

Basics of Green IT & India Perspective

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This Insights publication deals with one of the most significant and sensitive trends of this decade - the impact of Information Technology on the environment and its potential in reducing emission level significantly. The publication also provides the current status of Green IT in India. This article was also published in the CSI Communications Jan2011 issue.

Introduction

Mother Nature & Dwindling Natural Resources

Ever since the existence of earth, mankind has been dependent on natural resources for survival and never felt real need for conserving them. As life progressed, mankind invented new means of survival and the next natural step that followed was that of growth – socio-economic growth. As the society grew the needs grew, creating newer industries fueling manifold increase in the consumption of natural resources. Such is the abundance of natural resources that even after billions of years we still continue to enjoy them. But the question is how long can this continue? Are we going to leave anything behind for our future generations?

It is only in the recent past that the world has started realizing the limitations of natural resources and things like global warming, that is severely damaging the geo-economic activities. Looking at the seriousness, worldwide industries have identified actions aimed at controlling this damage.

Globalization & Impact of Information Technology (IT) on the Environment

In this era of globalization and flat world, organizations have managed to thrive and grow, throwing away the limitations of social, economic & cultural boundaries. Technological advancements in Information Technology (IT) are often credited for this growth. Future technological advancements are aimed at leveraging the global skills for producing some of the best results in every sphere of life, making IT an inseparable component of our personal & professional life. The very global nature of today's businesses is resulting into larger IT facilities. Their demand, including PC's & server space is growing exponentially.











Most of us are very familiar with the social media tools like, Facebook, Twitter, Blogs and LinkedIn that have changed the way we interact socially. Similarly, the advent of mobile technology has reached even to grass root levels, where it has found place in our day-to-day activities like banking or even agriculture. Technologies like internet, wireless broadband, virtualization and 3G/4G have become significant part of the corporate world.

While IT, also mentioned as Information & Communications Technology (ICT) sometimes, is credited for making life easier and making exponential growth possible, the darker side of this is the adverse impact it leaves on the environment by producing enormous amount of electronic waste. It is therefore time for everyone to wake up to this challenge and start utilizing resources judiciously and managing businesses in a more environment friendly manner.

This is leading the world towards high-tech consumerism. A glance through some of the findings by the United Nations Environmental Program (UNEP) is really shocking.

- Global e-waste generation is growing annually at 40 million tons
- US is the unchallenged leader, with China as distant second

Quick Links

-  [Understanding Green IT](#)
-  [Green IT Key Components](#)
-  [IT Emission Sources](#)
-  [Measuring the Emission](#)
-  [Adopting Green IT Practices](#)
-  [Green IT Benefits](#)
-  [Green IT Adoption Challenges](#)
-  [Green IT India Perspective](#)
-  [Green IT Benchmarking](#)
-  [E-waste Recycle & CDM Program](#)
-  [IT as an Enabler](#)

- Developing economies like China & India are catching up fast
- China will overtake the US by 2020, as principal e-waste producer
- Next 10 years, India's e-waste (notably cell phones), is likely to grow by 18 times

In addition to this, there are numerous hazardous chemicals that are used in various electronic devices, like – Mercury, Beryllium, Lead, Brominated Flame Retardant & Hexavalent Chromium, to name a few. These chemicals are toxic in nature and pose severe risks to humans & the environment.

Even though IT is credited for bringing in operational efficiencies, the IT Equipment in-efficiency figures mentioned below are startling. There is tremendous room for improvement in utilizing the IT equipment efficiently and in a more environmental friendly manner.

- Computers & Monitors
 - 50% of desktop power is wasted
 - 90% of PCs have energy saving option disabled
- Data Centers
 - Average capacity utilization is 12%-15% in working hours
 - 33%-40% power used is wasted
 - Cooling costs are very high
- Printer
 - Wastes more energy than PCs
 - Most of the printers are not used in duplex printing mode
 - Power management settings are often not enabled

Understanding Green IT

We have seen above how IT has become an integral part of our personal & professional life, so let us understand the definition of Green IT.

