

# TRENDS & PREDICTIONS

Info-Tech Advisor Premium - Forecast



## About this research note:

Trends & Predictions notes identify emerging issues in the IT space, give insight into their implications, and provide tactical guidance on how IT decision makers can capitalize on these trends.

## 11 Green Initiatives Your Peers Are Cultivating

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With pressure increasing on IT to “be green” it can be difficult to identify which strategies are mature and ripe for adoption. This Trends & Predictions research note cuts through the hype to clearly map what enterprises are really doing to green their IT operations.

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## Executive Summary

There is a significant amount of buzz around the greening of IT. Vendors are marketing their products as “green” solutions, environmental issues are being brought to light in the media, and enterprises are running into real problems in terms of power and cooling capacity for their data centers. So where should decision makers really focus when looking to implement green initiatives? Numbers don’t lie. This note explores:

- » The adoption rates for 13 green technologies/tactics.
- » Two models for assessing the maturity of various green initiatives.
- » Green adoption trends in the mid-market.
- » Factors that affect adoption.

Find out what enterprises are really doing to become more energy efficient and environmentally conscious in this Premium Trends & Predictions research note. Learn about which strategies make sense at this point in time.



## Trend Point

Enterprises have demonstrated a growing interest in green IT strategies. The previous Premium Trends & Predictions note – [“Info-Tech’s Green Index: How Green Are You?”](#) – explores the questions, “To what degree is IT leadership concerned about improving energy efficiency and environmental responsibility?” and “How green is your enterprise’s IT operations?”

The answers to these questions suggest a technology adoption curve that is fairly immature, but growing. This is evidenced by the fact that adoption is primarily being led by innovative and leading-edge enterprises. Also, there is still a large gap between interest in green IT and implementation of best practices. Although 25% of IT leaders are “very” or “extremely” concerned about energy efficiency and environmental responsibility, fewer than 10% consider themselves “very” or “extremely” green.

