

Green IT

Giving CSI a Purpose

by Mark Blanke



As more companies look to improve their bottom line and decrease their negative impact on the environment, many IT organizations are using **Green IT** best practices to meet company objectives. Generally speaking, **Green IT** is the practice of applying strategic and tactical initiatives to pursue maximum efficiency of an organization's information technology to limit consumption and minimize the impact on the environment. Now, while that may be easy to say, there is no formal approach, framework or governance to achieve **Green IT**.

Many individuals or organizations with good intentions may implement a tactic or two to be greener. Something like setting the printer's default settings to duplex printing will have a positive impact on the environment by reducing the amount of paper used. It will also help the business reduce its costs for paper and recycling. However, the problem is that many of these activities are not well tracked and so the benefits are not properly understood.

Too often IT organizations have no formal plan to drive green initiatives or incorporate green practices into their day-to-day operations. In a growing trend, some companies create a sustainability committee or designate a Chief Sustainability Officer. However, this practice usually does not manage improvements within IT or provide any sort of direction for controlling IT methods. What is needed is IT Service Management. ITIL provides the perfect ITSM best practices framework to help incorporate green practices into IT operations, as well as equip the committee with the ability to approve, implement, report, and improve upon sustainable IT goals.

Although **Green IT** is not an IT Service, **Green IT** will affect Service Management in two ways:

It will enhance the service management program and processes;

It will improve the IT Services the organization already provides.

Your question may be *where do I start?* If you already have a service management program in place, then greening IT should be managed as a typical process and service improvement exercise, which starts with Continual Service Improvement (CSI). CSI is the ideal place to begin driving a formal **Green IT** initiative, as well as improving all IT Services. As with any CSI endeavor, you need to be able to answer the value question: What is the value to the business? One of the greatest aspects to **Green IT** is it usually not only has a positive environmental impact, but also has a financial or other value benefit.

The first step in providing greener IT is to understand the objectives of the business and customers. For example, are there company-wide objectives to reduce carbon dioxide emissions? Are there cost cutting targets to which **Green IT** might be able to contribute? What about marketing objectives or internal sustainability goals to be more environmentally friendly? The answers to these questions are important in order to help sell the necessary improvements within IT.

When greening IT, having specific controls in place is important to its success. Otherwise a few simple green

techniques are put in place ad-hoc and not much else is accomplished, so the benefits are not well understood. By putting controls in place, you are ensuring that the **Green IT** objectives are actually put into practice and followed by everyone continually. This is where enhancing your ITIL framework is advantageous. ITIL provides the controls necessary to introduce green practices into IT operations through the enhancement of policies and process definitions. For instance, the Supplier Management process can be enhanced to ensure that IT vendors meet certain green requirements. You may insist that a hardware manufacturer use green materials as part of their product or you may require a vendor to meet certain packaging constraints. These specifications can be embedded in the supplier management process and be a requirement for all participants of the process.

Another example of using ITIL as a control process for **Green IT** enhancements is change management. This process should be updated to ensure that **Green IT** reviews are performed as part of a Request For Change (RFC) and that the change policy ensures that RFCs, when applicable, are evaluated for certain green criteria. For example, does the hardware requested meet a certain energy efficiency rating such as ENERGY STAR?

Another way to move **Green IT** forward within an organization is by improving IT's service value. If IT services are more cost effective and reduces the company's carbon footprint, this shows a clear value to the business overall. It is also advantageous to publicize the green efforts and encourage employees to participate and recommend new ideas. Employees who know their companies are striving to be green are typically happier, and this helps provide even more value to the business.

Some examples of **Green IT** benefits include:

- Reduced Carbon Dioxide emissions
- Reduced use of consumables such as paper, ink, and toner
- Reduced use of real-estate
- Reduced use of electricity and other energy sources
- Reduced harmful waste disposal
- Improved use of recycling
- Improved operational efficiency
- Reduced operational expenses

While not all **Green IT** improvements have a cost benefit, a large majority do. Since most **Green IT** initiatives are focused on the reduction of resources, which have a cost and, therefore, when used less, have a return to the business. Reduction of electricity/energy use has a great potential for significant cost savings, but the cost benefits can also come from using less equipment, occupying less real estate, and

reducing waste removal needs, all of which provide a financial return.

To embark on a **Green IT** service improvement initiative, you need to formally identify what you want to accomplish. Keep in mind that as with any process improvement endeavor, not all of the improvements need to be made at once. As is the nature of CSI, this is an iterative approach, and improvements and enhancements can be made continually.

