

# IMPROVING ENERGY EFFICIENCY IN THE DATA CENTRE - IT SAVES MONEY AND MAKES GOOD SENSE



## GROWING PRESSURE TO BE ENERGY EFFICIENT

After two decades of distributed computing, the pendulum has swung back to a centralized-computing model, with the intelligence and processing once again found in the data centre. As a result, the importance of the data centre has grown to the point where the ability of an organization to survive and thrive in today's business environment is in many ways inextricably linked to the vitality of its data centre, whether it be in-house or outsourced to a service provider such as Q9.

This time around, however, the centralization of processing involves additional dimensions that demand new and innovative thinking by those building and operating today's data centres. One of those dimensions is power consumption, which has not only become a major contributor to rising data centre costs but also a key element in the quest for environmental sustainability driven by worrisome climate change.

The problem is the huge increase in power needed by today's denser, faster tech-

nologies. In addition, a greater amount of energy is needed to eliminate the significant heat generated by these technologies. Combine this with the rising cost of electricity, and the cost of power and cooling is moving rapidly toward becoming the biggest single data centre cost. As the price and demand for power con-

tinues to rise, and as industry continues to exert pressure on data centres to reduce their carbon footprint, managing power consumption and increasing energy efficiency become top priorities.

"We're often asked about our 'green strategy', as the media likes to call it, but to us, it really boils down to a discussion about energy efficiency,"

says David Chaloner, Senior Vice President, Marketing at Q9. "When we talk to customers and prospective customers about this, we try to offer a balanced view of what the issues are, where the real cost saving opportunities lie and how Q9 trades-off the desire to be energy efficient and friendly to the environment against what

must always be our top priority – ensuring guaranteed 100 per cent power availability to our customers."

Fortunately for Q9, its customers – and the planet – business goals such as cost reduction and reliable, high-availability service delivery are not mutually exclusive with improving energy efficiency and environmental responsibility.

## WHERE IS ALL THAT POWER GOING?

Before exploring issues and opportunities related to energy efficiency in a data centre environment, one must first understand where all that power is going.

In truth, the vast majority of power in an outsourced data centre scenario isn't consumed by the service provider but rather by the customer equipment hosted there. This equipment not only consumes power directly, to operate, but also indirectly, by virtue of the heat it generates that must be dissipated by cooling systems.

According to Chaloner, "Compared to the amount supporting customer equipment, the power consumed by our own equipment to monitor and manage our data centres is pretty small in the overall picture."

That said, however, and given the service provider is ultimately footing the bill for all of the power consumed in a data centre, it still makes good business sense to explore ways to increase energy efficiency.

"We are building new

Circuit Snapshot for Enclosure 000/1001/1

Enclosure	Power Source	Circuit/Phase	Measured Current	Circuit Breaker	Measurement Date & Time
000/1001/1	Facility-A/Blue	26/L1	3.5 A	20 A	03/15/2011 12:44 EST
000/1001/1	Facility-A/Blue	28/L2	3.8 A	20 A	03/15/2011 12:44 EST
000/1001/1	Facility-A/Blue	30/L3	3.7 A	20 A	03/15/2011 12:44 EST
000/1001/1	Facility-A/Red	26/L1	3.4 A	20 A	03/15/2011 12:44 EST
000/1001/1	Facility-A/Red	28/L2	3.8 A	20 A	03/15/2011 12:44 EST
000/1001/1	Facility-A/Red	30/L3	3.8 A	20 A	03/15/2011 12:44 EST

Last Measured Demand: 2,645 VA  
 Redundant Capacity: 5,760 VA (46%)  
 Total Capacity: 11,520 VA (23%)

phases of capacity all the time and are always looking at new solutions and technologies,” says Chaloner. “We’ve also amassed an incredible amount of in-house knowledge that we apply on an ongoing basis to improve our data centre designs and the energy efficiency of our operations.”

**RELIABLE SERVICE DELIVERY IS PARAMOUNT**

Simply put, Q9’s energy efficiency strategy is ruled by an unwavering commitment to first, above all else, ensuring the uninterrupted delivery of space, power, cooling, Internet connectivity and physical security to its customers.

With that as the guiding principle, here is a snapshot of just a few of the energy efficiency opportunities Q9 is undertaking:

• **Modular Capacity Build-Out**

Power and cooling systems run at peak power efficiency when under full load – in other words, when the data centre is full – which presents a real challenge to how data centre operators build-out capacity.

“Our data centres have typically taken three to four years to fill, which isn’t very efficient from a systems perspective,” says Chaloner, who goes on to describe Q9’s new approach of delivering ‘phases’ of additional capacity through the modular build-out of its data centre facilities.

“In Calgary, Brampton and Kamloops, we acquired or built very large building shells and are adding capacity in smaller increments within those shells. We can fill that modular capacity quicker, say in only one year, which gets our systems up to full load and thus peak operating efficiency much sooner.”

