



Advisory

The Green CEO

Executive Summary

“If we don’t correct what we’re doing to nature, nature will assuredly turn around and correct us...”

More and more chief executive officers (CEOs) are taking corrective actions to reduce the greenhouse gasses that their enterprises ultimately produce by consuming electricity. These CEOs are:

- *Attacking infrastructure waste* (by optimizing datacenter power and cooling; and by building “green” energy-efficient buildings, distribution centers, and manufacturing plants);
- *Optimizing business process flows* (by focusing on lowering energy usage in the supply chain, ranging from the acquisition of raw materials through the delivery of finished goods); and by
- *Changing employee and consumer behaviors* (sensitizing employees and customers to efficient energy use practices and environmental responsibility).

This *Advisory* provides a high-level overview of some of the motivations/drivers and some of the approaches being used by CEOs to manage energy use. In 2008, expect a series of related, follow-on, in-depth articles from *Clabby Analytics* that will explore energy-efficient datacenters and building practices; supply chain energy efficiencies; and employee/consumer energy-use behavior modification.

The Motivational Drivers for Going Green

Over the past year I’ve travelled to Southeast Asia, South America, the Middle East, Europe, and all over North America. In conversations with business executives in these locations (CEOs, CIOs, CFOs) I have found a lot of interest in “going green”, but not much action (except in Europe). Further, I find many large multinational companies have established energy policies, while midsized and small businesses generally have not.

The three major motivational factors driving enterprise green initiatives are:

1. Regulatory compliance;
2. Operational savings; and,
3. Brand stewardship.

Regulatory Compliance

In Europe, one of the primary drivers for adopting energy saving policies is strong European Union (EU) regulatory action. In January, 2005, the EU introduced its emissions trading scheme (ETS) — a cap and trade mechanism. Under this scheme,

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EU member states set an emissions quota for enterprises within their jurisdiction. Energy cap credits are issued to each enterprise — and enterprises that exceed their caps need to purchase additional credits from enterprises that have not exceeded their caps. Additional information on EU energy policies can be found at: http://en.wikipedia.org/wiki/Energy_policy_of_the_European_Union.

Regulatory compliance is a major driver of enterprise energy policies in the EU.

Unfortunately, the world's largest polluter (the United States) has not formed a policy similar to that of the European Union. But a grass roots movement is underway in major U.S. cities — and at the state level — to start regulating energy use. Clabby Analytics will follow this trend more closely as regulations evolve within U.S. markets.

Operational Cost Savings

Much of the remainder of this paper focuses on how enterprises can build an energy use program focused primarily on operational cost savings. In short, enterprises are finding that they can “go green” as well as reduce operating costs. And the places that enterprises are focusing their efforts include:

- Infrastructure (particularly the datacenter);
- Processes;
- Buildings; and,
- Human behaviors.

Global competition for oil and gas has created a seller's market where some analysts expect energy prices to double within ten years. Many CEOs know they need to mitigate these escalating costs by using energy more efficiently, as well as by investing in alternate sources of energy. Energy use policies are already being monitored at the board level in many enterprises.

Remember, the price of carbon-producing oil and coal energies are rising. Operational costs are tied closely to the cost of energy rises. Adopting energy reduction strategies in the face of these escalating costs is just plain good business...

Brand Stewardship

For some enterprises, promoting commitment to environmental change can drive brand awareness (and thus, drive sales); create a positive public perspective regarding an enterprise's products or services; and/or become a crucial element when making purchase decisions (a differentiator). This final point is particularly worth emphasizing: some CEOs see going green as a means to grow their business using green policies as a differentiator.

The motivations for undertaking green endeavors vary greatly. Some CEOs are compelled by regulation to institute energy conservation policies. Some CEOs believe they have a moral responsibility to stop polluting this planet; others see opportunities to reduce costs and manage risks; while still others see opportunities to grow their businesses by adopting green business practices. Some see all of the above.

Which Predicament Is Your Enterprise In?