To initiate your Continual Service Improvement process for your initial **Green IT** improvements, begin by understanding what is important to the individuals within the company. Meet with business sponsors, customers, and coworkers and gather some ideas and targets to become greener. Then set your initial goals and objectives. The first objective might be to reduce IT's use of electricity by 10% or, alternately, to improve the IT supply chain and make it much more environmentally friendly. These two objectives are very different and will have different approaches to improving IT.

The goal to reduce energy use has more of an impact to the provisioning of IT Services, while the goal to improve the supply chain is an initiative around improving the ITIL processes. There are many examples of the enhancements you can make to improve your ITIL processes to help green your IT organization. For this article, we will use the example of reducing electricity consumption as our goal since this has more of an impact to IT services and operations than the ITIL processes themselves.

Before we walk through an example of a **Green IT** improvement project, let us address a common issue with IT departments and **Green IT**. A significant number of IT departments do not pay the electricity bill or pay for the data center and computer room facilities. Therefore, these IT groups probably do not include the electricity and facilities costs in their IT Services and may not have these cost units defined in their financial management process. If this is the case, electrical use is probably not monitored and tracked, and the benefit of reducing energy consumption or reducing the real estate footprint does not directly benefit the IT department. Accordingly, it is not necessarily in the best interest of this type of IT organization to initiate an energy reduction initiative of their own accord. This must be done with the support of the business as well as the organization(s) that control the facilities and pay the utility bills. The funding must also be allocated to support this type of initiative, especially if the costs are not being captured into the service costs and charged back to the business. So let us embark on a CSI initiative to reduce the electricity consumption of IT by 10%.

If we follow the guidance of CSI and use the **Seven Step Improvement Process**, we would start by identifying our vision and moving through the seven steps.

Our goal is to reduce IT's electricity consumption by 10%. Let us put some more details around this objective.

The 10% reduction needs to be achieved over a one-year timeframe and focused within a single data center.

The improvements must be achieved by IT using less equipment, not by improving the facilities, such as changing the lighting, cooling or climate control system.

The improvements should also be achieved by maintaining the current levels of service and providing the same IT services. In other words, we are not going to stop providing a service and have that be the 10% electricity savings.

With those goals set, let us start with **STEP 1** and **Define what you should measure**. Obviously we need to measure how much electricity is used by the specific data center in question. We need to make sure that we are measuring this in enough detail to see the reduction in a more real-time state. We will probably need to measure more than just checking an electricity bill. The data center should be metered or sub-metered, and, if possible, there should be a sub-meter of only the electrical use of IT equipment. If the metered data can be provided in near-real-time, this would be the most beneficial. In addition to just consumption, knowing the variable cost rates of electricity, such as peak demand times, will help more accurately define the cost-savings when the initiative is complete.

STEP 2- Define what you can measure.

You should investigate what type of data you are getting from your data center today. You may already have meters in place, or you might be able to show kWh usage on your UPS. You may have UPSs and/or PDUs that can report on electrical consumption and be monitored to show historical consumption levels.

STEP 3- Gathering the data.

Based on knowing what you can measure today, determine what will be measured and how you will gather it. If it is more of a manual exercise, start collecting the information from the various sources. Otherwise generate the reports from the collection tools to provide the electrical use information. This may be a time where you identify the need to enhance your monitoring requirements and capabilities. If so, define this and incorporate this into the corrective action plan that will be implemented in Step 7.

STEP 4- Processing the data.

Now that you have the electrical use information, you can try to organize it better to make it more meaningful. Fortunately for electrical consumption data, this is pretty straightforward. Having graphs of data on how much electricity was used throughout the day, each day, and then comparing it from one day to the next and from one week to the next will probably have value to see trends in consumption.

STEP 5- Analyzing the data.

Once you have the data you can begin to review where the electricity is being consumed and how to best approach reduction. For this example let us say that there is a collection of servers that are a little less efficient than some newer servers recently put in place. This may be a good indicator that moving to more efficient servers is a good tactic. Of course you should look at other data too. Are two sets of servers that are being compared utilized in a similar manner? Obviously a database server that is used heavily will use more electricity than a simple web server that is occasionally accessed. It is important to ensure that you are analyzing the data appropriately.

Suppose we replaced a series of servers that are approximately four years old. Based on a study from Intel, by replacing a rack of four-year-old servers with new servers, computing capability can be increased over seven times and power consumption reduced by about 9%. If we use this as the basis for an improvement process, as well as the information we have collected that validates that an average server is using 350 Watts of power, we have good basis to pursue improvement in this area. So, if there is a bank of 50 servers in our data center approximately four years old, and we replaced them with new servers and applied virtualization so that the 50 servers could be replaced by only eight energy-efficient blade servers, this would have a significant impact on energy savings. This would also have many other benefits, such as the reduction of needed rack space by 90% (50u versus 5u of rack space). This will probably result in a 70% reduction of electricity for those 50 servers. Depending on the size of the data center, this could very well achieve or exceed the goal to reduce electricity consumption by 10% overall.