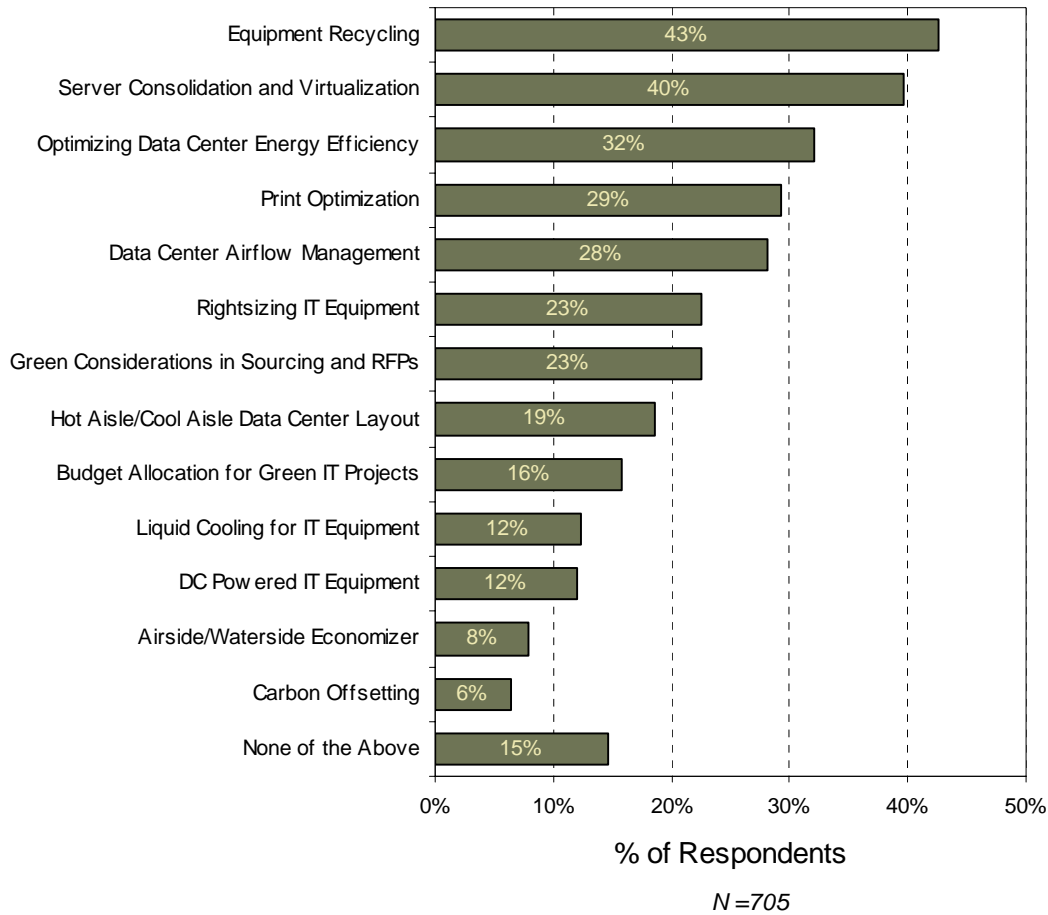
### *Green Technology Adoption*

In order to speculate on how this gap might be bridged, we must explore individual technologies/tactics and assess their relative maturity in the industry. Looking at overall adoption rates (Figure 1), we see that some strategies, such as equipment recycling and server consolidation and virtualization, are already experiencing fairly high adoption rates.



