UNIT 1

1) What do we mean by Green IT?

Green IT (also referred to as Green ICT or Green computing) has been defined or described by several sources including Murugesan (2008), Lamb (2009), Unhelkar (2010a and 2010c, 2011). Green IT definition appears in Wikipedia, 2010 as well. But it is the definition of Murugesan (2008) that is particularly comprehensive: "the study and practice of designing, manufacturing, using, and disposing of computers, servers, and associated subsystems (such as monitors, printers, storage devices, and networking and communications systems) efficiently and effectively with minimal or no impact on the environment." Ā is definition can be interpreted as serving an organization's attempt to achieve economic viability and improve system performance and use, while abiding the social and ethical responsibilities. Lamb (2009) simplifies this definition: "Green IT is the study and practice of using computing resources efficiently." Ā us, Green IT includes the dimensions of environmental sustainability, the economics of energy efficiency, and the total cost of ownership, which includes the cost of disposal and recycling.*
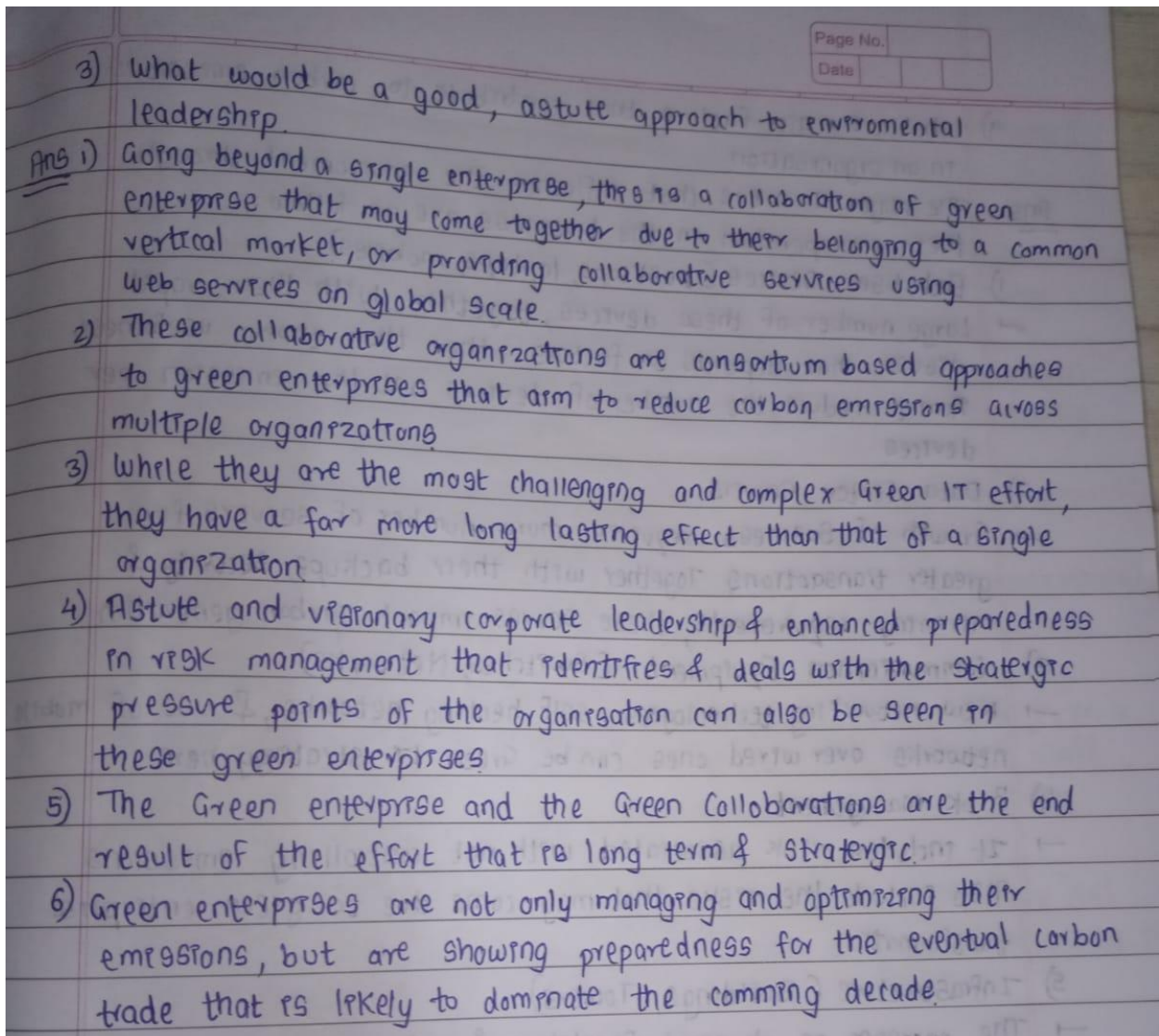
2) How does IT relate to business? What is the impact of this close relationship