• **Power-Based Pricing**

Unlike co-location service providers who charge based on the amount of space a customer uses, Q9’s pricing is based on a power reservation

model – the total amount of power a customer requires.

“By not charging for space, Q9 eliminates the tendency for customers to try to reduce their co-location cost by increasing their density and squeezing everything together to minimize their physical footprint in the data centre,” explains Chaloner. “When customers do that, it creates under-utilized areas that negatively impact cooling efficiency.”

Facility Power Report for Example Customer						
Output in CSV format: <input type="checkbox"/>						
	Facility Code	Description	Contracted Commitment	Month-to-Date Measured Peak (March 2011)	Previous Month Measured Peak (February 2011)	Facility History Reports
Enclosure Detail	000	Facility A	33,500 VA	30,718 VA	29,715 VA	Monthly   Daily

Enclosure Power Detail for Facility-A Data Centre						
Output in CSV format: <input type="checkbox"/>						
	Enclosure	Total Capacity	Redundant Capacity	Month-to-Date Measured Peak (March 2011)	Previous Month Measured Peak (February 2011)	Enclosure History Reports
Circuit Snapshot	000/1001/1	11,520 VA	5,760 VA	2,690 VA	2,693 VA	Monthly   Daily
Circuit Snapshot	000/1001/2	11,520 VA	5,760 VA	4,232 VA	4,132 VA	Monthly   Daily
Circuit Snapshot	000/1001/3	11,520 VA	5,760 VA	1,858 VA	1,834 VA	Monthly   Daily
Circuit Snapshot	000/1001/4	11,520 VA	5,760 VA	1,760 VA	1,710 VA	Monthly   Daily
Circuit Snapshot	000/1001/5	11,520 VA	5,760 VA	3,265 VA	3,290 VA	Monthly   Daily
Circuit Snapshot	000/1001/6	11,520 VA	5,760 VA	1,025 VA	1,016 VA	Monthly   Daily
Circuit Snapshot	000/1001/7	11,520 VA	5,760 VA	2,106 VA	2,198 VA	Monthly   Daily
Circuit Snapshot	000/1001/8	11,520 VA	5,760 VA	3,046 VA	3,079 VA	Monthly   Daily
Circuit Snapshot	000/1001/9	11,520 VA	5,760 VA	1,448 VA	1,461 VA	Monthly   Daily
Circuit Snapshot	000/1001/10	11,520 VA	5,760 VA	3,178 VA	3,202 VA	Monthly   Daily
Circuit Snapshot	000/1001/11	11,520 VA	5,760 VA	3,472 VA	3,342 VA	Monthly   Daily
Circuit Snapshot	000/1001/12	11,520 VA	5,760 VA	4,154 VA	4,023 VA	Monthly   Daily

In fact, Q9 takes it a step further by working with each customer prior to installation to ensure that their cooling load will be distributed as evenly as possible throughout their environment.

“The work we do upfront in educating customers and helping them design a good cooling distribution plan has two significant benefits,” says Chaloner. “First and foremost, it ensures that they are taking advantage of the reliability of the redundant cooling capacity we are providing in their environment. Secondly, it ensures that our cooling systems are running in their most efficient state.”

The power reservation model also provides an economic incentive for customers to be more energy efficient – less power required equals less co-location cost. This is often

achieved through normal equipment refresh cycles with newer, more-efficient hardware delivering more computing cycles per unit of power demand.

• **Expanding the Environmental Envelope**

The American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) recently expanded the recommended ‘environmental envelope’ – both

power-hungry cooling systems by using natural outside air temperature for cooling.

“While the free cooling concept has been around for years and looks good on paper, it’s not a simple technology to design and operate effectively in a data centre environment where reliability is critical,” cautions Chaloner, citing the examples that if not implemented properly, free cooling can destabilize the cooling system or introduce contaminants from the outside air.

“Fortunately, we have considerable hands-on experience with free cooling, due in no small part to having our own in-house data centre design and build team. We’re realizing significant savings through the ongoing use of both air-side and water-side economizers in our data centres,” says Chaloner.

**MAKING GOOD BUSINESS & ENVIRONMENTAL SENSE**

A recent design improvement by Q9 that also significantly reduces power consumption is a new humidification system that uses about 20 times less electricity and doesn’t introduce more heat into the data centre (that then requires additional cooling capacity and energy to remove), as is often the case with heat-based humidification systems.

Along with the new humidification system and the other initiatives summarized above, Q9 continues to implement numerous smaller energy improvements, such as occupancy sensors that reduce the data centre lighting level when no people are present, while still providing adequate light for security cameras.

“We continue to focus on initiatives like these not so that we can brand everything we do as ‘green’ just to attract customers,” stresses Chaloner, “But rather because there is a solid business case behind each of the improvements. It just makes good sense to do things this way.”