

## **Interview: Green Initiatives and Energy Conservation in a Modern Atlanta Datacenter**

**Author: Jeff Hinkle of Global Net Access (AtlantaNAP)**

The 'Green Initiative' has become a critical focal point for data centers around the world due to the high payoffs associated with efficiency and the impact on operations these can have. It has become very important to find ways to reduce and manage operating costs due to the modern datacenter's increasing power needs and the recent instability of energy costs. As an added benefit, these efficiencies offer incredibly positive environmental impacts while improving energy efficiency.

With the increasing competitive environment, limited resources and increased focus on preserving the environment for future generations, the green benefits of energy conservation are no longer a secondary consideration for server and colocation datacenters. Businesses are now waking up to the importance of aligning themselves with their consumer market through an image of environmental responsibility. In addition, datacenter managers and owners themselves have become concerned consumers and bring their own motivations to the workplace for improving datacenter energy efficiency and green practices.

### **AtlantaNAP energy efficiency background and current tests and findings**

Established in 1994, our Atlanta data center the AtlantaNAP has been incorporating energy recycling and other green practices from the day of ground breaking on the 65,000 square foot facility. The Environmental Protection Agency (EPA) and Energy Star have teamed to develop high standards of energy efficiency for modern datacenters and the server technology they employ. Starting in January 2009, Energy Star began the data collection process for developing an Energy Star Rating for data centers. With the many green initiatives AtlantaNAP has implemented, and with more in the works, we're confident that our main [Atlanta colocation](#) hub, will pass their rating standards with flying colors. Read on for details about the creative energy recycling systems AtlantaNAP has put into practice, as well as our further green initiatives for the coming year.

### **Current Energy Efficiency Strategies Deliver Big Results**

With over 6000 servers in the Atlanta datacenter (current installed capacity of 4 megawatts of power and 2000 tons of cooling), you can bet that AtlantaNAP puts energy efficiency at the top of its list of priorities. From day one our team started working on ways to get the most for the energy dollar, while keeping server performance at peak.

### **Creative Heat Recycling Applications**

#### ***The Offices***

When the Atlanta datacenter building was first constructed, AtlantaNAP included heat pumps from the onset to move BTUS from our data center directly to the company offices for heating. From day one we have never had to utilize an outside source of heat such as electricity or natural gas to burn for heat; that's a 50% energy savings for the AtlantaNAP offices!

The extraction of heat from the data center cooling towers results in greater efficiency of server operation, and a decrease in energy waste.

#### ***The Generator Room***

AtlantaNAP has created an innovative, energy efficient system for heating the diesel generators that must be kept warmed up and ready to start immediately in case of a power outage. Block heaters (we use lighter duty than what would be found in northern climates to save money during the warm months) use warm water to keep the generators warmed up and ready for action. A facilities audit resulted in recommendations for additional auxiliary heat in the Atlanta datacenter generator room, since this area must always be open via louvers to the outside air, even in deepest winter and going to larger block heaters for the whole year in the southern climate would have resulted in excessive power usage during months when the temp was above 35 degrees.

The AtlantaNAP solution was to put outside dry coolers to a unique use (normally mounted on datacenter roofs) by mounting two 20 ton units in the generator room. Venting was set up to move excess BTUs from the data center through this dry cooler system to the generator room, effectively raising the temperature without use of any natural gas or heating oil. The only additional energy use is the small amount of electricity to generate fan motor output. As seen in the office heating system, AtlantaNAP heat recycling once more results in a nearly 100% energy savings for the generator room since the dry coolers offset work on the cooling towers.

Again, the cooling towers now run more efficiently due to the moving of excess heat away from the datacenter servers. Research and functional testing has shown repeatedly that running servers at less than 80% of capacity results in substantial energy savings and significant increase in the life of the equipment. Heat moving and recycling from the datacenter to the offices and generator room keeps AtlantaNAP servers running beautifully at less than 70% of full capacity.

#### **Generator Testing under full load to save fuel and raise system reliability**

AtlantaNAP tests generators comprehensively every two weeks with a full switch over of the complete datacenter server load to the diesel generator system and off the AC power, which is rarely done by other server hosting companies. This virtually ensures the safety of the emergency data backup system in case of power outage due to a live real time test of the gen sets under controlled conditions. It also uses the fuel of the generators to actually power the facility instead of simply wasting it by running the generators and the utility at the same time. It is critical to know if you are going to have a problem under load when your gen sets are needed and that is why we run them real time under supervision – so that we can switch back to utility when we know its there if we encounter a problem. You want a gen set to fail when you don't need it and can get it repaired in an non emergency situation vs. it failing when you need it and causing a catastrophic failure like we have seen so many times with those facilities that don't test real time. The environmental impact of this is that it takes the load off the utility and actually uses the fuel instead of wasting it by not running under transferred load.

