather important information on cost, personnel, and how to meet reuse targets. By the time the legislation was passed, companies were already prepared.

Japanese electronic waste goes, mainly, to two large, centralized recycling companies, each operated by a consortium of electronics manufacturers. Companies don't involve third parties, but send them to these operations instead. This helps save more money, because the middleman has been eliminated from the equation.

e. **What are the Basel Action Network functions?**

The Basel Action Network (BAN) is a non-profit organization which operates globally. It is focused on working with the human rights and environmental impacts of e-waste. It also works to ban waste trade and promote green, toxin-free design of consumer products.

BAN performs these broad functions:

- It provides information on the waste trade for journalists, academics, and the general public by using e-mail, newsletter and electronic action alerts.
- It also provides international policy advocacy. BAN works with United Nations (UN), Organization of Economic Cooperation and Development (OECD) and the UN Environment Program (UNEP) Chemicals Program and Governing Council. It also has produced Model National Legislation on toxic waste trade for developing countries.
- BAN conducts field research and investigations in developing countries and provides photographic and video documentation of e-waste trade.
- BAN participates with NGOs around the world in campaigns to counter toxic trade.

f. **Explain any five e-waste laws of states in US.**

In US there is no national law governing e-waste, however many states of US have taken it upon themselves to protect their environments.

**EPEAT:** US gradually moving towards Green IT laws. It is also requirement as country is huge purchaser of Computers, so disposal also have to be kept in mind. The US government is preparing a plan to purchase PCs and monitors that are energy efficient and have reduced levels of toxic chemicals.

**National Computer Recycling Act:** In this law, the core element is that consumers would be charged a US \$10 recycling fee each time a new computer is sold. It also requires the EPA to take a number of steps to help manage e-waste in the United States.

**Electronic Waste Recycling Act:** California passed regulation (formally known as SB 20) to implement an electronic waste recovery and recycling program in 2005. In this law there is a provision for cost-free recycling opportunities to consumers.

**Cell Phone Takeback and Recycling:** Assembly Bill- AB 2901 requires some of California's largest cellular telephone retailers to take back used cellular telephones at no cost to the consumer. The phones are then reused, recycled, or properly disposed of.

**Rechargeable Battery Takeback and Recycling:** Assembly Bill - AB 1125 requires all retailers that sell rechargeable batteries to accept them back at no cost to the consumer. This makes it easy for consumers to drop off end-of-life batteries for recycling or proper disposal.

State	Summary	Covered Devices	Effective Date
Arkansas	HB 2115 imposes a deadline for the disposal of state computer and e-waste in landfills.	State agency- generated e-waste. Equipment includes computers, computer monitors, TVs, audio and stereo , VCRs, equipment, monitors, printers, computers, keyboards, telephones, and fax machines.	2008
Connecticut	HB7249 establishes a mandatory recycling program for discarded CEDs (Covered Electronic Devices) Cities arrange for the collection and transportation to recyclers, and recyclers bill the manufacturers.	TVs, monitors, personal computers, and laptops.	January 1, 2009
Maine	LD 1892 requires municipalities to send waste computer and television monitors to consolidation centers funded by the manufacturers.	TVs, computer monitors, or anything that has a display greater than 4 inches or contains a circuit board.	January 18, 2006
Maryland	In HB 575, a county-by-county collection system is established. Manufacturers are responsible for funding the program or creating their own plans.	Desktop computers, personal computers, laptops, and TVs.	January 1, 2006. Expires 2010.
Massachusetts	CRTs are prohibited from all solid waste disposal facilities.	Cathode ray tubes.	April 1, 2000

Minnesota	HF 854 requires manufacturers to pay a registration fee for setting up their e-waste recycling program, and they must collect 60 percent of the weight of covered electronic devices sold in the state and 80 percent thereafter.	TVs, computer monitors, Laptops, computers, printers, scanners, and other computer peripherals.	Aug-07
Montana	HB 555 establishes a public education program to provide alternative disposal information for household hazardous waste recycling.	Video, audio, computers, telecommunications equipment, and household appliances.	Apr-07
New Hampshire	HB 1455 prohibits disposing of video display devices in solid waste landfills or incinerators.	CRTs.	July 1, 2007
North Carolina	S 1492 requires manufacturers to pay for the transportation and recycling costs for covered devices from collection sites.	Desktops, laptops, monitors, keyboards, and mice.	January 1, 2009
Oregon	HB 2626 requires manufacturers of CEDs to participate in recycling programs and provide collection sites for e-waste. Manufacturers pay for the program, based on how much they sell in Oregon.	TVs, monitors, personal computers, and laptops.	January 1, 2009
Rhode Island	S 2509 bans electronics from landfills. The law will require the Department of Environmental Management and stakeholders to develop the plan for collecting, recycling, or reusing covered products.	Desktops, laptops, monitors (both CRT and flat screen), plasma televisions, and "any similar video display device with a screen greater than four inches diagonally and that contains a circuit board."	July 1, 2008
Texas	HB 2714 requires manufacturers of electronic devices to pay for the collection, transportation, and recycling of covered devices.	Desktops, laptops, and monitors.	September 1, 2008

2. Attempt any three of the following:
- a. Write a note on Data De-Duplication and Virtualization.

### Data De-Duplication

In computer industry there is a good practice of keeping backup of the data to tackle uncertain risk of data loss. But sometimes we take backup repeatedly and unnecessarily, which in turns result in wasteful duplication and also it is costly in terms of load on machine.

The “data de-duplication” tool is used to minimize the storage and bandwidth consumed from disk-based backup. This eliminates need to take constant back up the same file over and over again, backup storage consumption is reduced 10 to 50 times. Because less data is sent across your network, overall bandwidth consumption is reduced by almost 500 times.

Here we gain multiple benefits as freeing up storage space as well as reducing the storage power consumption. Once data storage has been reduced, snapshots and other copies from high performance disks can be shifted to lower-performance, energy-efficient disks. Because less data is being replicated, money is saved because network traffic and storage capacity are not being overused.