between IT and business on the environment?

- IT in business makes use of massive computing and networking technologies that require large and dedicated data centers.

- The location of these data centers and the people who work in them are all socially affected by this use of IT by business.

- Furthermore, as the social fabric gets disturbed, it in turn affects the overall environment in which the society exists.

- Finally, there is also a direct influence of IT on the society and environment—independent of its influence on business.
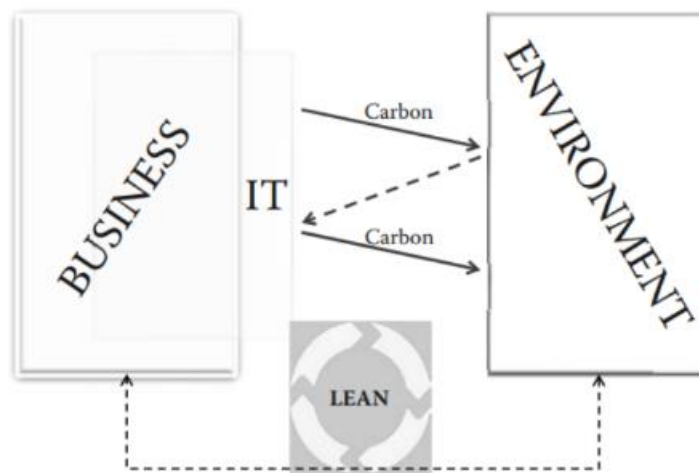
- The carbon impact is shown by an arrow from left to right. This impact of business activities through IT on the environment has to be understood in three ways: from the length of time, the depth of activity, and the width of coverage of the carbon effect.

- The greater the intensity of business activities, the higher is the carbon generation. The awareness of environmental issues, in turn, influence the way in which IT is structured and operated (as is attempted here).

- This effect, in turn, would lead to an improved IT sheath that would b e optimized and efficient.

- The lean approach to business is thus easily applicable to t he Green I T strategies; as a lean business would also have a corresponding lean IT—opening up the idea that lean is green.

3) What would be a good, astute approach to environmental leadership?

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Ans i) Going beyond a single enterprise, this is a collaboration of green enterprise that may come together due to their belonging to a common vertical market, or providing collaborative services using web services on global scale.

2) These collaborative organizations are consortium based approaches to green enterprises that aim to reduce carbon emissions across multiple organizations

3) While they are the most challenging and complex Green IT effort, they have a far more long lasting effect than that of a single organization

4) Astute and visionary corporate leadership & enhanced preparedness in risk management that identifies & deals with the stratergic pressure points of the organisation can also be seen in these green enterprises

5) The Green enterprise and the Green Collobarations are the end result of the effort that is long term & stratergic

6) Green enterprises are not only managing and optimizing their emissions, but are showing preparedness for the eventual carbon trade that is likely to dominate the comming decade.

4) What are Green IT strategies? How would you develop Green IT strategies for

an organization looking 3–5 years ahead in time?

- Green Technology Strategies is the study and practice of using computers and. telecommunications in a way which maximizes positive environmental benefit and minimize the negative impact
- helps to reduce our environmental impact, and reducing the energy consumption and environmental impact of the IT sector as a whole.
- A green it strategy facilitates decision and transformation initiatives that improve the environment.
- Setting a clear vision and strategies ultimately enables people to make better Decision that align with the enterprise priorities to prove goods and services in the global market place.

- A green strategies approach considers both internal and external organizational characteristics.

- It outlines a long term and unifies approach of an organization towards environmental responsibility.