#### **Datacenter Air to Air Free Cooling System Delivers Significant Energy Cost Savings**

AtlantaNAP is currently testing air to air exchange via a roof fan system that has been installed in the main datacenter consists of six fan intakes drawing air from the outside, which is then drawn through the data center and out of the facility via one large outtake fan. Currently this is an on/off system with our [Atlanta datacenter](#) staff monitoring inside temperature via the main service panel and turning fans on or off according to these readings.

There is no cold / hot isolation in the testing environment due to the minimal investment for the tests. We believe that isolation of hot aisle output and venting directly to the outside will significantly increase the efficiency numbers.

*Our preliminary measurements show a substantial A/C cooling energy savings of 6%, translating to serious dollar savings as well. Server cooling is a large expense for all datacenters and any savings in this realm are always welcome; a 6% decrease in energy costs is by no means small.*

During the process we have found that following issues that must be resolved before the system can go into automatic operation:

- Pollen is too small for the current filters – we are looking at a high flow filtration that will trap pollen.
- During exceptionally cold / low humidity days the embedded humidification systems can not keep up and a supplemental humidification system must be installed and tied to the building computer with a failsafe monitoring in place to govern the air to air exchange.
- Mixing of air in general in the facility is not optimum for maximum btu exchange.

### **Upcoming 2009 Initiatives for the Datacenter Cooling System:**

With the great energy saving results seen so far with this first incarnation of the cooling system, we knew that even greater energy efficiency was very achievable. For this next phase of our green initiative, we expect to see at least a 10% energy savings—good both for the environment and the AtlantaNAP wallet.

#### ***Computer-Optimized Datacenter Cooling***

The AtlantaNAP plan is for the cooling system to be computer-optimized through the company's existing automated building systems. The system will monitor for when the differential between inside and outside air reaches 10 degrees and then will start up the fan cooling system. This system will optimize usage for as much time of the day as possible and will take advantage of the cool night air, even when staff is not here to physically start up the system.

#### ***'Hot Aisle' Enclosure***

The second part of the enhanced energy conservation plan is to enclose the 'hot' aisles of the datacenter, where server heat raises temperatures to around 110F°. A vent system will be constructed to directly move this very hot air to the system's outtake fan. This will result in **two benefits:**

1. This excess heat is removed from contact with other datacenter equipment so that their operating efficiency is not affected.
2. This heated air causes an artificial differential between inside and outside air so that the new computer-optimized cooling system will kick in even if the outside air is around 85 or 90 degrees. It is still more cost-efficient to cool 90 degree air than 100 degree air.

### **The Hinkle Benchmark: Making the Case for Newer more Efficient Servers**

As President of our growing [Atlanta dedicated server](#) and [colocation datacenter](#), it became very apparent to me that a clear, workable measure was needed in order to demonstrate, to clients and colleagues, the real energy savings gained from implementing newer, more efficient server technology. It had long been apparent to the core AtlantaNAP team that server consolidation and the retirement of outdated equipment would result in serious cost savings, as well as making better use of the Earth's limited energy resources. The question was how to illustrate those energy savings in a clear and easily quantifiable manner.

The answer came with a mathematical tool I created which we dubbed the [Hinkle Benchmark](#). This energy efficiency formula allows AtlantaNAP to illustrate and justify consolidation of servers and retirement of outdated technology to the computer recycling facility. The newest server equipment is highly energy efficient, lasts longer, and saves our clients substantial money.

Energy cost savings begin evidencing rather quickly; clients don't necessarily have to wait for 'long term' savings effects.

The benchmark is calculated by summing all of servers' Passmark score and dividing it by the manufacturers stated watts used per chip and then dividing this number by the total number of servers. The resulting metric will give an indication of the relative use of power compared to the overall delivery of computational power.

We use this as an ongoing target to encourage the retirement of older computer assets and to be mindful of the implementation of new assets based on how effective it is at delivering computational power.

We have decided not to deploy atom processors based on the impact on our benchmark score for example as their low cpu to energy efficiency – while some of our competitors have rushed to do this for profit reasons. We are also aggressively pursuing virtualization to increase the score as well.