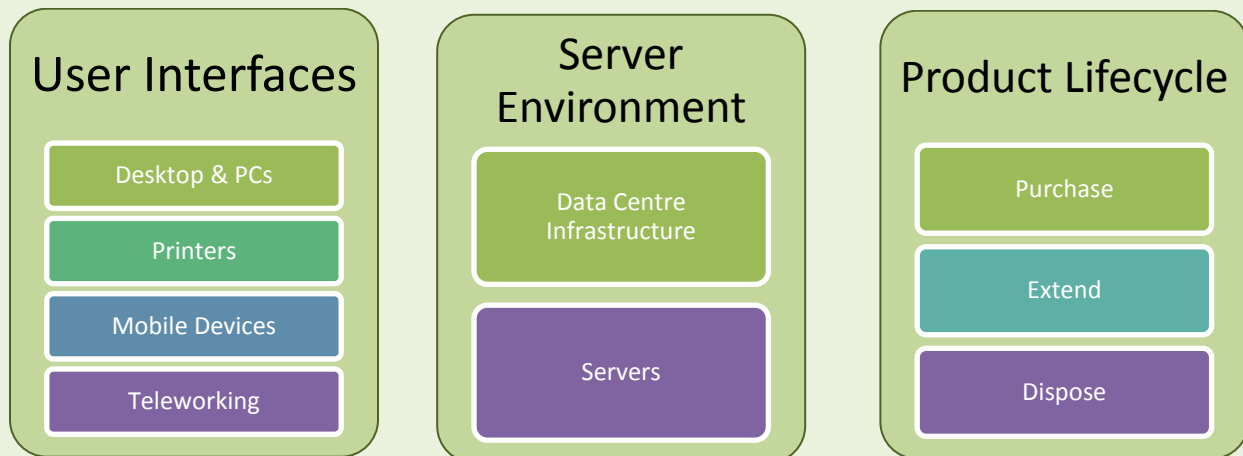
- Green IT which is also called Green Computing, means using IT with minimal impact on environment or environmentally sustainable IT. A more formal definition is - Practices followed during manufacture, usage and recycling or disposal of any IT related device, systems, or processes aimed at minimizing or completely removing damage to the environment

Every product that we use goes through the lifecycle of manufacture-usage-disposal. This means practically all products that we use leave some impact on the environment during their lifecycle.

Green IT - Key Components

In order to control the IT emission it is important to understand the areas that need to be tackled. Based on the usage and product life cycle the components of Green IT can be broadly classified as,

- User Interfaces
- Server Environment
- Product Life cycle



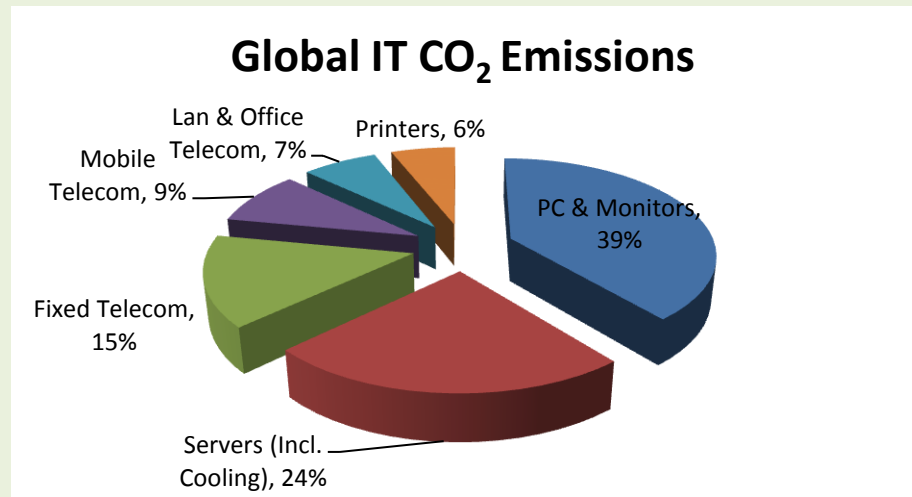
IT Emission Sources

IT industry, once considered to be non-polluting industry, contributes close to 3-4% of the global greenhouse gas (GHG) emissions and is likely to grow to 6% by 2020.

If one has to breakdown the IT emission sources, then the picture that emerges out is quite shocking.

The following pie chart gives distribution of information technology emission sources.

Unlike popular belief, it is the PC & Monitors that contribute maximum and not servers. The adjacent diagram gives details about the various emission sources within IT. This means PC users have a greater responsibility in using IT sensibly.



Measuring the Emission



Now that we know that every product we use leaves some impact on the environment during its lifecycle, the question is how to measure their emission? It is measured as Carbon Footprint.

A carbon footprint is the total set of greenhouse gas (GHG) emissions caused by organization, event, product or a person.

