

# Closed Loop Lifecycle Planning©: Optimizing for energy efficiency in the upcoming technology refresh cycle

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## Management Summary

The concept of a “green” technology refresh cycle for client computing may not be a part of the planning process today, but in the near term it will become mainstream. There are two fundamental with opposing perspectives for technology refresh cycles for desktops and notebook PCs.

The first camp believes that a planned, phased technology refresh cycle is optimal. The second camp, however, questions the basic concept of a technology refresh itself. Why refresh technology for desktops and notebook PCs at all when you can ride the wave until they die and only then replace them? Both sides have presented compelling positions, which makes for a complex and often emotional dilemma..

There is merit to both positions. The research performed while writing *Closed Loop Lifecycle Planning*<sup>©</sup> demonstrated that there is no right or wrong decision in regard to client lifecycle management, only conscious and unconscious decisions. However, in regards to the “greening” of client computing, the gray area is now becoming clearer.

Historically, IT considered “green” initiatives the realm of facilities and data centers, not client computing. After all, for a long period of time desktops and notebook PCs were considered commodities. Businesses are now realizing that the financial, social, and cultural benefits are significant.

Another conclusion of this white paper is that the “greening” of client computing in general is ubiquitous, which implies that a level of “green” is now inherent in client computing.

This paper encourages all businesses, regardless of size and complexities, to consider a more formal “green” strategy in regards to client computing and the technology refresh cycle. The timing could not be better. There is also a business case to be made that the ‘business as usual’ environment could view the “green’ initiative as a compelling event unto itself.

For ease of review, this white paper is separated into different sections to briefly summarize key points. It is important to remember that all of the topics interplay and are dynamic in the market place today.

- 1) Access technology (desktops and notebook PCs)
- 2) The platform choices
- 3) The impact of regulations
- 4) The impact of practice levels
- 5) What the future holds

These topics are presented in no particular order of priority; all carry substantial weight in the discussion.

### 1.0 Access Technology (Desktops and Notebook PCs)

When one compares the desktops and notebook PCs available today to devices that are beyond three years old, aside from the form factors and features, the amount of energy consumed is significantly less. While many teams understand this, creating the business case frequently requires diligence and a reliance on several sources of information.

One of the objectives of this white paper is to present the business case, common objections, and provide the methodology to address a client “green” initiative.

### 1.1 The “Green” Client Methodology

The operational framework of Closed Loop Lifecycle Planning provides the design for the approach that businesses can take to address a “green” client initiative. The methodology is a combination of several factors and resources of information, which when combined, results in an optimized “green” solution.

The methodology is comprised of the following elements:

- Technology
- Practices
- Industry support
- Platform choices
- Management tools

While each of these elements is independent of the others, it is the combination that makes the overall business case for “green” extraordinarily compelling.

#### *Technology*

The technology itself is a key element of the “green” initiative. Innovation is responsible for the development of environmentally friendlier client computing devices. Research and development investments remain critical in this initiative.

While all of the marketing literature may say or indicate similar concepts, the levels of commitment and investments may vary. This represents a challenge for businesses attempting to optimize a “green” approach to a technology refresh.

Within the industry, technology has been developed that addresses many of the concerns regarding power consumption, heat, idle asset time, disposal, and other issues. The key concepts are represented in this section.

80 PLUS is an innovative, electric utility-funded incentive program to integrate more energy-efficient power supplies into desktop computers and servers. Participating utilities and energy efficiency organizations across North America have contributed over five million dollars in incentives to help the computer industry transition to 80 PLUS certified power supplies.

#### **What is the 80 PLUS specification?**

The [80 PLUS performance specification](#) requires power supplies in computers and servers to be 80% or greater energy efficient at 20%, 50% and 100% of rated load with a true power factor of 0.9 or greater. This makes an 80 PLUS certified power supply substantially more efficient than typical power supplies and creates a unique market differentiation opportunity for power supply and computer manufacturers<sup>4</sup>.