**Figure 1. Overall Adoption Rates for Green Technologies**

Source: Info-Tech Research Group, June 2007



## Situation Analysis

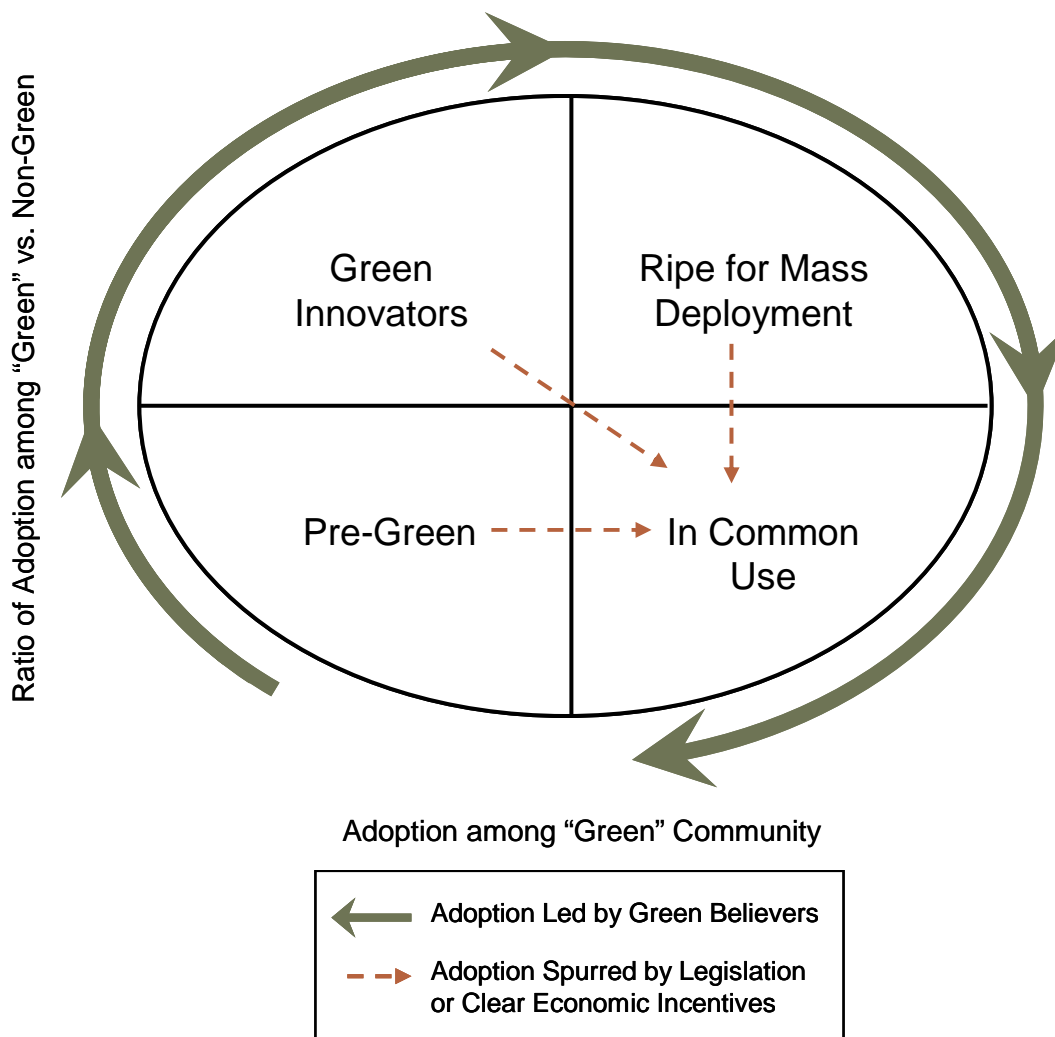
### *Green-Led Adoption*

While overall adoption rates are useful, they don't tell the complete story. In order to assess the merit of a technology/tactic as a "green" strategy, it helps to compare its adoption rate among the green community versus its adoption among those enterprises that are not green. The charts below (Figure 2a and 2b) do just that – they highlight how mature a technology is as a green solution.



**Figure 2a. Green-Led Technology Adoption**

Source: Info-Tech Research Group, June 2007



- » **The horizontal axis** graphs the adoption rate of green technologies/tactics among enterprises that are very/extremely green.
- » **The vertical axis** graphs the ratio of adoption among very/extremely green enterprises versus those that are not.