The type of business you run will ultimately dictate your behavior when it comes to planning your company's energy policies:

- *Proactive large emitters* — Large businesses (such as those in the transportation, manufacturing, and retail industries) that use a lot of energy are being driven to structure an energy use policies in order to reduce financial risk and exposure. Further, large retailers (such as Walmart) have huge energy costs within their buildings as well as within their supply chains.
- *Reactive medium/large emitters* — The CEO at this type of business (for instance, light manufacturing) is not under the same financial pressure as large emitters; regards energy as a variable cost to be worked into the total cost of goods/services produced; and accordingly is taking little action to reduce energy usage costs. At this type of enterprise, true energy operational costs are usually not known. And energy cost reduction is not a board-monitored activity.

These enterprises will be eventually be compelled through legislation to reduce their carbon footprints (as is already happening in Europe). In other parts of the world, energy utilities are also providing energy conservation incentives to encourage efficient energy use. And, as energy costs double over the next ten years (or less), energy consumption will become a board level discussion at these enterprises.

- *Medium emitters* — CEOs at these mid-sized businesses (again, light manufacturing is an example) whose carbon footprints are lower than proactive large emitters and reactive medium/large emitters have generally failed to act on energy initiatives for a variety of reasons. Leading the list is financial impact (going green is considered an additional expense item). But a limited understanding of the enterprise's true energy expenses also plays a huge role in mid-sized emitters' indecisiveness and lack-of-action.

Increasing energy cost, as well as competitive pressures from medium emitters who take action first, will eventually drive medium emitters into action.

- *Low emitters* — Typically, information driven enterprises such as banks, healthcare institutions, governments, and some retail organizations, these enterprises are typically "brand aware" and are eager to promote environmentally friendly messages that support green energy use. Going green is not cost prohibitive — and consumer recognition of green efforts is viewed as an asset.

Wresting Back Control: How to Build a Strategic Energy Use Plan

Believe it or not, complete energy templates that can take you through a step-by-step approach to building an enterprise-wide, strategic energy use plan are readily available on the Internet as well as from various vendors. In fact, some of these templates are so granular that they can actually take you through the development of an energy use plan by industry!

There are essentially four steps involved in building a strategic energy use plan:

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1. High-level (c-level executive) corporate commitment to energy conservation (including the assignment of responsibility and accountability). CFOs need to work closely with CIOs in order to meet strategic objectives established by the CEO and board;
2. Gather information (you must look closely at infrastructure, processes and behaviors);
3. Modify energy use (focus on the following attack points: the datacenter; building design; supply chain processes and practices; and employee/consumer behaviors. Alternate energy sourcing can also play a role here);
4. Ongoing monitoring of energy use and corresponding actions to ensure the energy strategy is being executed.

Getting Started: Gathering Data — Where to Look

The biggest problem that all CEOs face is monitoring energy use — most cannot construct a composite picture of how energy is being used within their respective organizations. And without knowing how energy is being used, it is difficult to build a strategy for cutting energy waste.

So, the big question is: “where to start”... Here are some recommendations (all of these recommendations will be explored in greater depth in subsequent sections of this report):

- *Infrastructure (datacenter)* — the low-hanging fruit (the opportunities to most easily reduce energy consumption) reside within the enterprise datacenter, as well as in building heating/cooling costs). Until recently, the state-of-the-art in tools to measure datacenter power consumption at the systems level have been pretty mediocre — but now there are a spate of tools and utilities that can help datacenter managers understand the power consumption characteristics of systems, storage, network, power supplies, chillers, air conditioners and other devices that burn electricity within the datacenter.

Note that recent CNET and Information Week surveys have shown that 20% of all enterprises surveyed have done an energy audit — and that 77% of datacenter IT organizations are not responsible for paying their energy bills (the CFO's office does that). CEOs and CFOs need to drive awareness of energy usage and accountability for energy usage to all departments within their organizations.