- A unified approach would accumulate these variations and, at the same time , not restrict the organization on the Basis of immediate visibility of its return on **green investment**.

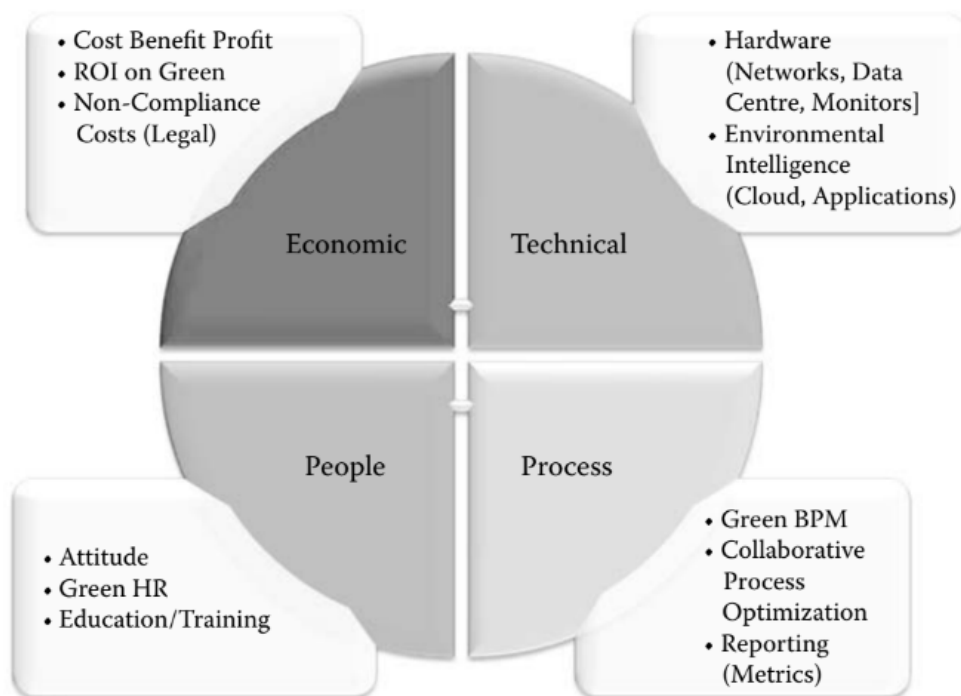6) What are the four dimensions along which an organization can transform to a

green organization?

- Cost Benefit Profit
- ROI on Green
- Non-Compliance Costs (Legal)

- Hardware (Networks, Data Centre, Monitors]
- Environmental Intelligence (Cloud, Applications)

Economic       Technical

People       Process

- Attitude
- Green HR
- Education/Training

- Green BPM
- Collaborative Process Optimization
- Reporting (Metrics)

re 2.10   Economy, people, processes, and technology dimensions in an ERBS.

## DIMENSION : PROCESSES

- "how" things are done within an organization
- Most visible one and used to judge level of ecological responsibility
- Key elements are Green BPM, Collaborative business process optimization and reporting (with metrics)
- Green BPM made up of Process Management and Process Reengineering

- Process reengineering : Fundamental Rethinking and Redesign of processes to achieve improvements
- Studies and optimizes to improve green credentials
- Maintenance process and precautionary action can help in reducing carbon generation

## DIMENSION : PEOPLE

- Depends on individual employee and customer making it more complex of all.
- studied to in great depths, focuses on attitudes of individuals and environment
- Best driven from the top of organization to grass-root level
- Involving Senior management in early stage of green initiative is vital
- Key work is to making stakeholders aware of importance of initiative and promoting it
- major differentiator between two organizations

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7) How does a Lean organization correlate to a Green organization?

**Lean Manufacturing**

The concept of Lean Manufacturing was first seen in Japan particularly in Toyota Production System. Lean manufacturing was originally developed by the Toyota Motor Co. in Japan based on concepts pioneered by Henry Ford. The concepts, tools and techniques had gone through a lot of testing before they were accepted .Lean manufacturing means manufacturing without waste. Waste takes many forms and can be found at any time and in any place. It may be found hidden in policies, procedures, process and product designs, and in operations. Waste consumes resources but does not add any value to the product.