NOTE: Many organizations have successfully replaced 20 servers with a single physical server using virtualization, so a 6.25-to-one server replacement ratio is not unreasonable.



One thing to keep in mind is that although your goal may be to save 10% in electricity usage, your initiative may have many other service improvement benefits or meet other goals defined as part of this, or possibly other, initiatives. For instance, the replacement of the 50 physical servers with eight blade servers may have other significant cost benefits aside from reducing utility costs. Operational costs should also be reduced with the need to manage less physical devices. Do you have data that shows what the operational costs of a server are? Are there cost savings that can realistically be placed on the reduction in data center floor space? Does the virtualization of the servers help with IT Service continuity, capacity, or availability, and if so, what type of cost saving or shared investment in the project can be demonstrated? It is important to gather all of this information so that the proposal is well founded and can demonstrate maximum value when being presented.

STEP 6- Presenting and using the information.

Once you have analyzed the data and identified an approach to reach the improvement goals, the data needs to be organized and presented. Ideally this presentation will secure approval for the initiative. Our case identifies that in order to reach our 10% reduction goal we need to replace 50 servers with eight blade servers using virtualization. The details of the initiative, the objectives and the benefits must all be presented to the various audiences.

Who do you need to present this to, and what are their interests? Conducting a stakeholder analysis will reveal the stakeholders requirements and expectations.

The business is going to be very interested in the ultimate cost savings as well as the positive impact it will have on the environment. Can you quantify the resulting CO2 reduction by implementing the project? If we use the US Department of Energy's Energy Information Administration's average of 0.0005883 metric tons CO2 per kWh (this number can change greatly based on location and other factors, so make sure you use what is relative to your company) and our initiative is expected to save 15kW per hour, or 131,400 kWh a year. Therefore, in one year the organization can reduce its carbon impact by over 77 metric tons. At US \$0.11 per kWh, the same 15kWh savings would produce US\$14,454.00 annually. Taken over a 4-year lifespan of the equipment that is \$57,816.00 in electricity savings.



Senior IT management may be very interested in all of the same business costs and savings, but may also be interested in more of the technical benefits. Highlighting the savings in data center space, reduced management needs and the added benefits of using virtualization to enhance ITSCM may be topics of particular interests.

The IT organization itself, while maybe not always as interested in the business goals, may be very interested in understanding the green benefits of the initiative. Of course, many internal IT groups are going to be more interested in the technical details of the program and what the impacts or advantages might be to them.

Obviously do not just highlight the benefits. It is necessary to detail out the steps required to make this happen. New server standards may need to be defined. If virtualization is not currently implemented, then this will be an investment in new technology, training, and operations. These costs need to be captured and incorporated into the presentations.

STEP 7- Implementing Corrective Action. By now, you hopefully have received approval for your initiative and it is time to put the plans in place. Take particular note of the electricity consumption metrics as you get started. You should establish a baseline prior to the implementation of the corrective action plan, which you may have already done as part of the previous steps. Furthermore, the migration is going to take a while and since not all servers will get migrated at the same time, you may be able to capture electricity metrics for moving a single server or set of servers. This information could be used to substantiate future migrations.

After the action plan has been implemented, it is important to continue to review the seven steps again. Hopefully you do not need to make changes to metrics, and can jump to collecting and analyzing the information. Do not assume that you achieved your goal. It is possible that you missed a target. Perhaps you needed to add some additional hardware to support the initiative, such as new storage, to support the virtual environment. This used electricity and you are just short of your reduction goal. Review the data and see if there are other tweaks or additional corrective action plans you can implement to achieve the goal.

For a Green IT initiative like this one, it is important to report back to the business, senior management, and general users on the benefits that have been achieved.

If all has been executed well, no service has been negatively affected and no service has been altered. Therefore, to the end user, nothing has changed. It is important for people to understand and feel good about the progress that has been made by an IT organization that thinks progressively. Hopefully there has been a significant savings to the business too, and that not all of the cost savings have been eaten up by performing the project. If there is a reduced operating cost, it is important that the financial management process review the cost units and see how this may have affected the price of one or more IT Services.

This is just one example of how you can use CSI to help green your IT environment, and this example was simplified a bit to fit into this article, but the method can be applied to almost any **Green IT** initiative.

For years IT Service Management, and specifically Continual Service Improvement, the foundation for process improvement, have been used to drive efficiency within IT organizations. By using **Green IT** as a new objective and vision, ITSM can be used to create efficiency in a whole new way, driving down costs while reducing the impact to the environment.



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