Be aware that several vendors offer datacenter power/cooling assessment services. These vendors have sophisticated equipment that can measure heat dissipation at various levels within a datacenter — and can structure airflow plans to efficiently dissipate that heat. Also, all of the leading systems vendors now offer power measurement software for their servers (although the level of sophistication of these software offerings varies greatly).

- *Infrastructure (buildings)* — power, heating, and cooling costs for building are comparatively easy to obtain. Once that data is gathered, the next task is to examine increasing building population density (serve more employees in less space), and capturing/reusing heat and cooling using existing or alternate energy sources.
- *Processes (supply chain, manufacturing, procurement, ...)* — collecting data on where energy is being wasted within a supply chain is a cumbersome, complex task. Analysts need to understand the cost structure of a given product;

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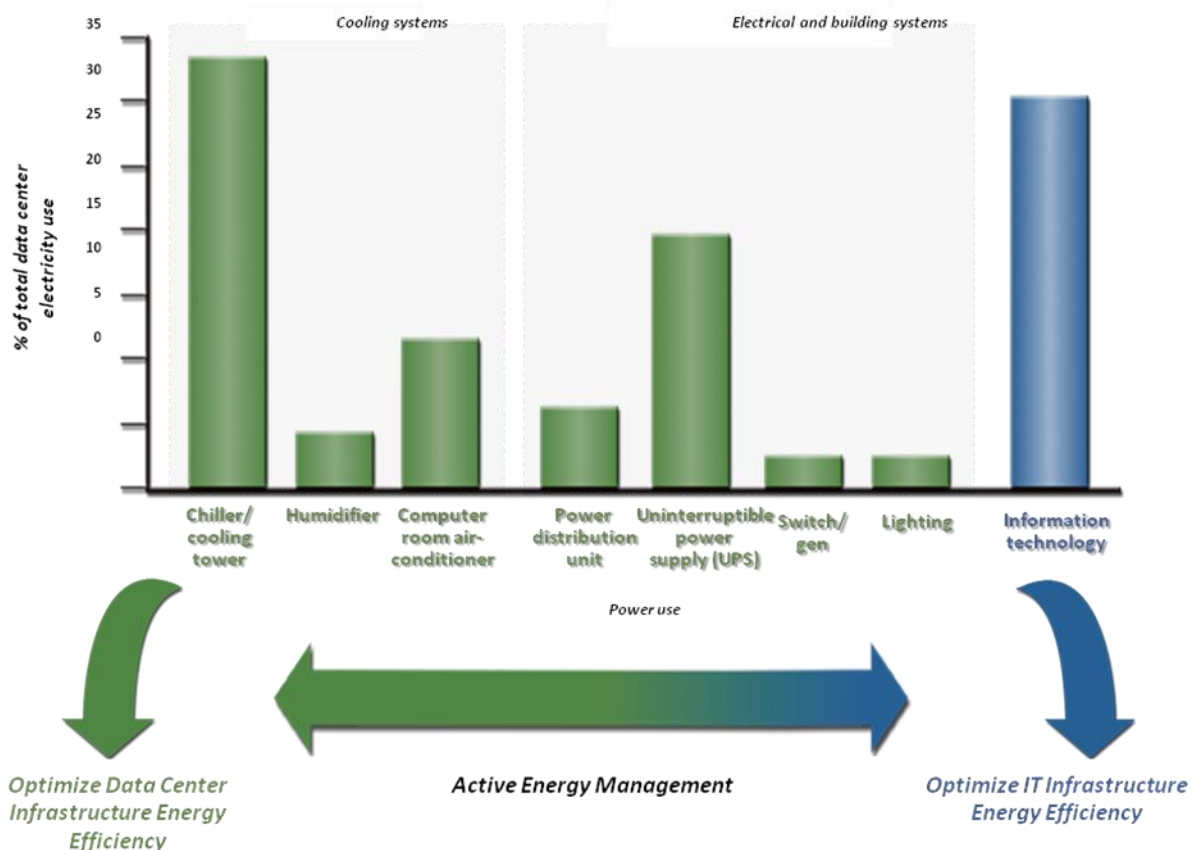
logistics (how much is it costing to get products or materials from one site to another); and trade-offs (if our organization has to spend more for a given part — but it can save money on transportation — should that be factored into the procurement model?).