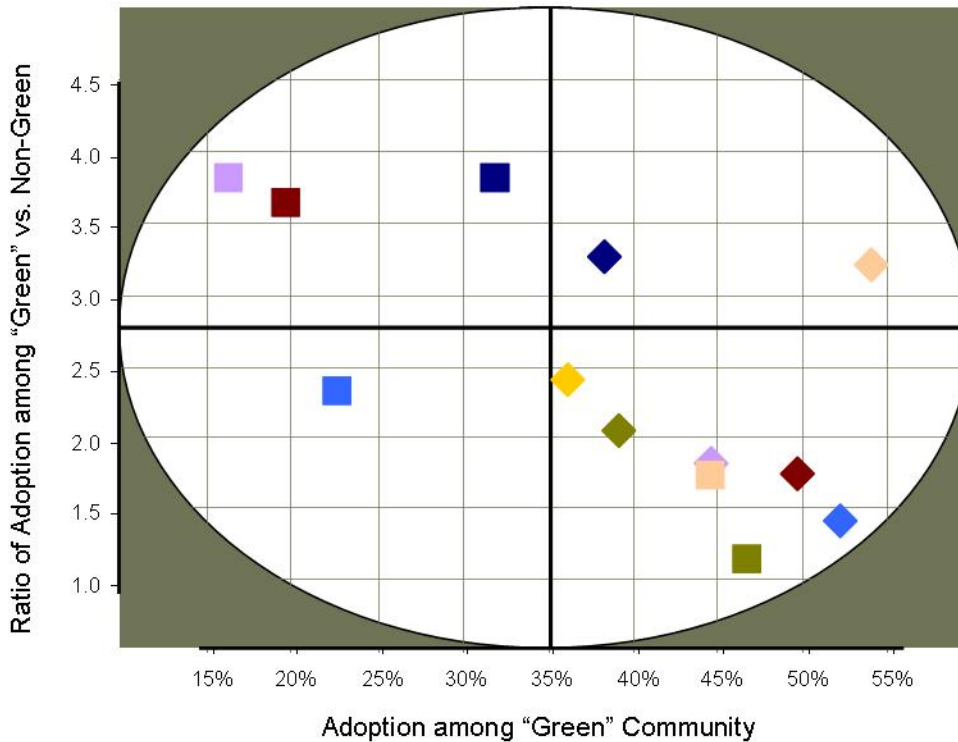


- » **Green-led adoption** occurs when a technology moves through the following stages:
  1. **Pre-green.** Technologies/tactics in this quadrant have low penetration among the green community, but also among the non-green community. These tend to be technologies that already exist as niche solutions waiting to be “discovered” or re-branded as green. Overall adoption may actually be higher than for technologies being adopted by green innovators, but it is not driven by the green community.
  2. **Green innovators.** Adoption is still fairly low, but penetration among the green community is significantly higher than among non-green enterprises. Many uniquely green technologies will begin their lifecycle in this quadrant coming in from the top-left corner where adoption is very low and really only prevalent among the green community.
  3. **Ripe for mass deployment.** Here we see significantly higher adoption among green enterprises. These technologies/tactics have now been proven by the green community and will begin to filter into the mass market.
  4. **In common use.** Once a technology reaches this quadrant it has high adoption among both green and non-green enterprises. As it moves towards the bottom-right corner it becomes more and more mature.
  
- » **Adoption that is non-green related** also occurs naturally and is likely more of a factor for technologies that help meet a compliance/legislative mandate or for technologies that have a clear economic incentive beyond the green cause (i.e. server consolidation and virtualization). This type of adoption is illustrated with the dashed arrows in Figure 2a above. This relationship is described directly in Figures 3a and 3b below, but it is important to understand that it is not possible to control for it entirely when looking at green-led adoption.



**Figure 2b. Green-Led Technology Adoption**

Source: Info-Tech Research Group, June 2007



- ◆ Budget Allocation for Green IT Projects
- ◆ Green Considerations in Sourcing and RFPs
- ◆ Server Consolidation and Virtualization
- ◆ Hot Aisle/Cool Aisle Data Center Layout
- ◆ Airside/Waterside Economizer
- ◆ Equipment Recycling
- ◆ Carbon Offsetting
- ◆ Optimizing DC Energy Efficiency
- ◆ Right-sizing IT Equipment
- ◆ Data Center Airflow Management
- ◆ Liquid Cooling for IT Equipment
- ◆ Print Optimization

Figure 2b highlights some interesting findings regarding green technologies/tactics. First, it is important to note that almost all of the technologies listed show at least a 1.5 times higher adoption rate among the green community than among the non-green community.



As expected, certain technologies, such as DC powered equipment, are still not proven strategies and show low adoption. Similarly, carbon offsetting (donating to green organizations/initiatives to offset the carbon emissions created by the enterprise) and airside/waterside economizers (using naturally cooled air/water instead of air conditioning) are also very niche, with over 3.5 times more adoption among green enterprises than among non-greens. All three of these approaches also have specific limitations that prevent adoption. For DC power, it is safety concerns and high implementation costs; airside/waterside economizers are only useful in certain climates, predominantly in the US north-west; and carbon offsetting is an investment that shows no direct returns to the enterprise, similar to a charitable donation, but without the tax benefits.

The technologies in common use are fairly predictable, including virtualization, equipment recycling, optimizing data center energy efficiency, and print optimization, data center airflow design, hot aisle/cool aisle layout, and rightsizing IT equipment. These are all strategies that have proven efficiency and cost benefits beyond simply fulfilling a green mandate.

Strategies to watch as up-and-coming green initiatives include green considerations in RFPs and budget allocation for green IT projects. Interestingly, both of these tactics are likely catalysts for more green adoption. Not surprisingly, virtually all of the strategies listed, with the exception of equipment recycling, are affected by green budget allocation.

Liquid cooling is also close to moving into the ripe-for-adoption zone. Since most data centers are only beginning to forecast the type of heat densities that would necessitate a liquid-cooled solution, this will likely remain in the green-innovators zone in the near term. However, expect this to change as the average heat output per racks starts to crest the 20kW to 30kW point.

### *Market-Led Adoption*

Another way to look at technology adoption is the traditional market adoption curve directed by innovative enterprises. Under this model, we look at the ratio of adoption among leading-edge investors versus conservative investors (Figures 3a and 3b). This is a useful view because it removes the green bubble and looks at the adoption of various strategies based on market forces. This allows decision makers to evaluate green IT technologies against any other IT investment.