There are six major gases that contribute to the Greenhouse Gas (GHG) effect. They are CO₂, N₂O, CH₄, HFCs, PFCs & SF₆. For simplicity of reporting, the carbon footprint is expressed in terms of the amount of carbon dioxide or its equivalent of other GHGs emitted (CO₂ equivalent tons per annum).

This method is used to calculate the emission during usage and is often divided into two parts - Primary Footprint & Secondary Footprint.

Primary Footprint
Direct Emissions
Emissions by burning fossil fuels

Secondary Footprint
Indirect emissions
Emission from manufacturing
Emission from transport
Emission from packaging

Emission is measured as estimates based on National Average Emission, Industry Standard Sampling at Source or through Live Monitoring.

Not Falling Prey to Green Washing Claims

Green washing is misrepresentation or over representation of product and/or companies being environmental friendly.

In order to score a point over competition or gain undue mileage, certain companies come up with claims / campaigns that are projected as green but they could probably be mere eye wash. As a responsible citizen it is our duty to be little cautious and not fall prey to such claims. Following table provides things that you should look for when you see some of the green washing claims.

When You See Claims Like This...	What You Should Look For...
Biodegradable	Mention about reasonable time for normal disposal
Recycled Content	Clear mention about how much of the product is made from recycled content
Recyclable	Proper method for collection, separation/recovery from solid waste & facility to actually recycle
Refillable	Availability of collection program for refilling or consumer should be able to refill it on its own
Less Packaging	Clear & relevant qualification for comparison. Sometimes comparison is done with non-existing, phased out product.

If such claims are not properly qualified as mentioned above, then that is a clear case of Green Washing.

Actions Needed For Adopting Green IT Practices

Adopting Green IT practices can certainly help in reducing IT emission levels significantly. This not only is lighter on the environment but can also result in improved bottom-line. From a long term perspective, Environmental Stewardship is the way going forward. This means, every business should own up to their actions impacting environment.

A formal Green IT strategy is one of the essential steps in embracing green IT practices but a planned initiative with clear identified goals is what is needed to succeed.

Following simple steps can help organizations adopting Green IT practices

- Setting up Organizational Sustainability Goals
- Identify GHG emission sources
- Baseline your organization to see where it stands on GHG emission
- Create Green IT Strategy
 - Set out clearly achievable targets
 - Look out for low hanging fruits, typically involves least OR no investment
 - Identify areas for long benefits – may need investments
 - Identify areas where IT can be used as an enabler
- Adopting GHG accounting model
- Put in place GHG emission measurement plan on an on-going basis – There are commercially available software products that can double up as GHG emission measurement & accounting tools
- Implement Green IT plan
- Be Carbon Neutral – Once your organization is able to reduce GHG emission levels to certain minimum levels, it can implement measures like CDM project that can offset remaining minimal

emissions, making your organization Carbon Neutral

The future for every sustainable business lies in making IT green and also finding innovative ways to effectively use IT as enabler.

Apart from organization, individuals can also play an important role in implementing Green IT practices by following simple rule of Reduce, Re-use and Recycle.

- Switch off from wall
- Switch off your PC & Monitor at the end of day
- Adjust power management settings
- Remove screen savers – they consume same amount of power
- Upgrade only what is needed
- While buying new equipment, buy only energy efficient equipment – Some IT equipment / brands carry Energy Star or EPEAT ratings

Green IT Benefits

Being environment friendly is not only good for the overall geo-economic condition but it can straightway add to your bottom-line. Some of the benefits of adopting Green IT practices are mentioned below.

- There are no negatives of adopting Green IT practice, therefore no regrets
- Significant gains can be achieved with little efforts
- Green IT results in better utilization of IT Infrastructure
- Some of the big direct savings that Green IT can deliver are,
 - Direct savings through reduction in energy consumption
 - Reduced physical IT infrastructure & space
 - Reduced Total Cost of Ownership
 - Reduced IT manpower cost
- Based on McKinsey estimates, innovative use of IT can result in 15% reduction in GHG emissions from other parts of the business