### Virtualization

In any computer organization, maximum power is consumed by the servers as they are using power for running as well as for cooling purpose. One way to reduce this power uses is decreasing the number of servers used.

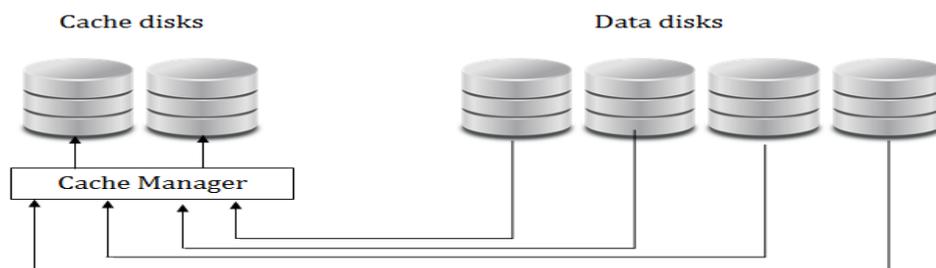
In older times we required many servers to fulfill the tasks of an organizations but now virtualization is available to do the same thing more effectively. In virtualization we can deploy the tasks of many servers on single server in effective and energy efficient manner. Storage of data is also a factor in power consumption. Direct attached storage device can consume 27 percent of electricity bill. The direct attached storage units fragment where data is stored in the organization. Clustering is also used for in computers which also add consumption of power.

In virtualization advanced clustering technologies are used for controlling the traffic for moving applications between servers and storage devices with precision. Use of this result in reduction for hardware, space, and energy usage.

- b. Explain MAID and RAID.

### MAID:

A massive array of idle disks (MAID) is a system that uses hundreds or thousands of hard drives for near line data storage.



MAID system structure

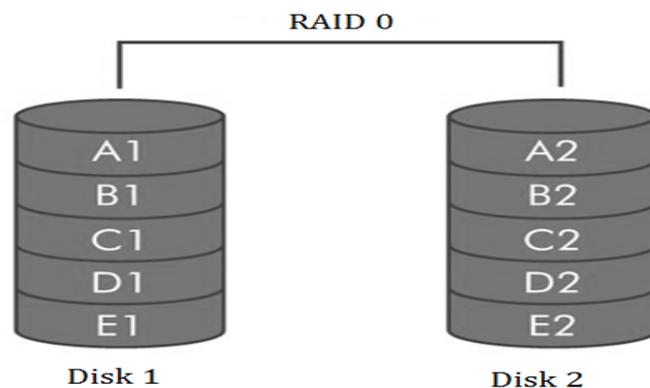
MAID is designed for write once, read occasionally (WORO) applications. The drives in this disk only spin whenever accessed. As small amount of the data is being accessed, these disks can be powered as needed, thus reducing the power used to run them as well as reducing the generation of heat, which in turn reduces cooling costs. MAID has increased storage density and is much less expensive, thus saving power and the need for cooling.

MAID solution are somewhat slow, its data access can take a few milliseconds up to 10 seconds. This system allows a dense packaging of drives, and typically only 25 percent of the disks are spinning at any given time. Use of SATA drives made architecture of MAID more popular because SATA disk are made to be spin as per need. So it is always a good solution to use MAID architecture for storage for achieving energy efficiency.

### **RAID:**

The RAID (redundant array of inexpensive disks) is majorly known for its security features. A typical RAID consumes more power. To deal with this issue, a new form of RAID has been introduced.

A Power-managed RAID provides parity protection, but with only some of the RAID disks actually turned on. When data is written, only the parity and associated data drives are powered up. When data is read, only the disk being read needs to be powered up.



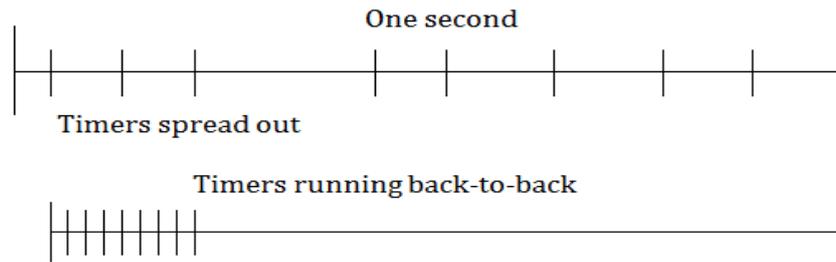
Here Non-disruptive and sequential read/writes are accomplished by staging the data to an always-spinning drive, while the next drive is being powered up. The result is that your organization can have hundreds of terabytes in storage in a single footprint which in turns results in power saving.

### c. **What is polling? Give example.**

#### **Polling:**

It is the process of automatically checking of, if a given action has been taken draws power from idling computers, because it automatically wakes the computer up to check for a given event. Every time an application polls for something, the CPU wakes from an idle state and consumes power. For example 10 polling actions that occur within 1 second. Schedule them so that they run immediately after another, rather than at various times during that period. By grouping them together, the computer only has to come out of an idle state once, rather than multiple times.

**Turn off Unused Devices:** It very simple but very important approach towards saving power. If a system is not being used it must be turned off immediately. By not doing this we are wasting unnecessarily measurable amount of energy.



Group your timers together so that they reduce the amount of time the computer has to be polled

**Use Large Buffers:** The organization where media is played from a CD, DVD, or hard drive, has to set applications' buffers, large enough to store as much of the media in memory as possible. Doing this reduces the hard drive, DVD, or CD drive from spinning as much and thus saves power.

d. **List and explain the issues regarding power consumption and cooling costs.**

By the studies it is proven that in majority of cases cooling consumes more power than for use in processing in IT industries (Almost 63 percent more). So it should not be overlooked. Event it necessary, we must figure out how much exactly we need to spend on cooling.

