A BIG DATA LOOK AT ENERGY TRENDS: 2008-2012

WHITEPAPER

Ecova, Inc.

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EXECUTIVE SUMMARY

Energy – without it, our economy would come to a standstill. Energy sources power our cars, our homes, our offices, educational facilities and healthcare buildings. The domino effect when energy is lost due to a storm or grid congestion is hard hitting: we are without key forms of technology and transportation, along with the loss of everyday necessities, conveniences and forms of communication. Energy is the lifeblood of the commercial sector in the U.S., and helps to keep the economy powered. Overall, the U.S. Department of Energy estimates that commercial facilities account for 36% of all U.S. electricity consumption and cost more than $190 billion in energy every year. Commercial facilities are also responsible for 18% of U.S. carbon dioxide (a primary greenhouse gas) emissions, and they consume more than 18%, or 18 quads, of U.S. primary energy—more than all of Canada's energy consumption.[1] Compounding this consumption scenario is a startling fact: On average, 30% of the energy used in commercial buildings is wasted, according to the U.S. Environmental Protection Agency.[1] Improving efficiency means tens of billions of dollars in potential energy savings, improved asset performance for owners and tenants, and increased profits.

On average, 30% of the energy used in commercial buildings is wasted, according to the U.S. Environmental Protection Agency

When the bottom fell out of the economy as we entered 2008, businesses across every industry were forced to double down on cost slashing, and no operating expense was spared. Energy consumption expenditures received as much scrutiny as did traditional supply chain expenditures. For many commercial operators, utility expenses are often their third-largest budget line item, trailing only labor and materials. Those companies that invested in efficiency programs to drive cost cutting—whether behavioral or technology driven—have enjoyed the rewards of reduced operational costs, an investment strategy that proved important to surviving a drawn-out, dismal economy.

This paper will showcase the monumental shift being experienced across Ecova's base of clients in terms of consumption reduction. We will explore how demand has been impacted, as well as load efficiency. We will provide insight into energy pricing, and we'll present a startling set of facts surrounding the price pressures impacting the water being used by commercial establishments, which will serve as a bellwether for the expansion of efficiency programs for this natural resource as the future unfolds.

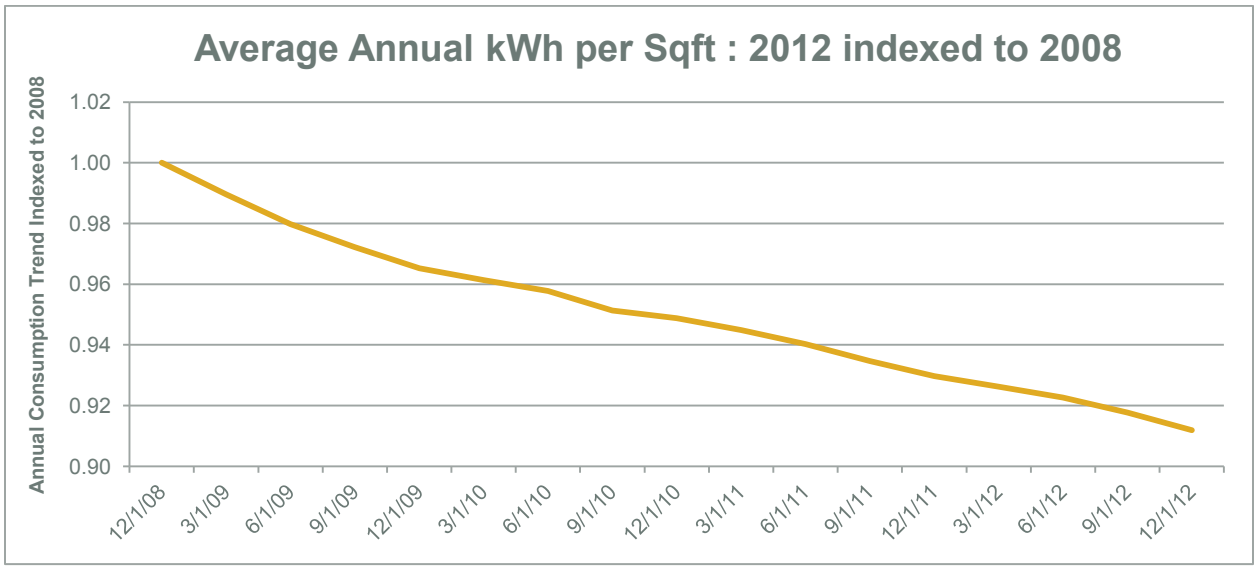
[1] U.S. Department of Energy, http://www1.eere.energy.gov/buildings/commercial/about.html, March, 2013

In this second annual report, Ecova once again illustrates to energy managers the power of our big data—our Energy Data Warehouse. As a company that processes and analyzes energy expenses for more than 700 of the country's largest enterprises, we have detailed insight into more than 25,000 MW of U.S. electricity demand. Our data continues to expand daily, given over one billion electronic transactions per day flow across our system. Ecova appends that energy data with external information such as sophisticated procurement, weather, client portfolio and business productivity numbers to create a complete picture of energy consumption and costs for just over 8% of total industrial and commercial U.S. electric load, more than nearly any utility in the United States.