From the description above, it is a simple task to understand that older client devices simply do not have the favorable environmental impact that new technology possesses.

According to this same public website, there is a savings calculator that defines the potential savings of, for example, an energy compliant desktop. The savings and implications are captured below from the calculator:

- Dollar savings per year \$7
- Lifetime cost \$30
- Average kWh savings 85
- Lifetime kWh 340

The math adds up quickly when an entire PC fleet is examined. This truly impacts the technology refresh cycle. At \$7 per PC if it is assumed that a desktop acquisition cost is \$600 the impact is about 1.2% of the price. Scaling the math assists a business in moving along the “green” lifecycle.

### *Practices*

Practice levels are traditionally thought of in terms of cost reduction, cost avoidance, risk, and service levels as these relate to lifecycle management. This is correct, but now the added dimension of practice levels can be extended to “green” implications of the practice levels. Section 4.0 of this white paper provides additional details on the topic of practice levels.

Closed Loop Lifecycle Planning defines practice levels in terms of lifecycle elements. These elements include the following from the bill of materials to support client computing.

- Hardware
- Software
- Staging and integration
- Installs, moves, adds and changes
- Warranty and maintenance
- Help desk
- Asset management
- Image management
- Project management
- Management tools
- Technology refresh
- Disposition
- TCO/economics

Each of these areas has a level of source information that will assist a business in developing their “green” strategy.

## *Industry Support*

The industry, aside from driving the program itself does offer rebates and other financial incentives directly to businesses that seek a “green” client computing environment.

The 80 PLUS initiative did not come into being in a vacuum. Several electric utility companies and energy efficiency organizations united to promote a more environmentally friendly client computing standard. Here are just a few of the utilities and organizations spearheading the 80 PLUS movement:

- Northwest Energy Alliance, or NEEA
- Pacific Gas and Electric Company
- Southern California Edison
- Western Massachusetts Electric
- BC Hydro
- Salt River Project

Companies within these utility districts may be eligible for rebates if they implement their own 80 PLUS initiatives. For a full list of sponsors and more information on rebates, see [www.80PLUS.org](http://www.80PLUS.org).

## *Practical methodology - weaving “green” requirements into the refresh cycle*

The following methodology derives from the User Segmentation and the bill of material described in Closed Loop Lifecycle Planning©. These steps permit a business to include the “green” aspect of client computing in the technology refresh cycle as part of the overall criteria.

### *Step 1*

#### Understanding the installed base

Many businesses have a varying degree of success in client asset management. One of the fundamental portions of the information is to secure a detailed aging report that identifies the PCs.

The report should be framed by age, configuration, and platform. This would likely initiate a follow on discussion of imaging and other lifecycle considerations. However, for purposes of the “green” initiative, the basic information is required.

In addition, it is almost always useful to understand the impact older technology has on certain lifecycle practices that would be additive to the “green” approach to client computing. Among these lifecycle statistics are:

- Help desk calls for older PCs
- Sparing for older PCs
- Number of desk side support calls for older PCs
- Spare parts (different than hot spares) required for older PCs

When these aspects are understood, then the impact of older technology on the infrastructure can be addressed and placed into a perspective. Frequently, businesses may not track the details of the installed base at this level, and comments and thoughts about older technology become more anecdotal than reality.

## Step 2

### Understanding the technology refresh technology alternatives

The technology refresh alternatives available today are quite different than those available even a short two years ago. Businesses that assume like for like technology refresh or a traditional desk top and notebook PC deployment, may overlook an opportunity to impact the installed set of economics.

Understanding the alternatives may impact the scope of the refresh project. Closed Loop Lifecycle Planning© suggests a scoping that could include the wide variety and range of access devices including, but not limited to:

- Desktops (all form factors)
- Notebooks (all form factors)
- Tablets
- PDAs
- Smart phones
- Thin client computing
- Diskless mobility
- CRTs and flat panel monitors

The methodology provides a business an opportunity to adjust the product mix, not only from cost and security based upon end user requirements, but also from a perspective of the impact of the environment including power consumption (as an example).