**Power Cost**

We need to know how the cost of power is computed. Electricity is paid for per kilowatt-hour (kWh) uses. This is a measure of the hourly consumption of electrical power.

**Causes of Cost**

Cooling is a major component of power consumption as well as of IT budget. There are many issues regarding power consumption and cooling costs as follows.

- As more servers and storage is used, it increases power consumption.
- As computing is done on large scale, larger amount of heat is produced in the server racks.
- There is irregularity of heat load in the datacenter causes by poor planning for heat management.
- Increasing power costs.
- A tendency to cooling datacentres than needed.

**Calculating Cooling Needs**

Almost every device in server room generates heat including lighting. Also the number of persons working in server room may turn to increase the heat in room. These sources of heat contribute to the heat load of the server room.

**Room Size**

The complete room requires cooling. To calculate the cooling needs of the room, use this formula:

$$\text{Room Area BTU} = \text{Length (meters(m))} \times \text{Width (m)} \times 337$$

## Windows

Generally, server rooms don't have any windows. If we don't have windows then following formula is not used. But in case of having windows following formula can be used to determine which is most applicable to your datacentre:

$$\text{South Window BTU} = \text{South Facing Window Length (m)} \times \text{Width (m)} \times 870$$

$$\text{North Window BTU} = \text{North Facing Window Length (m)} \times \text{Width (m)} \times 165$$

If there are no blinds on the windows, multiply the results by 1.5.

## People in the Room

If you have permanent staff working in server room, the heat load goes up about 400 BTU per person. Here's the formula:

$$\text{Total Occupant BTU} = \text{Number of occupants} \times 400$$

## Equipment

Maximum heat in server room is generated by equipment's used. The equipment's power consumption details are always mentioned in its documentation or on the vendor websites. Here one thing is important to remember that we have to include all the equipment's available in server room such as CPU, light bulbs, photocopier or other additional equipment. Here's the formula:

$$\text{Equipment BTU} = \text{Total wattage for all equipment} \times 3.5$$

## Lighting

Multiply the total wattage for lighting by 4.25, as shown in the following formula:

$$\text{Lighting BTU} = \text{Total wattage for all lighting} \times 4.25$$

## Total Cooling Requirement

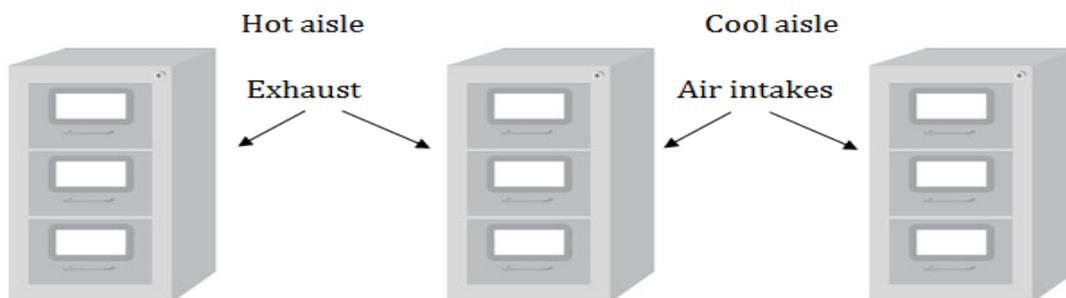
Finally by adding all above results we can get the total amount of cooling needed for our datacenter, as follows:

$$\text{Total Heat Load} = \text{Room Area BTU} + \text{Windows BTU} + \text{Total Occupant BTU} + \text{Equipment BTU} + \text{Lighting BTU}$$

- e. **Explain Hot Aisle (path)/Cold Aisle and Raised Floors.**

## Hot Aisle (path)/Cold Aisle

Generally equipment design to fetch the air from the front side and then blow the exhaust out from the back side. Following figure shows the equipment arrangement for hot air path and cool air path.



Normally the cool sides of equipment are arranged together, whereas the hot sides of equipment face each other. This allows the equipment to fetch in cool air, rather than air that has already been preheated by the rack of equipment in front of it.

The cold air path have penetrate the floor tiles to fetch cooler air from the raised floor. The floor mounted cooling is placed at the end of hot air side, but not parallel to the row of racks. This is because parallel placement can cause the hot exhaust to be fetch across the top of the racks and mixed with the cool air. It also decreases overall energy efficiency.

### **Raised Floors**

Generally the Datacentres are built on a floor that is raised 18 to 36 inches. The higher the floor level, the more air that can be distributed under the floor and the more air that can be used by the cooling system.

But sometimes height can create a problem in daily operations. Also if height of racks is reaching near to ceiling hot air will not exhaust properly from upper side. It is can become barrier in case of rack sizes, but also for the flow of air over the top of equipment.

- f. List and explain datacentres design and decision making issues.

### **Datacentre Design**

The cooling solutions for the datacentres can be optimized as per the design of the datacentre. We can reduce the amount of cooling needed just by selecting proper designing of our datacentre and deploying cooling solutions using proper ways.

### **Centralized Control**

The custom centralized air-handling system is the best solution for cooling. This system has several advantages over the multiple distributed unit system, as listed below.

- Better efficiency.
- Can use surplus and redundant capacity.
- Unit's works in combination with each other, instead fighting against each other.
- Uses fluid-cooled chiller plants, which are much more efficient than water- and air cooled datacentres.
- Less maintenance is required.

### **Design for Your Need**

It is always better to have a system as per our need and solutions best fit for it. Unfortunately, our datacentres' power needs rarely get the exact fit they need. They are usually loaded too light.

There are ways to correct size, it is important to get as close as we can with electrical and mechanical systems so that they still operate properly when under loaded, but are still scalable for larger loads. We can achieve this by considering following few issues:

- Increase the duct, plenum, and piping infrastructure. This reduces operating costs and allows a measure of future proofing.
- Use variable speed motor drives on chillers, chilled and condenser water pumps. Also, use cooling tower fans to help with part load performance. This can be especially helpful when controlled as part of a coordinated cooling system.
- Examine efficient design techniques, such as medium temperature cooling loops and fluid-side economizers.
- Cooling-tower energy use is typically a small portion of energy consumption. If we increase cooling towers, we can improve chiller performance and fluid-side

economizers. Although this involves a larger cost up front and a larger physical footprint, but will gain savings in operational costs.