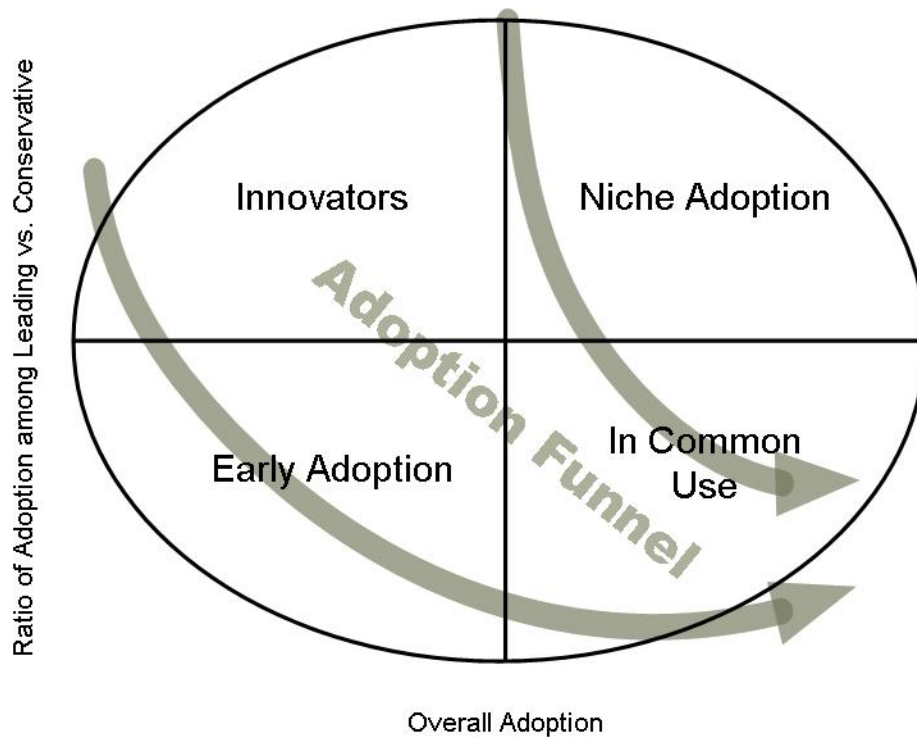
Comparing the two different charts (green-led adoption versus market-led adoption) highlights those strategies that have unique merit as green versus those that are adopted for other reasons.





### Figure 3a. Market-Led Technology Adoption

Source: Info-Tech Research Group, June 2007



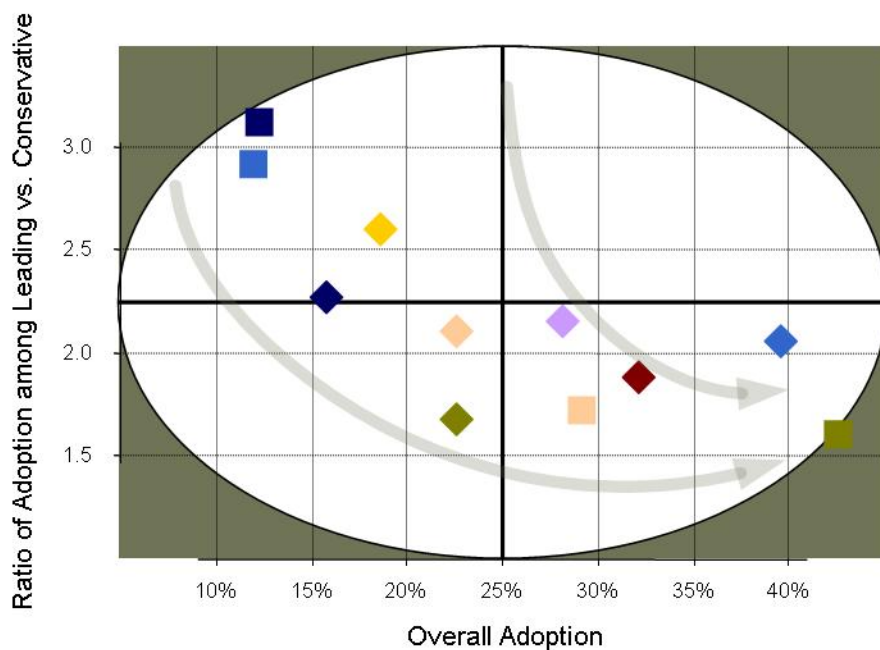
- » **The horizontal axis** graphs the overall adoption of the technology/tactic (as seen in Figure 2a above).
- » **The vertical axis** graphs the ratio of adoption among those that are leading-edge investors versus those that are conservative investors.
- » **The adoption funnel** describes the typical path of a technology through the following stages of adoption:
  - **Early adopters:** These leading-edge enterprises see the possibilities of the new technology and are willing to accept some shortcomings to get “ahead of the curve.”
  - **Niche adoption:** Overall adoption rates are bolstered by a few niche users of the technology in the leading-edge segment.