## Step 3

### Optimize the product mix

Once Step 2 is completed and Step 1 is thoroughly defined, a business can now establish the optimal set of access devices in support of the end user requirements. This becomes the baseline for the “green” overlay of best practices in each of the access technologies that are available.

## Step 4

### Define the “green” criteria

The “green” criteria include all of the topics and elements discussed in this paper and provide the baseline set of potential economics considerations. Each of the elements needs to be framed in the definition. If a business is generating an RFP then this is a much easier proposition to articulate. A comprehensive approach is required for a business to become “green” on the client computing infrastructure.

Comprehensive does not imply complexity. The objective is to consolidate all of the considerations so that businesses can make a conscious decision relating to embracing the “green” initiatives. Below is a sample of these criteria (not in any order of priority):

1. Baseline energy costs  
The importance of understanding the existing installed base is critical since it is this installed base that establishes the potential impact on energy savings. The percentage of devices over 36 months for example, will likely be a driver of energy savings.
2. Baseline disposal costs  
Simply stated, older technology weighs more, and is more costly to dispose. The de-

manufacturing process is more challenging. As manufacturers create more environmentally enhanced alternatives and approaches, newer technology will become less costly and easier to dispose. Shipping costs alone on older desktops for example that may be 5 years old, could be quite costly to ship.

### 3. 10% rule

In closed loop lifecycle planning© there was the finding of the “10% rule”. The 10% rule discusses that shifts in product mix- notebook to desktop, desktop to thin client, etc. have a significant impact on the overall set of economics.

If thin clients, as an example replace, desktops, the reduction in power, footprint and disposal costs become significant. 10% seems to be the point in break-even where the trade off between a niche solution and a main stream solution appears for many businesses.

### 4. Rebates and other incentives

As part of the criteria for a “green” client technology refresh, a business needs to understand if the local utility companies have programs that encourage and may provide incentives to endorse this behavior. Many utilities do have the program and each business must contact locally to determine applicability.

There are also hosts of federal, state and local regulations which may prove beneficial as a part of the process. Again, the business must assess the impact, but clearly ignoring this potential may not be optimal.

### 5. Energy management tools

There are third party software companies, such as Verdiem, that provide energy management software to the industry. The power management reporting, techniques, and impact may be significant on their own merit to warrant consideration regardless of the technology refresh cycle. However, leveraging this software in the context of reviewing the overall refresh cycle is certainly desirable.

### 6. Product features

One of the differentiators between PC manufacturers is the “green” features that are part of the portfolio. It should not be assumed that every manufacturer has the same features and approach to the “green” technology refresh cycle. There are differences. These differences generally are identifiable in the product features, and infrastructure to support the product itself.

As “green” becomes main stream, and some will argue that it already is, exceeding specifications, modular designs, power management capabilities and so on will become the newer set of relevant product features.

## 2.0 Platform Choices

When this white paper references ‘platform’, it makes a distinction between “fat client devices” compared to thin client. The thin client in this example will be based upon PC blades; however, all thin client computing platforms would likely have a similar set of power economics.

In a simulation of the potential power consumption of replacing 2,000 desktops with an equivalent number of PC blades, the power consumption is reduced by 36% over five years. The five year simulated figures are as follows:

Power consumption for 2,000 desktop devices today	\$698,731 <sup>7</sup>
Power consumption for 2,000 PC blades	\$447,188
Potential savings from platform choice	\$251,543 or 36%

When calculated as a per unit impact (dividing by 2,000) the power consumption based upon platform choice is \$125 per device over 5 years, or \$25 annually. The calculation assumes that a PC consumes \$69 of power annually.