### **Put Everything Together**

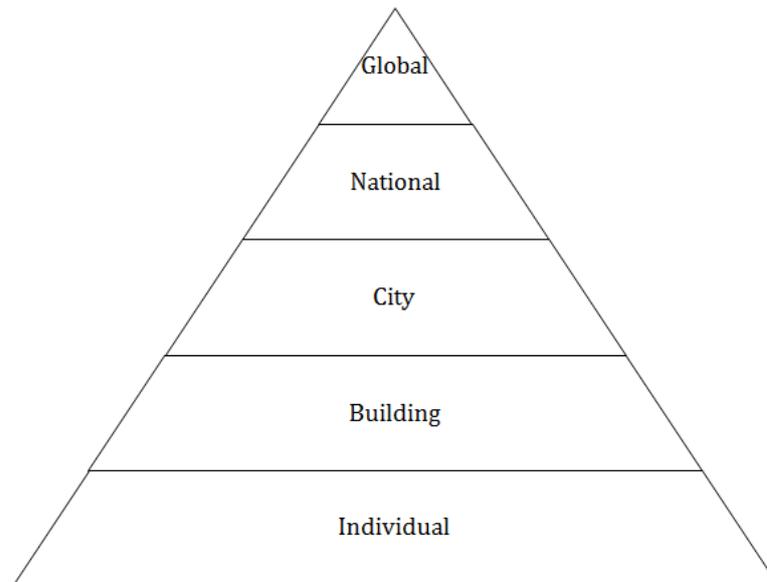
Only getting the cooling device is not called as efficient cooling. We have to think on larger scale for whole organization. Organization wide considerations must be implemented, including design and decision making issues. Such issues include:

- Use life cycle cost analysis as part of decision-making process.
- Involve all stakeholders to keep the team together on the project.
- Document and clarify the reasons for key design decisions.
- Set computable goals based on best practices.
- Introduce energy optimization as early as possible in the design phase to keep the project focused and to keep costs minimized.
- Include integrated monitoring, measuring, and controls in facility design.
- Examine and benchmark existing facilities and then track performance.
- Look back over the data and look for any opportunities to improve performance.
- Evaluate the potential for onsite power generation.
- Make sure all members of the facility operations staff get site specific training, including the identification and proper operation of energy-efficiency features.

### **3. Attempt any three of the following:**

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#### **a. List and explain decision making pyramid with its levels.**



At the bottom of the pyramid is the individual; the top represents the global community. Also, the following trends become possible:

- Individual decisions are replaced by group decisions.
- Decisions become more complex and they encompass a broader range of issues.
- The amount and quality of information needed for decision making increases.
- Short term decisions evolve into long term decisions.

#### **1. Global**

##### **Actions:**

- International attention is paid to trends in CO2 concentrations and how international trade is increasing CO2 concentration.
- Scenarios are generated to understand the long-term impact of CO2 concentration. Plans are generated for individual nations to help arrest CO2 concentration levels.

**Stakeholders:**

- UN and international organizations, universities, research institutions, and international NGOs.

**2. National**

**Actions:**

- National policies and programs to reduce CO2 levels are developed. This is manifested in the form of rules, regulations, research and development, and financial support.

**Stakeholders:**

- National governmental departments and ministries, universities, research institutions, business and industry associations, and chambers of commerce.

**3. City**

**Actions:**

- Cities and local governments apply programs developed at the national level to local issues.
- Goals and objectives are reflected in local ordinances, regulations, and so forth. At the city level, those ordinances are combined with informational campaigns to inform members of the community.

**Stakeholders:**

- Local governmental agencies, business and industry organizations, local chambers of commerce, financial institutions, NGOs, community groups, and local universities.

**4. Building**

**Actions:**

- At this level, “real” action takes place. This is where action is taken on programs and ordinances from higher levels.
- At this level, chosen materials, designs, technology choices, and building usage all play a part in reducing CO2 levels.

**Stakeholders:**

- Individuals, clubs, NGOs, and management teams.

**5. Individual**

**Actions:**

- This level represents the day-to-day use of a building. Individual choices at this level add up to have an impact, for instance, reducing the amount of electricity used, minimizing water usage, recycling waste products, and so forth.
- These actions can be taken based on regulation by the organization like “Don’t throw your cans in the trash, recycle them” or by an individual’s own volition as “I know I should recycle this pop can.”

**Stakeholders:**

- Individuals, clubs, NGOs, and management teams.

b. **Which things are necessary to environmentally preferable purchasing plan?**

**Environmentally Preferable Purchasing Plan**

Every organization must adopt an environmentally preferable purchasing plan. This establishes environmentally conscious policies for the sorts of materials we purchase. Some considerations include the following:

- **Paper:** We can purchase 35 percent to 100 percent post-consumer recycled paper. It used to be a special item that only few suppliers have, but now bigger brand name retailers such as Staples also offer paper with up to 100 percent recycled content.
- **Supplies:** Many business supplies, such as clipboards, binders, post-its, folders, envelopes, notepads, notebooks, and calendars, can be purchased with different percentages of recycled content. Many small and online retailers offer a great variety of products. Again, these items can be found at Office Depot and Staples.
- **Paperless:** Make our work paperless maximum wherever possible, example send messages electronically, instead of using papers. We scan the scan documents and send it electronically by using email attachments.
- **Janitorial (cleaner):** Organization must look for chlorine free products that have more than 35 percent post-consumer recycled content for cleaning purpose.
- **Business cards:** Business cards also can be printed on recycled paper.
- **Food products:** Instead of Styrofoam cups, plastic silverware switch over to buy biodegradable/compostable food service ware.
- **Bags:** Make use of paper bags only. Plastic bags are made of petroleum products and do not biodegrade and cannot be recycled.