- *Human behavior* — some elements of gathering energy costs related to human behaviors are easy to obtain; others are more difficult to measure. For example, costs related to air travel are easy to obtain; while costs related to commuting or vehicular travel between sites can be a bit more difficult to gather. But, as described earlier, some company already have templates in place that can help measure employee-related power consumption/waste.

A Closer Look at Creating an Energy Efficient Datacenter

Attacking energy waste within the datacenter is a great place to start because tools and utilities that measure energy consumption by device are readily available — returns on investment are short-cycled — and energy consumption characteristics of devices such as air conditioners, chillers, power supplies, power distribution, and information technology costs are generally “known”.

Figure 1 — Energy Costs Within the Datacenter



Source: IBM Corporation — May, 2007

Figure 1 illustrates a datacenter cost model. Note that information technologies are not the biggest energy consumers within the datacenter (systems/storage and networks hover at around 30%). The largest costs within the datacenter fall into heat

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dissipation/cooling, followed by supplying/distributing power. To reduce costs within the datacenter, start by focusing on lowering the electrical consumption of information systems. Reduced electrical consumption lowers heat generated. Less heat means less cooling. And all of these mean less power draw (which lightens the load on uninterruptable power supplies and power distribution units).

Especially noteworthy is that many IT executives (particularly in North America and Europe) are attacking the energy costs related to information technology by consolidating and virtualizing their datacenters. Virtualization is a piece of the puzzle — but not the whole enchilada when it comes to datacenter energy use reduction.

Another point worth noting is that software is evolving that links IT management and facilities management. IBM, for instance, has software that captures data on energy use within its facilities, analyzes that use; and even enables IBM accountants to analyze the rates they have been billed for electrical consumption. This type of software represents the next big game change in enterprise energy strategic planning because not only does this software account for energy used, it also provides corporate accountants with a mechanism to recover operational expenses related to overcharging.

Attacking Systems/Storage Costs: Virtualize and Consolidate

How can your organization reduce the costs to run information systems? At the server/storage level, start by “virtualizing” your servers and storage environments. Virtualization pools distributed resources while helping to increase overall systems/storage utilization. Imaging supplanting thousands of partially used servers/storage devices — each with its own power supply and each running at 20% efficiency — with scaled-up high-end servers/storage units or scaled-out blade architectures that use energy far more efficiently while providing greater utilization, easier management, reduced licensing costs, test environments, and other benefits.

The virtualization trend is in full swing in North America and Europe — witness that the industry's virtualization software leader (EMC's VMware) is fast approaching the \$1billion annual sales revenue mark. Other places that I've recently visited (South America, Southeast Asia, and the Middle East) have yet to embrace the virtualization movement — but energy cost and availability may change this scenario soon.

It should also be noted that migrating from older, slower servers to faster, more power efficient processors that require fewer servers to do the same amount of work is another way to reduce energy consumption. Further, consider that by virtualizing server environment and then consolidating on larger systems, IT departments are able to eliminate a lot of network switches (because a lot of the previously distributed data is travelling over internal system busses). Significant energy savings (as well as capital cost recovery) can be achieved by eliminating a lot of external networking equipment.

Attacking Heat Dissipation/Cooling Costs: Update Your Chillers and Refrigerant — and Look into Water Cooling

Chillers/cooling towers are the datacenter's biggest energy consumers — and, accordingly, should be the primary focal point for energy cost reduction. As described in the previous subsection, IT managers should virtualize and consolidate systems, storage, and network environments to reduce electrical consumption and

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corresponding heat generation. Once this is accomplished a datacenter heat profile is generated, and then a map of heat flow and cooling requirements can be generated.