When examining alternative desktop and notebook PC solutions, the thin client represents an on going investment and return in power consumption.

A common issue in discussions of “green” initiatives is one of allotment of benefits. Will IT receive the credit for the savings in power consumption generated by its “green” choices, or will those benefits be attributed to facilities or a broader enterprise initiative? For this reason, benefits are often overlooked, or in the worse case, ignored and attributed as a “soft” cost.

Scaling is obviously a potential driver of the size of the potential impact. When examining the power consumption, the story gets better with increasing scale. However, the scaling of the enterprise, may prove to have a more direct linkage to total expenses, and therefore, may be even more relevant.

The point of this discussion is that the choice of platform plays a significant role in establishing a “green” direction for an entire enterprise.

### ***Management Tools***

There are a growing number of innovative management toolsets and strategies that provide a business yet another set of opportunities to reduce costs of the technology refresh cycle and embrace a “green” initiative. An example will be provided in this section: Verdiem.

Verdiem<sup>3</sup> provides businesses a proactive approach to managing the consumption of power based upon settings, usage, and other detailed criteria. Without going into a detailed explanation of the software, the conclusion is that up to \$420 annually could be saved as a result of efficient power management. Again, to place this in context, this represents an incremental 3.3% of the acquisition costs of a PC. In addition, the savings is recurring.

## **3.0 The Impact of Regulations**

Regulations- just the mention may make some businesses feel intimidated. The requirements to protect intellectual property, personal and consumer information, confidentiality, and other facets of security are indeed daunting. There is an existing and continually expanding list of regulatory requirements, both nationally and globally. The roster of regulations includes such far-reaching laws as:

- HIPAA (USA)
- Sarbanes Oxley
- Gramm- Leach- Biley Act
- Safe Harbor
- RoHS (Europe)
- Patriot Act
- California SB 1386
- Electronic Transaction Act of 1998

- Basel 2 Capital Accord
- Canadian Electronic Evidence Act
- SEC 17a-4
- Piped
- Maritime Transport Security Act 2003
- ISO 18501/ 18509
- FDA 21 CFR Part 11

There are also several key sample governmental regulatory organizations:

- Environmental Protection Agency (EPA)
- Department of Defense (DoD) IT Regulations
- Public Records Office (UK)
- Electronic Ledger Storage Law (Japan)

It is clear that the number, complexity and types of regulations will increase over time. It is also clear that the compliance to the regulations will become more critical in the near term.

The question in this section is- what does the regulations have to do with “green” initiatives for client computing? The answer in this context is disposal of the assets, meaning the end of life of the devices.

The older devices contain more hazardous materials than the newer devices. This is a statement of where the technology has developed, not a value statement on commitment of manufacturers. Devices today are more modular and environmentally friendly. Form factors, size, and chassis are distinctly different. Just compare a five year old desktop to a newer desktop today. The difference in weight alone is significant.

It is reasonable to assume that a five year old desktop device, in reasonable condition, will have a nominal residual value, likely in the range of \$20 to \$25 (assuming configuration rules). In all likelihood, there may be a charge for shipping or other charges. On the other hand, a three year old desktop may have \$100 to \$125 value (or greater depending again on configuration).

For older technology, there is likely no resale market so the device would in essence be de-manufactured, and recycled. The newer device could be resold, and when it is ultimately recycled the impact on the environment would be less.

Regulations also require a “green” approach to disposition. In addition, some regulations require that the disk drives and any other proprietary information be effectively scrubbed or cleansed. This is an integral part of the disposal process. In the newer technologies, disk sanitizer is available as well as software to effectively cleanse this information. Also, the providers of the disposal services typically provide DoD-compliant disposal.

Both the physical and intellectual aspect of disposition are part of the “greening” of client computing.