Consumers will want to look at their provider's score and hopefully choose a Data Center that is committed to improving in this area.

Dedicated server and colocation clients should look at a provider's Hinkle Benchmark and choose a data center committed to improving energy efficiency. This equation also allows AtlantaNAP to evidence to clients the need to upgrade their server equipment.

We challenge our competitors and other users to adopt this benchmark to measure their efficiency and we grant use of it for free to anyone willing to pick up the challenge.

### **Green Initiatives beyond Energy Conservation**

While increasing the datacenter's energy efficiency is of the highest priority, AtlantaNAP is also committed to other [datacenter green initiatives](#) that decrease our company's impact on Earth's resources and fragile ecosystems. Our company is full of conservation-minded individuals who bring their green ideas to the ATLANTANAP table. We've worked to reduce our carbon footprint and to recycle at every opportunity. The facility has been mentioned in many green tech websites including: <http://www.sustainablewebsites.com/green-data-center>.

### ***Global Access Network (AtlantaNAP) uses no natural gas or heating oil in datacenter operations.***

This is just sound business practice and something most of us believe in as citizens of the planet.

We recycle virtually every scrap of cardboard. A local community member in need of the income picks up cardboard and transports it to the local recycling station. We recycle all scrap metals, mostly steel and copper. All old server equipment is picked up by a local area computer recycling company. AtlantaNAP has significantly reduced packing materials that are unnecessary by requesting that vendors ship new equipment in bulk packaging whenever possible. The Gaylord boxes we use allow us to receive up to 20 servers in a single box on one pallet with no extra packing material inside. This practice has cut our packaging waste by nearly two thirds!

### **Well Water on Site: Self Sustained Cooling and Zero Stress on City Water Resources**

ATLANTANAP has its own well dug on the property for cooling our server equipment. We are not dependent on the town and put no strain on city resources. In case of any local or national disaster, we have our own power and water resources, ensuring the total safety of our clients' data. This saves on chemicals in the treatment process and the electricity to move the water throughout the system to our facility. The water also gives us the benefit of geothermal cooling

since the water comes out of the ground at an average temperature of 50 degrees F which gives us free cooling when we add it to our system.

### **Fire Safety**

It goes without saying that our datacenter is virtually paperless in operation and, whenever possible, communications happen electronically rather than via paper-based mail or fax systems.

Our Atlanta datacenter is made almost completely of concrete, even the floor tiles, and almost nothing burns. Very few combustible materials of any kind has been used in the facility. ATLANTANAP uses double interlock pre-action based sprinkler systems that do not harm human beings or the surrounding environment. Our mantra is to not provide the initial ignition or fuel source, thereby preventing the fire in the first place.

### **Closing Thoughts**

The green initiatives our modern datacenter has put in place are already yielding excellent savings in the energy realm and with the plans we have for 2009, the AtlantaNAP team is excited to see just how far we can take this efficiency challenge.

### **About the Author and Company**

The author, [Jeff Hinkle](#), is President of Global Net Access (AtlantaNAP) and highly invested in green initiatives and the conservation of our planet's resources. Jeff has a long and deep history in creative datacenter and networking solutions. The author can be reached for questions and comments at [jhinkle@AtlantaNAP.com](mailto:jhinkle@AtlantaNAP.com).

**About the company:** Global Net Access and AtlantaNAP are sister companies under the same ownership. Their lines of business include a full end to end Enterprise solution of Co-Location, Dedicated Server managed service and high performance backbone ip networking. The company is headquartered in Atlanta, Georgia and also has operations in Dallas, Texas operating under the DallasNAP brand. AtlantaNAP ([www.AtlantaNAP.com](http://www.AtlantaNAP.com)) is host to numerous corporate and enterprise co-location clients including the company's dedicated server line, NetDepot ([www.netdepot.com](http://www.netdepot.com)), which manages and operates over 2000 dedicated servers for clients spanning the globe. The recent expansion to Dallas allows the company to better serve the high demand for colocation and dedicated server clients in the dynamic Texas market. It also allows for in house single source disaster recovery and geographic diversity of various services. For more information about green datacenter initiatives, as well as creative hosting and networking strategies, please visit [www.AtlantaNAP.net](http://www.AtlantaNAP.net) [www.gnax.net](http://www.gnax.net) [www.netdepot.com](http://www.netdepot.com) or call 404-230-9150.