c. **How to find out which products have low levels of toxins?**

Generally the janitorial cleaning products have some harmful ingredients that may cause harm to human health, indoor air quality, and the environment. Some ingredients in janitorial cleaning products can instantly burn the eyes, skin, and lungs. By choosing the least toxic cleaning products for our organization, we can minimize the impact on environment with also caring of our employees. We find out which products have low levels of toxins by observing the following things:

- Reading the product label and Material Safety Data Sheet (MSDS) can help us make this determination.
- Examine the list of institutional cleaning products that have been certified by Green Seal as meeting its Standard GS-37 for general cleaners and GS-40 for floor-care products.
- Refer the Janitorial Pollution Prevention website. This public service website has fact sheets on safe and effective cleaning techniques for windows, carpets, restrooms, and other cleaning job.

Call the manufacturers to ask about any less-toxic alternatives they offer. Many vendors have several product lines, one of which may contain less-harmful ingredients than the others.

d. **Which things are needed to go paperless in organization?**

### **Going Paperless**

With a proper plan we can be a paperless or at least able to reduce the paper use easily. With an organization we need to take a specific approach for going paperless.

### **Organizational Realities**

There are many ways we can adopt in organization for going paperless, it is not just the scanners that will do the work. Every stakeholder of an organization must be agree to adopt the approach. Once we decided to go for paperless, we need to take care of following things:

- **It won't happen overnight:** The execution of going paperless cannot be implemented at one go in organization. We need to start gradually by scanning old papers. Then we can go for incoming paperwork as paperless.
- **"Paperless" isn't an absolute:** Sometimes we may require a hard print of paper. Some of our clients or business partners will still want their interactions done via paper. Also, there will likely be some tax documentation that needs to be maintained as hard copies.
- **You have to sell it:** The idea of going paperless might not be easily accepted by all. We need to convince our people by explaining them effectively about benefits of the new system. For an employees it might be hard to change. The best thing we can do is educate them about the benefits of being paperless, and understand that it will take some time for everyone to come around. Give it time.

Going paperless will save money in in the cost of printing, mailing, shipping, and storage. But as we proceed with the system, there are other advantages also:

- It takes less time for finding lost paperwork.
- It gives ability to access most documents in seconds.
- It gives ability to access all our documents from home or satellite offices.
- It saves the space in our office as filing cabinets are moved out.

### **Work Smart**

Some recommended practices can be used by everyone in an organization:

- **Be realistic:** Keep only the important and required documents. We must recycle what we don't need.
- **Naming:** After scanning, every document should be labeled as descriptively as possible so that it can be searched easily by name only.
- **Set up a filing system:** Use proper folders to store the information i categorized manner and also try to keep it in hierarchical manner on the computes.
- **Shredding and recycling:** After finishing the scanning of all the documents, only keep few really important documents and shred rest of the documents as it may contain sensitive information.
- **Know your limits:** Going paperless is not one night work. If we have to scan thousands of paper, it is not possible in one sitting. So set smaller goals to achieve it.

- e. **What is the use of Microsoft Office SharePoint Server 2007? List its features.**

### **Microsoft Office SharePoint Server 2007**

A Microsoft Office SharePoint Server (MOSS) is a robust solution as a CMS. Using it we can centrally manage our organization's information and maintain it. It is accessible through web browser for our employees. It supports all intranet, extranet, and web applications in one platform, thus eliminates need of multiple small systems. It also improves overall productivity by simplifying everyday tasks.

### **Features**

The MOSS is used to work with Microsoft Office applications, e-mail, or web browsers in organization. Some of the functionality of MOSS includes:

- **The ability to control access:** It allows us to establish customized document management policies to control access rights. Access can be managed at a per item basis; we can also manage the retention period and expiration actions.
- **Central management:** It helps to store and manage all our documents and content in one central location. This helps with locating documents.
- **Content management:** It includes Master Pages and Page Layouts, which include templates allowing us to give our content a consistent look. We can also publish content from one area to another.
- **Work across the organization:** The content created in one part of the organization can be easily integrated into the system and stored in document libraries or web services. By doing this we avoid duplicating effort and making errors from having to manually re-enter that data.

- f. **What is Value Added Network? Give its benefits.**

### **Value Added Networks**

A VAN is a private network provider hired by a company to facilitate electronic data interchange (EDI) and/or provide other network services such as message encryption, secure email and management reporting. A Value-Added Network (VAN) simplifies the communications process by reducing the number of parties with which a company needs to communicate. The VAN accomplishes this by acting as an intermediary between business partners that share standards based or proprietary data. VANs may be operated by large companies for efficient supply chain management with their suppliers, or by industry consortiums or telecoms.

### **Benefits to using a VAN include:**

- The alert system VANs can alerts organizations to transmission issues or delivery receipts.
- The archival storage VANs can store critical business data for extended periods of time.
- Audit trails Information including setup, configuration, and document transmission events can be audited.
- Real-time data delivery Data can be delivered in real time, rather than in batches, thus allowing speedier response to transmissions.
- Reliable and secure transmission VANs ensure that a company's data is securely transmitted and is received by the recipient.

**4. Attempt any three of the following:**

**a. Explain the recycling problems in China and Africa.**

The global dumping ground for e-waste is China and Africa. Here we will discuss about e-waste has become a big problem for China and Africa and about the toxins that are in computers that make responsible recycling so important.

**China**

The E-waste problem in China was the issue of news headlines in recent years. Normally 80 percent of e-waste of America is shipped to china every year. Along with them Canada, Japan, and South Korea also send their e-waste to China. The size of e-waste exported every year by US to china is bigger than to consume a football ground area. It is exported to Guiyu, China.