#### **4.0 The Impact of Practice Levels**

Practice levels have a profound impact on the ability of a business to be “green” in client computing. Practice levels in client lifecycle management play a significant role in determining the level of “green” benefits and risk avoidance. Equally importantly, practice levels reflect the maturity of an enterprise in lifecycle planning and the desire for continuous process improvements. The practice levels also include

some of the key implications regarding lifecycle. The following are examples of such business practice levels:

- Asset management
- Disposition
- Cascading
- User segmentation
- Capital vs. expense budgets
- Other budgets vs. IT budgets

### *Asset Management*

The practice level of asset management plays an important role in the ability of a business to adopt a “green” client strategy. In order to implement a technology refresh strategy in general and a “green” refresh plan specifically, a business must know what devices are in the installed base.

The configuration, age, and specifications of the devices are important so that businesses can assess the environmental impact. In order to calculate, for example, the improvement in power consumption, the usage of the older device needs to be compared to the new devices. Without strong asset management, the installed base becomes more of an estimate and less precise.

### *Disposition*

The end of life of client devices has taken on an importance for a wide range of business reasons. From a regulatory, security and privacy perspective the rules are clear and defined regarding the level of diligence required.

From an environmental perspective, the rules are clear in terms of the EPA, for example, but not as clear when relating to specific governance of how to best dispose of an asset. Because there is no real entrance or exit costs to enter into the disposition business the number of suppliers are many.

Businesses need to consider disposition and the actual disposal of the asset with the same rigor that is invested in regulatory, security and risk decisions. Disposition is still viewed by many businesses as a cost, not as a requirement to be “green”.

### *Cascading*

*Closed Loop Lifecycle Planning*<sup>©</sup> defines cascading as the redeployment of existing access devices. The cascaded devices are not “net new” to the installed base of a business. Forgetting the business case on whether or not cascading as a business practice has merit or not, the implication to many businesses is that cascading devices extends the useful life of client devices.

The typical result is that access devices are retained beyond the initial lifecycle (three to four years, as an example). The focus is typically on remaining depreciation (if any) or if the device itself is good enough to be used in the installed base.

Unfortunately, in the majority of cases, the environment is not one of the criteria for consideration. Older equipment costs more in terms of power consumption and disposition values. Regardless of the support issues older cascaded devices encompass, the environmental considerations alone may in fact be compelling.

## *User Segmentation*

*Closed Loop Lifecycle Planning*<sup>©</sup> defines user segmentation as the alignment of end user requirements to the optimal portfolio of access devices, service levels, costs and risks. With more device diversity and innovation, user segmentation strategies can deliver benefits that result in a business better managing the overall product mix and portfolio.

From an environment perspective, having “green” as a part of the user segmentation logic and criteria will provide businesses a basis for technology refresh on many types of devices, and could lead to environmental optimization.

Few people argue these days that the economics of CRTs compared to flat panel monitors, particularly in relation to the environment.

User segmentation raises the bar to permit businesses to leverage a methodology to explore the following types of access devices from the number of devices actually required to the safe disposal of the devices. The scope could include, as examples:

- Desktops
- Notebook PCs
- Tablets
- Thin clients
- PC blades
- Workstation blades
- Server blades
- CRT and flat panel monitors
- Handheld devices
- Cell phones and smart phones

The point to be made is that each device and decision associated with the devices also implies some level of decision-making regarding “green”. How long devices are to be retained, how the devices are to be maintained, and how the devices are to be disposed are samples of conscious and unconscious decisions organizations make.

## *Capital vs. Expense Budgets*

There is always a push-pull argument in all businesses regarding capital versus expense budgets. Capital means that cash or credit is used to pay for access devices. Capital is a use of balance sheet assets. The expense budget is ongoing income statement activities.

In most businesses, acquisition of new products, such as desktops and notebook PCs require capital dollars. Other devices such as PDAs, handhelds, cell phones, smart phones and so on typically are handled with expense dollars.

Typically, capital dollars have more visibility in an organization, requiring a level of approvals and frequently depreciation or amortization on the corporate books. Capital dollars are frequently a subject of negotiation in businesses and are often incremented or decremented based upon certain economic results or activities.