- **Early majority:** The technology is increasingly proving itself and is making its way into more conservative enterprises. Likely price, usability, and proven value/ROI of the technology have improved.
- **In common use:** Once a technology reaches this quadrant it has high adoption among both leading-edge and conservative enterprises. As it moves towards the bottom-right corner it becomes more and more mature.

**Figure 3b. Market-Led Technology Adoption**

Source: Info-Tech Research Group, June 2007



◆ Budget Allocation for Green IT Projects	◆ Optimizing DC Energy Efficiency
◆ Green Considerations in Sourcing and RFPs	◆ Rightsizing IT Equipment
◆ Server Consolidation and Virtualization	◆ Data Center Airflow Management
◆ Hot Aisle/Cool Aisle Data Center Layout	◆ Liquid Cooling for IT Equipment
◆ Print Optimization	◆ Equipment Recycling
◆ DC Powered IT Equipment	



Using the more traditional technology adoption lifecycle, we see that most of the technologies/tactics listed have moved up and to the left and out of the common use area. This makes sense, because green as a strategy is still not widely accepted (29% of enterprises consider themselves at least somewhat green) and so adoption of green strategies outside the green community is lower.

Of the 13 strategies that were initially discussed, we see that 11 are still being adopted to some degree, while two are very fringe. Carbon offsetting and airside/waterside economizers have fallen completely off the grid with adoption ratios of 8.7 (times more adoption among leading edge) and 7.3 respectively, and overall adoption rates of less than 10%. The only item that ranks consistently high is equipment recycling, which is mandated by law in many areas.

In Figure 3b, more established and not traditionally green items dominate the common use area, including data center airflow management/energy optimization, virtualization, and print optimization. Coming down the funnel, enterprises can expect to see tactics such as rightsizing IT equipment, green considerations in RFPs, budget allocation for green IT projects, and hot aisle/cool aisle data center layouts.

## Info-Tech Predicts

Given the findings above, Info-Tech expects the following trends to emerge in the near-term:

- » **Growing budgets for green IT initiatives.** One of the major challenges in going green is that, in most cases, power costs are not part of the IT budget, reducing the motivation for IT to make “green” decisions. As energy conservation becomes an enterprise-wide initiative, IT will also receive internal budget incentives for purchasing equipment that meets target efficiency levels.
- » **Green sourcing.** Enterprise IT departments can expect green considerations in RFPs to become more and more prevalent. Two factors will drive this change:
  - A redefinition of data center TCO that includes energy efficiency as a significant cost factor when considering new equipment.
  - Corporate mandates to become green and source responsibly.

## Key Takeaways

In many cases, the green initiatives discussed in this note are already being planned or are underway, but not explicitly described as a “green” effort. If this is the case, it may be an issue of re-branding the initiatives as green in order to secure the desired funding or fulfill a corporate mandate for green.



Getting both high level support and cross-enterprise buy-in is critical for the success of a major IT project. Green is currently a message that resonates strongly with decision makers and the general public and so is an opportunity. Sometimes metrics like increased utilization and better resource allocation don't resonate with the ones that hold the purse strings. Green metrics, though, with their immense appeal to the marketplace, get noticed.