The E-waste recycling is big business in Guiyu and it gives approximately 80 percent employment to the peoples. Here separation of copper, gold, and other materials from the e-waste is done by dropping motherboards into acid baths, grind plastic casings from monitors, and grill components over open coal fires. That's why the town has largest dioxin levels on the planet. After disassembly, one ton of computer scrap yields more gold than 17 tons of gold. Circuit boards can be 40 times richer in copper than copper.

**Africa**

Africa is also facing the same problem of consuming e-waste. In the Ikeja Computer Village, near Lagos, Nigeria, many vendors are selling the repaired products from the e-waste like computers, fax machines, cellular telephones, and other devices.

It sounds like e-waste is reused here in a positive manner, but actually 75 percent of the electronics shipped to the Computer Village are irreparable.

Nigeria has a good repair market, but it lacks a system to safely deal with e-waste. Most of the e-waste is winds up in landfills and unofficial dumps. As such, toxins seep into the earth.

And when plastic cases are burned, they mix carcinogenic dioxins and polyaromatic hydrocarbons (PAHs) into the air, which is very dangerous for health.

Every month approximately 500 shipping containers filled with used electronic equipment pass through Lagos. Each container can be packed with a load equal to:

- 800 computer monitors
- 800 CPUs
- 350 large television sets

Out of the material almost 75 percent of this material is not repairable. Currently African importers are happy with making small profit don't mind with the few items they can remanufacture and sell without caring of dumping useless materials into landfills.

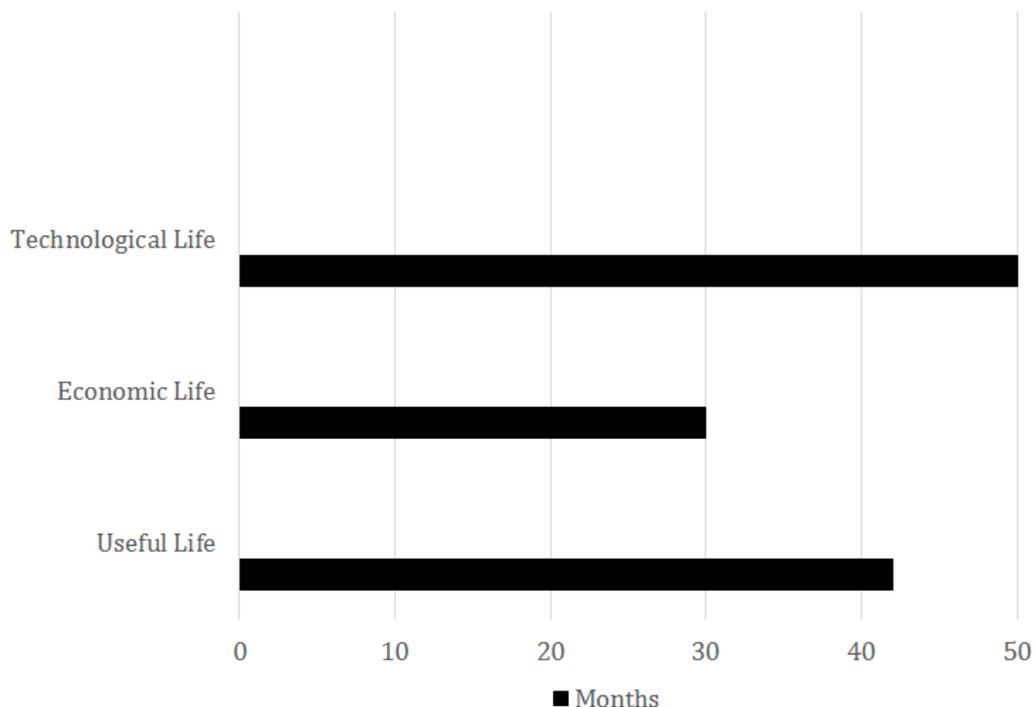
**b. How to determine the system's long life?**

The life of system is an unclear thing. The systems we can keep the system for several year as it is purchased for higher price, but fact is that electronic components effectiveness will

come at some point. A system's life is based on three factors, which determines, how long the system's life actually is?

- **Useful life:** This expresses the equipment's lifetime, in which eventually the equipment wears out (loss effectiveness) and it is not feasible to repair it anymore.
- **Technological life:** The maintenance become difficult even after repairing. For example, it might not be possible to find the right type of memory chips for the system because they are no longer made. This results in elimination of product only.
- **Economic life:** Sometimes a system might is functional, but it costs too much to use with repairing. It might also be that newer systems can be purchased that have lower operating costs so that the payback period of making that purchase is short.

A system's life is based on economic and technological factors.



It very difficult to exactly predict the lifetime of a system, but approximation can be done using above factors.

c. **Which are benefits to leasing the equipment?**

There are a number of benefits to leasing the equipment as follows:

- **Keeping equipment up to date:** Because computers become obsolete quickly, we pass the financial burden of their removal on to the leasing company. For example in 3-year lease on our sales department's computers. Once that lease expires, the computers go away and we can find a new deal.
- **Predictable monthly expenses:** We are able to figure out exact expenses, because we have a deal and we know what we are paying.
- **Low (or no) upfront costs:** Many leases don't require an upfront payment. So if our organization has trouble with cash flow, likely we will be able to avoid a down payment.

- **Staying competitive:** Leasing allows us an option to get the latest and greatest equipment with regular rollover to be competent with other organizations.
- But leasing isn't all perfect. Let's talk about the downsides of leasing. Cons include:
- **Paying more, overall:** Leasing is more expensive than purchase. Also when the lease is over, we give the computer back. If we had bought it, we would still own it.
- **A deal is a deal:** With a lease, we still have to pay for the equipment even if we don't use it anymore. If our business changes or leased equipment is no longer needed, we are still obligated to make the monthly payments.

d. **Write short note on EPEAT Certification.**

### **EPEAT**

The Electronic Product Environmental Assessment Tool (EPEAT) is one the certification that we already studied in earlier in Chapter 2. The US government made it mandatory to purchase the equipment's with EPEAT certification, as government is biggest buyer of these devices.