**Green Manufacturing**

Green Manufacturing is a method of manufacturing that minimizes waste and pollution achieved through research and process design. It is also a method that supports and sustains a renewable way of producing products and/or services that do not harm us or the environment. Green Manufacturing goals are also to conserve natural resources for future generations. The benefit of Green Manufacturing is to create a great reputation to the public, saves useless cost, and promotes research and design.

**Conclusion**

Lean and green manufacturing concept is one of the best recent trends in operation management. Operations management has long been focused on waste reduction, so modern management programs like Lean Manufacturing represent today's best practices in operation management. Even without explicitly targeting environmental results, lean efforts can yield sufficient environmental benefits. However, because environmental wastes and pollution are not the main focal points, these achievement may not be maximized in the normal scheme of lean . Thus it is concluded that the two strategies (lean and green) can be integrated and offered simultaneously in the operation management to reduce both waste and pollution.
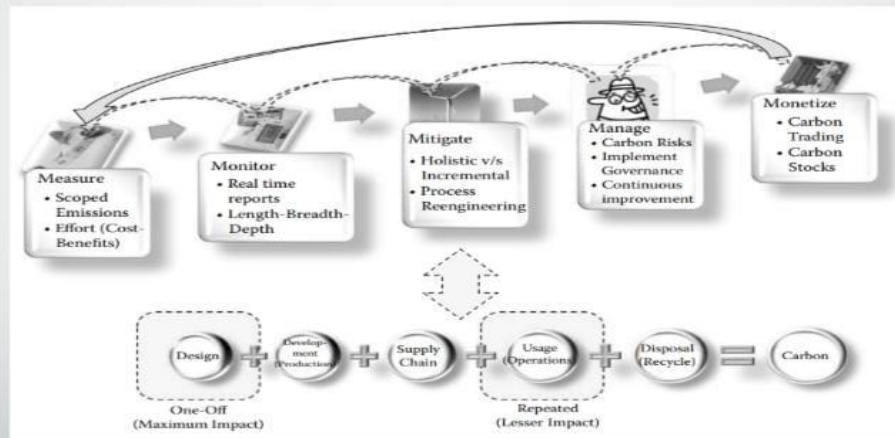
8) Discuss the various renewable sources of energy. How do these different energy sources impact the carbon emission calculations?
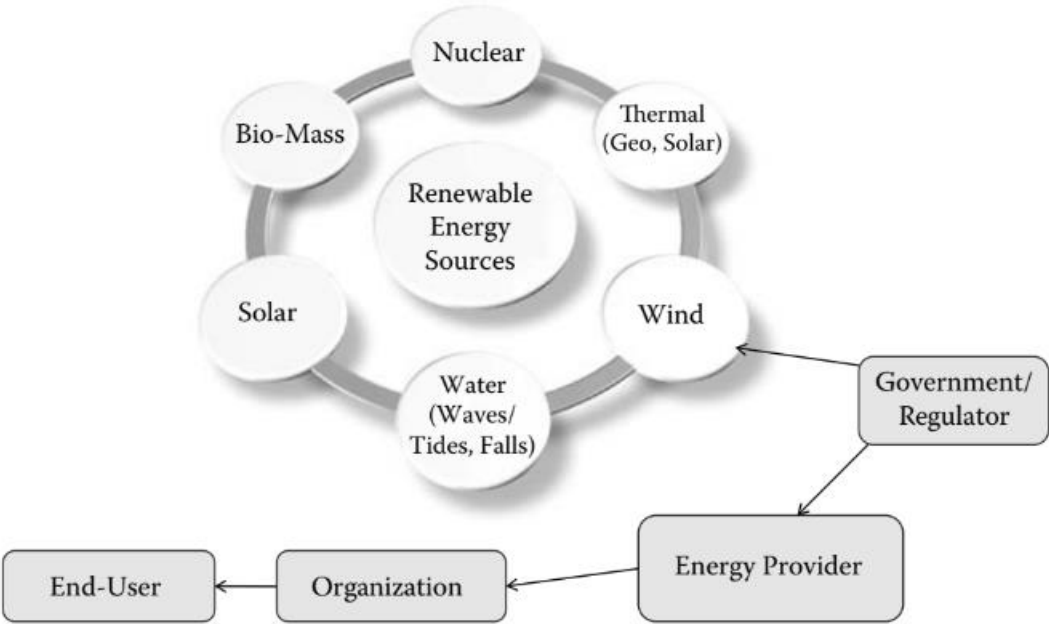
9) What are the five purposes of Green IT metrics?