### *The “Safe” List*

Enterprises that are new to green IT or that are exploring opportunities for cost-savings should investigate the following proven strategies:

1. **Equipment recycling.** This is a standard practice for many enterprises. In most areas, it is illegal to dispose of certain PC components in landfills and so recycling is compulsory. PC recycling shops can help IT departments dispose of old equipment and ensure legal compliance. Concerns regarding the safety of the company's data and information leaks can be mitigated using proper hard disk sanitization.
2. **Rightsizing IT equipment.** The number one way to reduce asset acquisition as well as ongoing energy costs is rightsizing IT equipment to match near-term requirements. This is a step that can be taken by enterprises of all sizes – even those with only a few servers. Case studies show that average server utilization rates range from 10% to 20% of capacity. Equipment – including servers, storage, power supplies, UPS systems, air conditioners, fans, and air exchange systems – operating with significant overcapacity is a waste. In addition to lowering IT investment in fixed assets, the Green Grid estimates that rightsizing IT equipment can reduce energy consumption by as much as 50%.
3. **Virtualization.** Virtualization can deliver a 40% to 75% one-time savings on equipment and up to 50% in ongoing operating expenses. As a further continuation of rightsizing, use server/storage consolidation and virtualization as a way to eliminate redundant/inefficient equipment, improve capacity utilization, and reduce electricity consumption. For more on the virtualization opportunity, refer to the ITA Premium research report, [“Achieving the Business Case in Virtualization.”](#)

#### Greening the Data Center

For more information on green data center strategies and best practices in power and cooling, refer to the following ITA Premium research notes:

[“Info-Tech’s Green Index: How Green Are You?”](#)

[“Greening the Data Center: Improve Energy Efficiency”](#)

[“Greening the Data Center: Reduce Cooling Requirements”](#)

[“Greening the Data Center: Take an Asset Lifecycle Approach”](#)

[“Eight Ways to Save on Electricity Bills”](#)



4. **Optimizing data center energy efficiency.** Data centers operate in an “always on” environment and consume copious amounts of energy. According to the [Lawrence Berkeley National Laboratory](#), the average data center has 10 to 30 times the energy requirement (and cost) of equivalent sized office space. This, coupled with the fact that US commercial electricity prices have increased over 20% in the past five years, means that data center energy consumption is finally attracting the attention of enterprise executives. Aside from cooling, key target areas include power supply and UPS efficiency, as well as energy tracking and management via tools such as HP’s [Insight Power Manager](#) or IBM’s [PowerExecutive](#). Tracking energy usage in the data center provides a baseline for calculating the ROI of new energy saving initiatives and helps identify areas of opportunity.
5. **Optimizing data center cooling (airflow design and hot aisle/cool aisle layout).** Optimizing cooling presents the single largest area of opportunity for IT to save energy. According to both the [Uptime Institute](#) and HP Labs, the heat density of data centers is currently increasing at a rate of about 15% to 20% per year. Due to the increasing power density and heat generation of newer equipment, cooling and air conditioning energy costs now surpass the cost of powering servers.
6. **Deliver more targeted and adaptive cooling.** Room-level air conditioners are imprecise and inefficient. For racks with an average heat output of 15 kW to 20 kW (or more), consider cooling solutions at the rack level that transfer heat close to the source as opposed to allowing it to diffuse throughout the surrounding area.
7. **Improve airflow management.** Air distribution is key when it comes to efficient cooling. Proper data center air management minimizes the mixing of hot air emitted from equipment and the cooling air supplied to it. Efficient air distribution can help increase the density capacity of the data center (W/ft<sup>2</sup>), reduce heat-related malfunctions, and lower operating costs. Pacific Gas & Electric ([PG&E](#)) suggests that poor airflow management can decrease the cooling capacity of a Computer Room Air Conditioning unit (CRAC) by 50% or more. A recognized approach to efficient air handling and air-flow management is implementing a cool aisle/hot aisle layout. This model is optimized when airflows are separated by enclosing aisles, thus allowing for more effective cooling.
8. **Print optimization.** Printing is a significant consumer of enterprise resources (5% of the average IT budget) and a contributor to waste. Enterprises that use multiple types of printers, tacitly allow the use of rogue personal printers, and fail to centrally manage their output fleet are throwing money away and increasing their environmental footprint. Recent case studies have shown that proper management of the printing resources and hardcopy devices can realize savings of up to 20% to 30%.



## Bottom Line

With pressure increasing on IT to “be green” it can be difficult to identify which strategies are mature and ripe for adoption. This Trends & Predictions research note cuts through the hype to clearly map what enterprises are really doing to green their IT operations.

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