The EPEAT evaluates electronic products according to three tiers of environmental performance: bronze, silver, and gold. The complete set of performance criteria includes 23 required criteria and 28 optional criteria in eight categories. To be registered as EPEAT certified, products must meet all the required criteria. Products may then achieve a higher-level EPEAT rating by meeting additional, optional criteria.

#### Certification Level and Requirements

- **Bronze:** Product meets all required criteria.
- **Silver** : Product meets all required criteria plus at least 50 percent of the optional criteria that apply to the product type being registered.
- **Gold** : Product meets all required criteria plus at least 75 percent of the optional criteria that apply to the product type being registered.

The three levels of EPEAT certification establish how well a given device meets the EPEAT requirements. The EPEAT maintains a listing of certified devices on its website.

You can find out which devices are currently EPEAT certified by visiting the EPEAT website as given in following screenshot for products in India as well as for other countries at [www.epeat.net](http://www.epeat.net).

e. **What is Blade server? Give its benefits.**

### **8.3.1 Blade Servers**

The blade servers are used to increase our organization's datacenter capabilities, without adding to its size.

#### **Benefits**

- **Less space needed:** Blades take up 35 to 45 percent less space than tower or rack-mounted servers.
- **Reduced power consumption:** By merging power supplies into the blade chassis, we reduce the power supplies needed and we benefit from an overall reduction of power use.

- **Lower management cost:** After merging our servers, deployment, management, and administration are simplified and improved. It results in cost savings and less headache for the IT staff.
- **Simplified cabling:** Blade servers reduce cabling requirements by 70 percent. Fewer cables enables better airflow, which means lower cooling costs.

### Features

The specific use of a blade server must be clear to us before selection of model. For example, if we are going to be performing complex calculations with a lot of data, we will in need of powerful server.

Sometimes companies buy bigger servers than they need, so they're spending money on processing power they're not using. The benefit of a blade system is that we can easily update the system if we discover we need more power. It's better to plan for future growth than to pay up front for power we don't need.

Following table lists some types of servers, what they do, and some sample uses. Features, expansion, build quality, and processing density are all factors to consider when choosing a blade server.

Server	Type	Functionality Usage
Single-function blade server	Bare-bones CPUs, sometimes with onboard storage or porting, and they run single applications.	Ideal for academic or office environments where blades can be assigned individual tasks, including web hosting, e-mail, and scheduling software.
Blade PCs	The central core of a thin-client setup. This server provides the processing and storage capacity for clients, which is then accessed by thin clients.	General office applications.
Enterprise-level blade server	Maximum power set in a small space. These systems generally use multiple racks and require compatibility with legacy systems, networks, and software.	These are most often used by digital production studios, high-level Stock brokers, and financial corporations.

#### f. What is the use of Remote Desktop? Explain its components.

### Remote Desktop

We can also work for an organization from home or a remote site. People can access their office computers, if they're using Windows, via Remote Desktop. A normal employee of an organization can also get the advantage of using Remote Desktop. It can be used for the following purposes:

- **To power thin clients:** If we are using thin clients, Remote Desktop can be used to connect our thin clients to the server.
- **To extend the life of existing machines:** Instead of throwing old machines, we can turn them into thin clients and run applications from the server.

The Remote Desktop was introduced in Windows XP. It allows the user to access their computer remotely. In case if user of organization want to access their computer from home or from another computer on the company network; Remote Desktop allows the user to access everything on the remote computer, including files, applications, and network connections. It also shows the desktop exactly as it does on the remote machine.

There are two components to a Remote Desktop connection:

- **Server:** It is the remote computer to which we want to connect.
- **Client:** It is the computer we will use form our connection with the server.

### 1. Remote Desktop Server

We have to specify number of users allowed for a Remote Desktop server at the time of configuration, so that authorization can be achieved. These user accounts must have passwords. If the password is not in place then we have to create it.

When we configure our server for Remote Desktop, we need to enter the user account name when Windows asks for the object name in the Select Users dialog box.

### 2. Remote Desktop Client

You can use a Microsoft Remote Desktop client to connect to a remote PC and your work resources from almost anywhere using just about any device. You can connect to your work PC and have access to all of your apps, files, and network resources as if you were sitting at your desk. You can leave apps open at work and then see those same apps at home - all by using the RD client.

## 5. Attempt *any three* of the following:

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### a. How CRM segregate the people of organization in group?

For customer you just an organization with some name, without having knowledge of our operation carried out in our company. The customers very well knows that that if they purchase something, someone has to process the payment, package the product for shipping and perform the actual shipping.

The Customer Relationship Management (CRM) is a philosophy of coordinating among all the stakeholders in an organization so that the customer is served well and has the best experience possible being our customer.

CRM segregate the people of our organization in the following groups:

- **Customer Facing Operations:** These are the people and technologies a customer experiences when he or she interacts with the company. This can include face-to-face interactions, telephone calls, instant messaging, web chats, e-mail, and so forth. This can also include kiosks and web self-service.
- **Internal Collaborative Functional Operations:** These are the people and technologies that support the company policies and back office operations that have a direct impact on the activities of the Customer Facing Operations group. This includes IT, billing, maintenance, planning, marketing, finance, and manufacturing.
- **External Collaboration Functions:** These people and technologies support the organization in its developing of relationships with outside groups. These groups include suppliers, vendors, distributors, lobbying groups, and trade associations.
- **Customer Advocates and Experience Designers:** These are the people and technologies that help deliver value to the customer and profit to the organization.
- **Performance Managers and Marketing Analysts:** These are the people and technologies that design key performance indicators and collect metrics and data that help keep CRM on track. This is the group that establishes milestones and data to determine if the CRM process is being effective.