❖ Carbon Metrics Coverage

☐ Measure
☐ Monitor
☐ Manage
☐ Mitigate
☐ Monetize

Measure
• Scoped Emissions
• Effort (Cost-Benefits)

Monitor
• Real time reports
• Length-Breadth-Depth

Mitigate
• Holistic v/s Incremental
• Process Reengineering

Manage
• Carbon Risks
• Implement Governance
• Continuous improvement

Monetize
• Carbon Trading
• Carbon Stocks

Design + Development/Production + Supply Chain + Usage (Operations) + Disposal (Recycle) = Carbon

One-Off
(Maximum Impact)

Repeated
(Lesser Impact)

10) Explain Green IT drivers in brief.

# . Green IT Drivers

- The drivers that impact the underlying motivations of a business for its environmental responsibility are, Figure 2.5, where six separate yet interrelated areas are seen.

- Figure 2.5 also shows a mapping between the drivers and the corresponding Green IT framework.

- The strategies, policies, design, implementation, and practice of Green IT are primarily driven by one or more combination of these drivers.

- These six groups of business drivers for environmental responsibility, as shown on the left in Figure 2.5 are the costs (including energy costs, operational costs); regulatory and legal; sociocultural and political; new market opportunities; enlightened self-interest; and responsible business ecosystem.

- The recognition of these drivers for Green IT lead to a further investigation by Trivedi and Unhelkar (2010) who reported the results surveys relating to thesedrivers as presented in Figure 2.6.

## Figure1: Drivers for environmental responsibility of business.
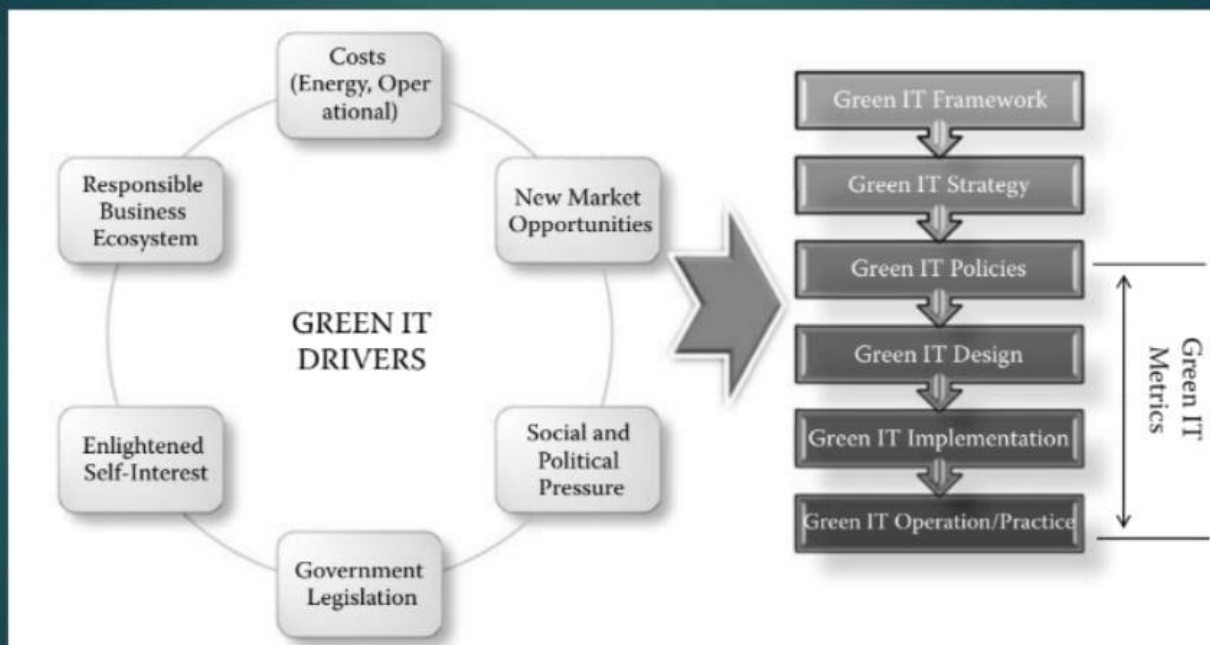
12) Describe how organization's Green IT strategies could be translated into practices in terms.