The expense budget is typically set year to year, frequently at a level less than the previous year. It is not unusual for businesses to seek a year to year operating expense reduction in the 8% to 10% range.

The dynamics described above set up a scenario where many businesses retain client devices well beyond the “normal” useful life. The belief is that the technology can be “ridden until it dies”. The assumption is that longer life without capital is better and economically sounder financial logic.

If the criterion is reset to include the implications and real costs of “green”, the decision and perception could very well change.

### **Other Budgets versus IT Budgets**

One of the key inhibitors to “green” initiatives is that the IT organization making the environmentally sound decision would not see any of the financial benefits accrue to IT. It is not unusual to see benefits accrue to facilities, purchasing or a general fund and IT omitted from the benefits. As a result there is frequently little motivation fiscally for IT to engage in an aggressive “greening” of client computing.

While corporate stewardship is not unusual, it is typically not the best basis to establish a governance model. *Closed Loop Lifecycle Planning*<sup>®</sup> suggests that the linkage of IT into “green” decisions and the related financial benefits be aligned (in many businesses today they are not). IT expertise is required to drive the “green” initiatives in client computing.

In some businesses, other organizations than IT drive the “green” initiatives and miss the point that it is the technology, tools, practices, and innovation which reduced the environmental impact. Unless that is your expertise, you may not be the optimal organization to take the sole lead. “Green” requires teamwork, and in many businesses too much time is spent determining who will be the captain of the team compared to the functioning of the team itself.

Two examples can illustrate this point. In Company A there is a disposal program driven by purchasing. When IT determines the end of life of client devices, the disposal agent is contacted and related activities are set in motion. In this scenario, the relationship is a revenue sharing one, meaning that once the one-time only costs are covered by the disposition agent, the proceeds if any are shared.

The proceeds when tendered are provided to an enterprise account, purchasing receives the kudos, and IT needs to acquire more incremental devices and still reduce their costs 8% to 10%. This does not provide IT a lot of motivation to become aggressive in the economics since proceeds are outside of their budget.

In another example, the benefits of reduced power consumption accrue to facilities, not to IT. There is, therefore, little motivation to aggressively pursue a more rapid refresh rate based upon the overall economics since IT will be measured against the performance of the IT budget.

Businesses are beginning to connect these dots, and the silos that have been created are being identified and addressed.

## **5.0 What the Future Holds**

The landscape is ever-changing. “Green”, once thought to be an oddity of the few, is now mainstream in terms of concepts and deliverables. Corporate citizenship is measured in many cases by how “green” a business has become. Becoming “green” is not an option, it is becoming, and in many cases already is, an entry to participate and compete in the global community.

Several obvious trends can be observed that are somewhat simple to anecdotally validate. These trends include:

- Increasing regulatory requirements

- More visibility to “green” initiatives
- More expectations will be set to be “green”
- Products will be developed to become more and more “green”
- Product lifecycles will become shorter to take advantage of “green”
- “Green” will become a part of the criteria for technology refreshes

### *Increasing Regulatory Requirements*

The landscape will become more regulated. The regulations will be global, national, regional and local. The amount of pending legislation will increase as more and more businesses, consumers, and individuals become more sensitive to the “green” initiatives.

*Green Line Supply*<sup>5</sup> lists the following potential pending legislation in California:

- California AB 1535 (Extending the scope of the Electronics Recycling Act of 2003)
- California AB 48 ( Expand the scope of Restriction of Hazardous Substances-like provisions)
- California 546 (focuses on tower computers)

### *More Visibility to “Green” Initiatives*

There is not a day that goes by where there is not a news report, scientific report, or opinion expressed regarding the topic of “green”. Regardless of what side of any cultural or political argument one is on, one cannot avoid being informed on the environment and the impact of being “green”.