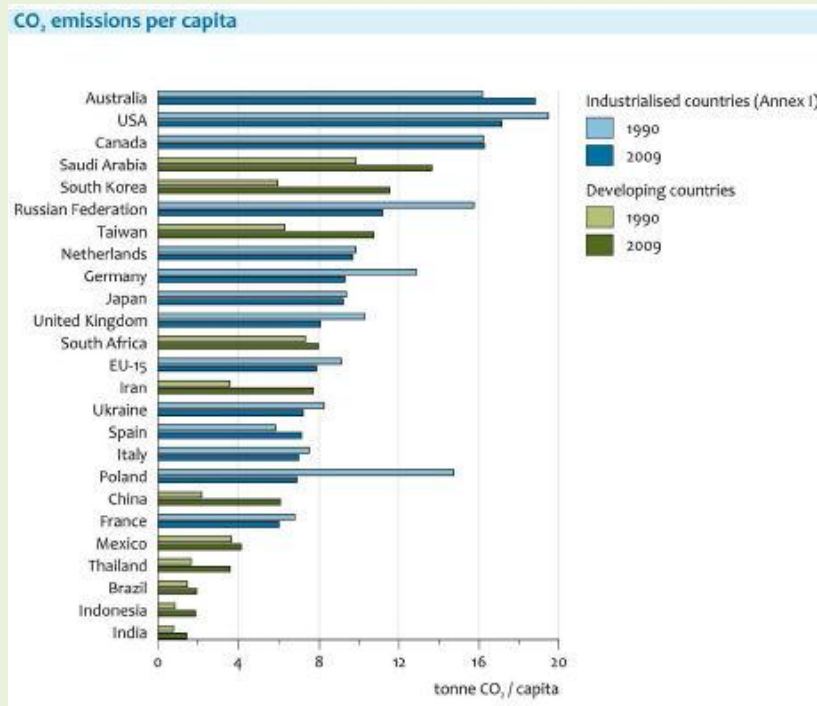
In addition to this, through CDM (Clean Development Mechanism) programs, organizations can earn money by trading their carbon credits in the international market.

Green IT Adoption Challenges

Like most other organization-wide initiatives, the biggest challenge in adopting Green IT practices is cultural change. In order for such initiative to succeed, what is needed is a comprehensive approach that simultaneously addresses Technology, Process & People related issues. Some of the typical challenges are mentioned below.

- Needs a major cultural shift, across the organization
- Effectiveness depends on behavioral changes
- Leveraging existing IT infrastructure and investments
- Lower priority for capital needed to achieve long term benefits
- Lack of uniform legal framework

Global GHG Emission During 2009



According to the Netherlands Environmental Assessment Agency report, Global GHG emission has remained stable for the year 2009.

GHG emission has fallen by 7% for industrialized nations but this fall has been compensated by the developing countries like China (increase by 8%) and India (increase by 6%).

Even with these higher year-on-year growth rates, the per person emission levels for China (6 tons) & India (1.4 tons) are still lower than the nations like Netherlands (10 tons) and US (17 tons).

Tackling Climate Change & Green IT - India Perspective

Internationally, The United Nations Framework Convention on Climate Change (UNFCCC), which came into force in 1994, established the first intergovernmental framework aiming to tackle climate change. This treaty ensures that member states work collaboratively in order to develop initiatives that not only reduce negative impacts associated with climate change, but also build capacity to cope with effects of increasing temperatures. The Kyoto Protocol, enforced in 2005, enshrined this commitment in legislation and presented legally binding targets which imposed requirements for ratified member states to reduce greenhouse gas (GHG) emissions. The commitment period for the Kyoto Protocol ends in 2012.

In the year 2008 India's National Action Plan for Climate Change (NAPCC) was launched by the Prime Minister. The plan includes eight missions covering specific areas like, Solar Energy, Enhanced Energy Efficiency, Sustainable Habitat, Water, Sustaining the Himalayan Eco-system, Green India, Sustainable Agriculture and Strategic knowledge for Climate Change which include assessment of the impact of climate change and actions needed to address climate change.

At the last year's Copenhagen Summit, India has committed to reduce its emission by 20-25% as compared to the 2005 emission levels. This commitment is entirely voluntary and is not legally binding on us. However, in long run this will not only help in reducing the emission level but also help in getting foreign investment in the area of clean technologies. In order to achieve the stated objective, the Indian government has taken a number of initiatives including,

- Setting up an expert group on Low Carbon Strategy for Inclusive Growth. This Group has been mandated to develop India's roadmap for low carbon development. Recommendations from this

group will become a central part of India's Twelfth Five Year Plan which will come into effect in 2012

- A "Carbon Tax" on Coal to Fund Clean Energy - Announcing a levy – a clean energy cess – on coal, at the rate of INR 50 (~USD 1) per ton, applicable to both domestically produced and imported coal. This cess is expected to earn around \$500 M for the year 2010-11 and will be used for projects in clean energy technology
- Release of India's national GHG inventory 2007. Between 1994 and 2007 there is a reduction of 30%. These are the first official numbers published after 1994. The numbers are less than fourth for US and China

It is good to know about so many initiatives being taken by the India government in tackling climate change but effective implementation is still a concern. India is more vulnerable to the climate change than the United States and China. Specifically poor communities in India, who contribute least to the climate change, are the most affected ones. There need to be a sense of urgency with proper perspective to include them while implementing these initiatives.