Green business policies and corresponding practices, also related to a lean business because green policies align themselves with the lean business principles and practices. For example, an organization can change its practices to reduce the slack in its business processes in response to a lean business initiative aimed at reducing waste. Such lean initiative would not only reduce waste due to reengineered activities but also reduce the organization's carbon footprint. Alternatively, an organization might decide to improve its product design in response to the changes in customer preferences in terms of green products and services. Is redesign of product will also help to reduce the emissions as there will be operational efficiency embedded in the product as also enhanced customer satisfaction with the use of the product. as, green policies as discussed here are closely associated with the business itself and are an integral part of the business. Attempts of converting policies into practices through the green programs may also result in occasional modification of the policies themselves. is should be anticipated and provisioned for in any good policy development schedule.



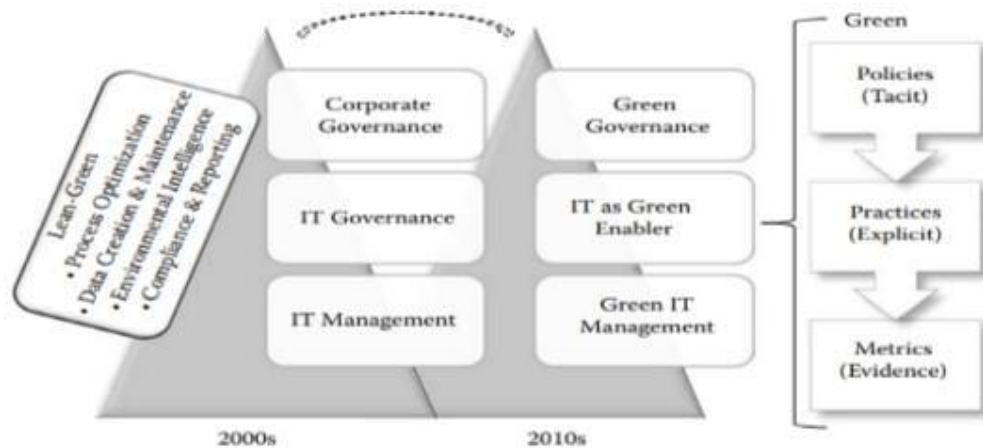Green policies are implemented through practices, and proved through metrics.

**Figure 3.1** Green corporations based on green policies, practices, and metrics (shifting of IT function).

- The approach to convert the green policies into practice is through a combination of training, usage, incentives, and introduction of penalty risks.
- Short-term operational strategies are easy to implement. Some examples of converting short-term policies into practice include:

1. Computing Power Management

2. Use of Blank Screen Saver

3. Limited Printing

4. Reuse and Recycling of Equipment

13) What is KPI in green strategies?

# KPI IN GREEN STRATEGIES

KEY PERFORMANCE INDICATOR ( KPI) PROVIDES INFORMATION ON AN ORGANIZATION'S PERFORMANCE AGAINST DEFINED AND MEASURABLE CRITERIA. KPIS CAN PROVIDE HELP IN MEASURING THE PROGRESS OF AN ORGANIZATION IN THE AREA OF ENVIRONMENTAL SUSTAINABILITY AND GREEN IT. KPIS LEAD TO AN INDICATION OF THE GREEN IT

# Green KPIs in Four Groups

| Primary Dimensions | Example Goals/KPIs (Timelines, Lengths, and Depths) My Organization Will Experience the Following: |
|---|---|
| Economic | Reduction in energy consumption by 10% of its current level per year for 3 years. Increase in green services |
| Technical | Use virtualized data servers for all its data warehouse; use smart meters to record, repost, and control emissions. |
| Process | Optimize SCM to reduce emissions by re-engineering individual processes. |
| People | Train people for Green IT at all levels. Telecommute once a week to reduce emissions. |

# EXAMPLES OF GREEN KPIS

- My organization will reduce 10% over its last year's energy bill. This reduction is aimed over next 3 years, at the end of which, we will review all factors associated with this reduction.
- My organization will eliminate the use of paper in all communications in the next 3 years