At this juncture, cooling requirements should be lessened through datacenter consolidation and virtualization — so fewer cooling towers, chillers, and air conditioners will be needed. But it also makes great sense to evaluate new cooling technologies.

Clabby Analytics recently visited an IBM semiconductor manufacturing plant in Bromont, QC, Canada. This plant is making use of phase change materials (glycol-based solutions) to store cold at night (when the weather is cooler and electricity is less expensive). This cold energy is used during the day to reduce datacenter and plant cooling costs — saving IBM 7-8% of their energy bill each year using this simple, environmentally friendly approach to cooling.

While evaluating other cooling technologies, plan on making the move to R410 refrigerants in air conditioners if you haven't made the shift already. This class of refrigerant is ozone free — and offers additional cost benefits over previous generation refrigerants.

Finally, evaluate water cooling. Water has a thermal conductivity of 0.6062; air is only 0.262 (making water almost three times more efficient than air at removing heat).

Also, I am one of the only research analysts to recommend this course of action: if you live in a cool climate, consider pumping the heated water that a datacenter generates through radiator system to heat a building. Wouldn't that make a lot more sense than dissipating and dumping that heat unused back into the atmosphere?

A Closer Look at Creating Energy Efficient Buildings/Work Environments

Here's a rule of thumb: big, open, unoccupied (or lightly occupied) spaces waste energy. As a CEO, your goal should be to populate the building space that you are paying for with as many employees as is reasonable for your type of business. "Brain" workers (information workers such as technology designers, sales and marketing types, executive managers, accountants, etc.) may cubicles and little extra space for meetings; while "brawn" workers may need a lot of extra space for assembly, repair, and other manual activities.

Match your workspace to the type of worker you employ. Wasted, unused space that is lit, heated, and/or cooled unnecessarily wastes energy.

Also, while on this topic of workspace, consider building environments that share workspaces. Not all employees need to come to a common place of work all of the time. In fact, due to clogged highways and long commutes, many companies have readily embraced telecommuting as a means to improve employee satisfaction, reduce stress, and reduce real estate costs. CEOs who are interested in further reducing office costs should also consider the idea of shared office space. Offices can easily be structured today that allow workers to share computing resources and workspaces without violating their partner's privacy.

Two years ago I wrote about Sun's Java Desktop System and SunRay clients. Other vendors such as IBM and Hewlett-Packard also offer similar products. A return to the centrally-controlled-client model of

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computing may experience a resurgence. And it clearly has a role in helping to reduce energy costs by allowing for secure, shared-office space.

Another attack point when it comes to buildings is design. Award winning designs feature the reuse of heat; the use of alternate forms of energy; the use of energy efficient building materials; the capture of natural light (and the use of florescent lighting); and more. Energy efficient designs can save millions of dollars/euros in energy costs over the life of a given building.

A Closer Look at the Relationship of Process Flow to Energy Efficiency

Processes are the set of business rules that an enterprise executes to conduct business. These processes govern how a company builds products; offers products and/or services to its clients or customers; and works with its supply chain partners.

Energy efficiency should be a core component in many process flows — but in most cases it is not. Yet processes transformation represents an opportunity to reduce the waste of raw materials — and a means to reduce the energy used to produce finished goods and move goods and raw materials to their ultimate destination (logistics).

Several processes are candidates for energy efficiency improvements, but especially:

- *Procurement* — procurement processes that don't weigh and measure the energy efficiency impact of products purchased do the enterprise a great disservice by failing to consider how certain products can help an enterprise avoid costs. Cost avoidance should be a core value in procurement decisions. Also, decisions based upon purchase price frequently weigh into the decision process — but the impact of logistics, handling, and associated energy consumption do not. Procurement is ripe for an energy conservation infusement. And,
- *Supply Chain* — opportunities abound for reducing materials waste and improving energy efficiency in the supply chain (processes that govern supplier interactions with business partners). One recent energy/waste conscious supply chain decision is Walmart's decision to demand that its partners stop over-packaging their respective products. This process decision stops the waste of raw materials — and save energy in many ways including reduced energy usage in the production and shipping of finished products.