- **Customer and Employee Surveyors and Analysts:** These are the people and technologies that determine whether customer and employee relationships are getting better or getting worse.

b. **What are the steps involved for good green procurement program?**

While purchasing new products, we can ensure we are doing so ecologically by engaging in *green procurement*. This requires an organization to perform an assessment of the environmental consequences of a product at the various stages of its life cycle. This means considering how the product was made, how it will be transported and used, and how it will be ultimately discarded.

A good green procurement program will include these steps:

- **Get organizational support:** The organizational policies and procedures need to be changed to accommodate such a change. Those responsible for making purchasing decisions must be involved in the implementation process, because their suggestions and support are important.
- **Conduct a self-evaluation:** We need to evaluate our current purchasing practices. This will help us to achieve starting benchmark and also clarify what we purchase, how much we purchase, where it comes from, and how much it costs. This will help us to measure the success of our green procurement efforts.
- **Set goals:** We have to set big goals that have specific measurements.
- **Develop a strategy:** We need to make a plan for achieving our goals. We need to identify how we will implement changes necessary to reach those goals. You need have to short and long term solutions for it.
- **Run a pilot project:** We should start from a small project, rather than directly implementing all at once. If it succeed then we can go for all.
- **Implement the plan:** After purchasing is complete, we will have to assign accountability and develop a communications plan that addresses employees, customers, suppliers, partners, and the public.
- **Review the program:** We need to evaluate our green procurement program on regular basis. Consistently check whether the plan is meeting its stated goals and objectives.

c. **Explain characteristics of Software as a Service.**

Few applications don't even need a software installed on our servers. This is another way that equipment can be eliminated from our company. It is referred as SaaS.

**Characteristics**

The SaaS is a model where a software vendor offers its software for use over the Internet. So we don't need any equipment to run it, we can access all the services of that software over internet. For software also we don't need to pay for, but for use we have to pay. Benefit of SaaS is that we don't have to worry about buying upgrades to the application, performing upgrades, and troubleshooting any problems. Any upgrades are performed by the SaaS provider.

The SaaS software includes the following characteristics:

- Network-based access to, and management of, commercially available software.

- Activities that are managed from central locations rather than at each customer's site, enabling customers to access applications remotely via the Web.
- Application delivery that typically is closer to a one-to-many model, including architecture, pricing, partnering, and management characteristics.
- Centralized feature updating, which obviates the need for downloadable patches and upgrades.

The SaaS applications are priced on a per-user basis. Additional fees can be added for extra bandwidth and storage.

d. **Explain transitioning four-step process.**

Companies are going towards green is sometimes because realization about importance of environment or sometime only because strict law enforcement by the government. Some companies are simply trying to achieve a certain level of environmental responsibility because of compliance issues.

But a good thing has happened. Initially by enforcement, later turning into started going beyond what was required. This type of cases go through four-step process:

- **Compliance:** These are put simply, in order to obey the law, organizations started taking steps to meet the minimum requirements. Compliance costs money, and businesses do not like to cut into their bottom lines, but the end result is that they got the ball rolling.
- **Personal commitment:** A company can only be as dedicated to environmental friendliness as its leaders are. Although being green can be important to the CEO, if that CEO leaves, there's potential for green initiatives to go out the window. It's important for the entire organization to sign on to the notion of being green.
- **Public trust:** The public can be unconvinced of our claimed greening. Although the public wants us to be responsible, it's easy enough for a company to tell everyone that it is being responsible, but still consuming way more power than it needs, throwing computers in dumpsters, and using tons of paper every year. Although advertising your green efforts is good for our company, we have to actually back it up with action.
- **Sustainable growth:** Once the organization has met its green goals, then it is time to set new goals and look for ways to develop greener products, increase energy efficiency, and reduce waste further.

It is really easy to simply meet compliance goals and then stop forward momentum. To help guide our organization to the next steps, we need to ensure that someone is continually driving our green initiatives.

e. **Write a note on SMART goals.**

**10.1.4 SMART Goals**

Most executives have heard about SMART goals. This concept is something that should be applied to our green goals. It is a mechanism that helps us to set and achieve certain goals. SMART is an acronym for **S**pecific **M**asurable **A**ttainable **R**ealistic **T**imely

- **Specific:** A goal should be particular and put in terms people can relate to. Rather than "We're going to reduce our greenhouse gas emissions," a specific goal states the following: "We are going to reduce our greenhouse gas emissions by 30 percent by the end of next year, and this is like taking x number of cars off the road."

- **Measurable:** Develop concrete criteria for measuring progress toward a goal. By measuring progress, we stay on track, achieve milestones, and maintain motivation to keep moving forward.
- **Attainable** When we identify our goals, we think of ways to achieve them. We identify previously overlooked opportunities and identify new ones.
- **Realistic:** Although it's admirable to have a goal such as "We're going to have zero impact on the environment by the end of the quarter," it's just not realistic, and we are setting ourselves up for failure. Set high goals, to be sure, but do a reality check and make sure they're something we can actually achieve.
- **Timely:** We need to have a timeline in mind. There should be a definite date by which we intend to meet our goals. If we leave things open ended, or if the end date is too far out in the future, there's no sense of urgency to meet the goals, so we run the real risk of languishing and not getting anything done.

SMART goal setting is just one way to meet our green goals. We mention it here as a mechanism to help keep us moving forward.

**f. Which steps are involved to conduct energy audit?**

We should also periodically assess and audit the performance of equipment, processes, and systems to help identify opportunities for improvement.

An energy audit must be done by energy professionals. In order to conduct an energy audit, we need to follow these steps:

- **Assemble your team:** We need to bring together a team with experience and knowledge of all energy-using systems, processes, and equipment. We can use our system specialists and facilities engineers, but we may discover that we need to hire an outside expert for objectivity and expertise.
  - **Plan and develop a strategy:** Figure out which systems we are going to evaluate and then assign team members to perform those tasks. Use benchmarking information to identify facilities and systems that aren't performing properly.
  - **Generate a report:** Based on our audit results, write a detailed summary of steps that can be taken to reduce energy use. The report should also recommend actions that should be implemented.
-