The Indian industry bodies are also not behind in taking concrete initiatives in the area of Green Business. The Confederation of Indian Industries (CII) Sohrabji Godrej Green Business Center (CII-Godrej GBC) has outlined initiatives like "Mission on Sustainable Growth (MSG)". As a part of this mission, CII Code for Ecologically Sustainable Business Growth has been developed. This program aims to involve top management of companies seeking voluntary commitments to reduce resource consumption & emission intensity.

Looking at the profit proposition of GHG inventory, CII has come up with Corporate GHG Inventory Program, which lays down guidelines for comprehensive corporate GHG accounting, reporting & management.

NASSCOM, India's premier trade body and chamber of commerce for IT-BPO industry, has also started its "Green IT" initiative. NASSCOM has partnered with TERI-Business Council for a new initiative called, "Corporate Action Plan on Climate Change: ICT as a Game Changer". This initiative aims to identify the sectors where ICT can play a game-changing role in carbon emission reduction thereby significantly contributing towards India's action on climate change

Since 2000, India has been effectively using Special Economic Zones (SEZ) as engine for economic growth. This has attracted large flow of foreign and domestic investments. So far about 144 SEZs are operation across India and many more are about to come. The Ministry of Commerce and Industry is therefore, developing guidelines for establishment of 'Green SEZs'. All new and existing SEZs are supposed to implement these guidelines and go for green certification.

Green IT Benchmarking

While everyone is aware and believes that Green IT is important; so far very little has been translated into action. Recently, Fujitsu Australia published a report on "Green IT: Global Benchmark". This paper is the first ever multi-country benchmark to determine the maturity of Green IT practices and technologies in end user organizations. The report is based on responses from over 630 CIOs and senior IT managers across four countries – US, UK, Australia and India.

The overall maturity level across industries in all the four countries is 56.4 (out of 100). There is relative

lack of maturity of Green IT policies, practices and technologies – across industries in all these countries.

India's overall Green IT maturity index across all industries is 52. Amongst the key industries the Green IT readiness is found to be highest in IT-Communication-Media, followed by Manufacturing and Financial Business Services.

E-Waste Recycling

Electronic Waste (E-waste) comprises of waste electronic goods which are not fit for their originally intended use. Some of the examples could be computers, printers, cell phones, TVs, computer batteries and personal stereos etc. E-waste contains toxic substances and chemicals, likely have adverse effect on the environment and health.

While all efforts are on to improve the operational efficiency of IT equipment and prolonging their lifecycle, e-waste is inevitable as the equipment nears its end of life. In India e-waste management is primarily managed through un-organized sector, in unhealthy conditions. The laborers used are often from poor economic background. Coupled with this, E-Waste management in India faces challenges like difficulty in inventorization, poor awareness and lack of legislation.

In the recent past, things have started changing. Now there are proper E-waste recyclers available in India. As of Sep2010, there are as many as 23 recyclers / processors registered under the Ministry of Environment & Forest (MOEF) & Central Pollution Control Board (CPCB), having environmentally sound management practices & the number is growing rapidly. With this facility one can locate E-waste recycler near you, if not next door.

India's E-Waste guide, which serves as information resource, has been developed as a part of initiative through Indo-German-Swiss partnership. These partners are working in close collaboration with manufacturers, users, recyclers, and NGOs to develop a sustainable E-waste management system in India.

CDM Program

As per the central feature of the Kyoto Protocol, countries are required to limit or reduce their greenhouse gas emissions by 2012. By setting such targets, emission reduction has taken economic value. CDM is a mechanism that helps in monetizing the emission reduction.

CDM stands for "Clean Development Mechanism". The CDM allows emission-reduction projects in developing countries to earn certified emission reduction (CER) credits, each equivalent to one ton of CO₂. These CERs can be traded and sold, and used by industrialized countries to a meet a part of their emission reduction targets under the Kyoto Protocol.