Other processes in manufacturing, distribution, facilities management, inventory control, product development, marketing and even sales are candidates for process transformation that includes energy use/energy savings considerations. Clabby Analytics will describe these processes and energy transformative ideas related to them as 2008 progresses.

A Closer Look at Human Behavior Considerations

CEO's need to recognize that modifications in human behavior can also contribute to enterprise energy cost savings — as well as to an enterprise brand image. The targets for energy savings behavior change are employees first and foremost, and consumers (who may choose to buy on a green basis).

With respect to employees, areas of waste include facilities use and inventory management — and travel/meetings/commuting. Simple things like closing loading bay doors when buildings are being air conditioned or heated are obvious — but impact studies

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show huge energy savings can also be realized by careful control of business-related travel.

One huge opportunity to reduce travel-related costs is through virtual meetings held electronically. Hewlett-Packard is working hard in this area to build next-generation video-conferencing systems.

With respect to consumers, some consumers are now starting to base purchase decisions on commitments that enterprises make to the environment. EnergyStar ratings (projections of energy usage under controlled measurement criteria), play a huge role in enterprise and now consumer purchase decisions. And as energy costs continue to escalate, so will the role of energy certification organizations like EnergyStar.

The Third Step — Continued Monitoring/Action

Previous sections have suggested ways to build an energy management plan — and have also provided “tips” on where to look for energy savings both inside and external to the enterprise. But energy management is not a one-time activity — it’s an ongoing activity that requires constant monitoring, tuning, and action.

Summary Observations

The top three benefits of energy management to CEOs include:

1. Saving the environment (good for mankind and animals in general...);
2. Operational cost savings (in datacenters, buildings/facilities, process flows, and through human behaviors); and
3. The opportunity to increase business (creating differentiation around energy use and energy efficiency in products and brands).

The roadmaps for saving energy (step-by-step templates organized to a fine grain of granularity by industry) are well known and available. Operational, strategic, and tactical plans are available to mimic — as are templates for the planning and management energy use, the building of energy efficient datacenters and facilities, and the ongoing operation of energy saving processes and environments.

Large enterprises have been particularly aggressive in addressing energy waste — and have undertaken programs to do so either voluntarily — or as the result of legislation.

Evidence of this is the strong growth of virtualization technology in North America and Europe in large accounts — and the use of energy credits that compel energy savings in Europe. (Note: utility energy providers are now aggressively promoting energy savings programs with strong incentives — another big inducement for large, as well as medium and small enterprises to partake in energy saving programs).

Energy savings is now becoming a key element in many business processes — especially in procurement and supply chain systems. Much additional work needs to be done here to further intertwine energy and process flow — but several money-saving proof points now show that process modification can save big money when energy implications are considered and acted upon.

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For CEOs who don't have time to marshal energy savings agenda, services are in place that can gather data, organize it, analyze its impact, and implement agreed-upon changes. Tools that diagnose energy use and dissipation have improved radically over the past few years — making it easier to gather energy consumption/use information. Assessment services are maturing — as evidenced by sophisticated energy templates that show how to save energy by industry. Datacenter options for saving energy have improved — especially in the areas of system/storage/network virtualization and in chiller technology. And proof points related to savings that can be garnered by modifying employee behavior now abound.

The only real major problem that remains is ACTION. According to a recent Forrester Research report, although 85% of the information technology (IT) executives it surveyed see environmental factors as important, only 25% of IT managers are writing energy efficiency requirements into their requests-for-proposal (RFPs). CEOs: you can either sit on the sidelines and wait for legislation to force action on energy issues — or you can take actions today that may result in operational cost savings, significant competitive advantages, and the opportunity for new business.

The fix for this problem is better education. Clabby Analytics is committed to delivering a wealth of research analysis, vendor strategy critique, and anecdotal discussion on how to build a green enterprise as part of my green research agenda in 2008.

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