### *More Expectations Will Be Set to “Green”*

In *Closed Loop Lifecycle Planning*<sup>6</sup>, the chain of expectations was discussed. The constituencies of share holders, customers, employees, and consumers all expect adherence to the regulations, but more they all anticipate embracing the concepts sincerely and with passion.

- Share holders  
Share holders will expect the company to embrace “green” and that some percentage of the product line and company will invest in technologies and businesses that are in line with “green” initiatives. Share holders expect innovation so that investing in “green” does not result in cost prohibitive solutions and that negatively impact the profit and loss statements.
- Customers  
Customers expect that all client devices are compliant to regulations (of course), but also there is an expectation that the customer should not need to become an expert on “green”. The assumption will be to heavily rely on the manufacturers.
- Employees  
The trend has already begun where there is intense pride being taken in businesses that adopt a “green” approach. Employees expect their company to embrace and adopt the initiatives.
- Consumers  
The consumer may or may not be a customer of a particular business. The consumer represents the overall buying public at large. In the realm of client computing, consumers clearly expect the energy, heat, power, and components all to have a better energy and environmental story than whatever the previous generation of technologies offered.

When looking at the future, there are at least three considerations on the horizon:

### *Products Will Be Developed to Become More and More “Green”*

Client devices will have “green” be a fundamental part of the devices’ design DNA. As each generation of access technology becomes more environmentally friendly, succeeding products will adopt those enhancements and more. The level of research and development required to deliver this promise to the industry requires a robust commitment to the research and development (R&D) function.

Innovation is a term that has received a lot of play in the industry of late, both from a positive and negative perspective. However, it is not possible to develop and create “green” access technologies without innovation and the related R&D that is required.

### *Product Lifecycles Will Become Shorter to Take Advantage of “Green”*

Access technology refresh cycles will by necessity be shortened to take advantage compelling environmental approaches. If a company desires to be “green” but there is conflict in the three to four year (or beyond) technology refresh cycle, assuming the business case is reasonable, then more businesses will defer to a shorter cycle.

Older technology will simply cost more to run, be more challenging to dispose of and will constantly have alternatives that are viable enough to be considered. Locking oneself into a financial scenario which ignores or avoids the impact either from the silo situation discussed earlier in this white paper or that the cost for “green” may be higher (either real or perceived) dismisses the concept that “green” has a social as well as a business basis for adoption.

### *“Green” Will Become a Part of the Criteria for Technology Refreshes*

Today, to develop a “green” business model, a business must develop criteria to examine the real costs, but also decide how to measure the impact that “green” access technologies will have on the enterprise.

In many RFPs and RFIs today, the criteria for “green” are typically anecdotal or ancillary to a tender request. The rationale is that there is a premium to be paid for adopting “green” which may or may not make the acquisition price attractive. Businesses that retain this perspective may miss the point of “green” initiatives: it is not about price but cost.

If TCO has taught the industry anything it is that acquisition price represents a fraction of the total cost. *Closed Loop Lifecycle Planning*® simply stated in 1999 what is still true to day: that “price does not equal cost”.

## **Conclusions**

The real test of when “green” enters the mainstream is when there is no need to place quotes around the term “green” itself. Another key test will be when the criteria for “green” are an integral part of RFPs, RFIs and customers buying criteria. Further, when “green” no longer requires advocates and sponsors internally, it will finally be mainstream.

When all of the savings are added and optimized, one conclusion becomes apparent- a “green” technology refresh strategy, if properly implemented and executed, could reduce the overall real cost of a technology refresh cycle by at least 10%. Savings should be looked at over the lifecycle of the technology and compared as a percent of the actual costs of older technologies as well as acquisition pricing.

Lifecycle strategies in general are not necessarily easy to change. Tactics are often steeped in culture, silos, and comfort levels. "Change is always unsettling," according to *Closed Loop Lifecycle Planning*© even when change is positive and good.

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