In India the Central Government has constituted the National Clean Development Mechanism (CDM) Authority for the purpose of protecting and improving the quality of environment. The authority receives projects for evaluation and approval as per the guidelines and general criteria laid down in the relevant rules and modalities pertaining to CDM. As of June 2010 there are more than 1500+ CDM projects approved by India.

In India some of the large corporates like TATA & ITC are amongst those who have already benefited from carbon trading.

IT As An Enabler

Information Technology has such a tremendous potential that innovative use of IT can accelerate adoption of green practices in other business areas.

Economic incentives to reduce carbon emission can drive rapid adoption of energy saving solutions, and many of these can come from the IT sector. Some countries (European) have put in place carbon monetizing systems to aggressively achieve the emission reduction.

Based on the International Telecommunication Union (ITU) report published in Dec 2010, ICT is seen as one of the key player in creating low carbon society. ICT can impact climate change mainly in three ways,

- Driving down emissions in the ICT sector itself through the introduction of more efficient equipment and networks
- Reducing emissions and enabling energy efficiency in other sectors through, for example, substituting for travel and replacing physical objects by electronic ones (de-materialization)
- Helping both developed and developing countries adapt to the negative effects of climate change using ICT based systems monitoring weather and the environment worldwide

Based on the SMART 2020 report, Information and Communications Technologies (ICT) could save 7.8 GT CO₂ equivalent in 2020, or 15% of global emissions in 2020. Some of the main areas of opportunities in ICT that are mentioned in the report are given below.

- **SMART GRID** – A smart grid built on better information and communications could reduce CO₂ emissions by 230-480 MMT and save \$15-35 billion in energy and fuel costs
- **ROAD TRANSPORTATION** – More efficient road transportation could reduce travel time and congestion, saving 240–440 MMT of CO₂ emissions and saving \$65–115 billion
- **SMART BUILDS** - Smart Buildings that consume less energy could abate 270-360 MMT of CO₂ and save \$40–50 billion
- **TRAVEL SUBSTITUTES** - Travel Substitution through virtual meetings and flexible work arrangements could reduce CO₂ by 70–130 MMT and save \$20–40 billion

Green IT- Business Potential

As adoption of Green IT practice increases across the globe, it is expected to create new business opportunities, and millions of new jobs driving the future green economy. Some of the potential business opportunities are listed below.

- Manufacturing
 - Process Automation
 - New battery technology
 - Optical quantum computer
 - New LCD/LED screens
- Transportation
 - Dematerialization – eCommerce, Videoconferencing, Tele-working
 - Eco driving – Fuel efficient Vehicles, Hybrid Technology
 - Eco friendly packaging

- Usage / Consumption
 - GHG emission management systems – Measure, Monitor, CDM (Clean Development Mechanism) /CDP (Carbon Disclosure Project –UK), Carbon trading
 - Smart Grids - improved efficiencies in power generation, transmission & distribution
 - Electronic Waste Management & Renewable Energy Sources
- Facility Management
 - Green Buildings
 - Virtualization, Cloud Computing (SaaS, IaaS & PaaS)
 - Blade Servers
 - Multifunction Printers
 - Power management software

Conclusion

Green IT is a very vast subject extending far beyond data centers and IT departments, therefore needing urgent comprehensive actions. Going by the current level of industry preparedness and lack of uniform government regulations, there is far more urgency that needs to be demonstrated. Failing this the true potential of IT as an enabler in reducing the global emission levels significantly by 2020 can not be achieved. Everyone, including governments, industries and individuals need to bring in significant changes in their policy making & implementation, business models and behaviors, respectively.

There are a few organizations worldwide which have taken up the role of spreading the awareness and providing assistance in adopting Green IT practices. This will assist in realizing the true potential of Green IT.

Large organizations have already adopted Green IT practices and have started reaping benefits through direct savings and achieving their corporate sustainability goals by reducing GHG emissions. It is time for everyone to take steps in adopting Green IT practices, if not already done, because Green IT is going to be the main stay for the future green economy.

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NASSCOM- India
Netherlands Environment Assessment Agency (NEAA)
Silicon Valley Toxics Coalition (SVTC)
SMART 2020
Special Economic Zone (SEZ) India – Ministry of Commerce & Industry, Department of Commerce
United Nations Environmental Program (UNEP)
United Nations Framework Convention on Climate Change (UNFCCC)

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