ENERGY INTENSITY IS DOWN AGAIN: COMPANIES CONTINUE TO USE LESS PER SQUARE FOOT

As shown in Figure 1 below, data from a rigorous analysis of more than 150,000 facilities shows a decrease in total electric consumption intensity (as measured by kWh per square foot) of 8.8% between Q4 2008 (set as the baseline period) and Q4 2012. This provides energy managers with timely benchmarks for their own trend analysis. This reduction is due to intensive cost cutting efforts undertaken by Ecova's clients, some backed by technology to support utility-sponsored demand reduction programs, often as part of a larger strategic initiative around energy and sustainability management that Ecova has helped to execute.

FIGURE 1: OVERALL ANNUAL KWH PER SQ. FT. TREND



Note: Consumption weather normalized using 2008 as the baseline weather year

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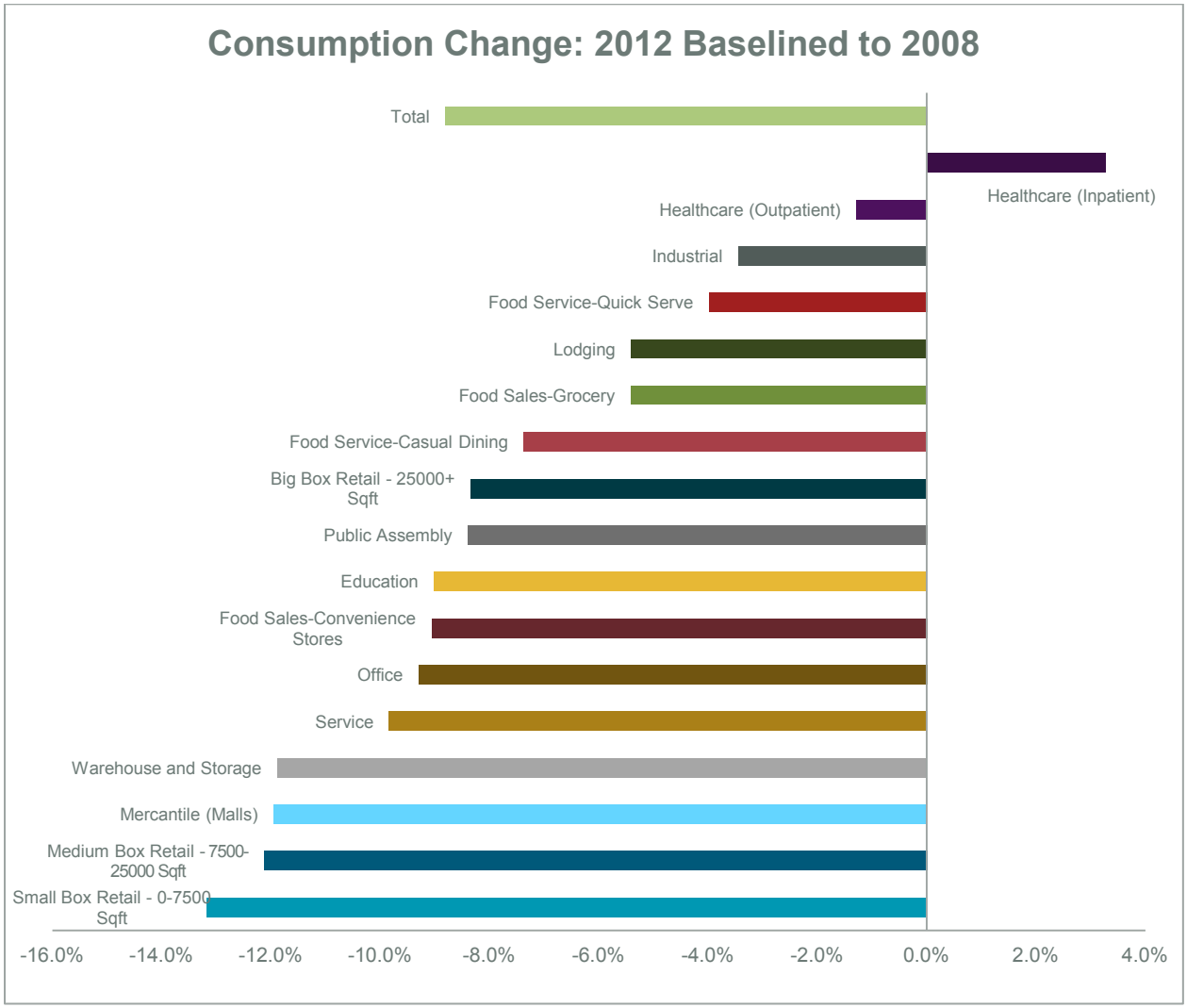
When consumption reduction is viewed by vertical market, much of the retail sector—including medium box retail, small box retail, and mercantile (malls)—has led the charge, as indicated in Figure 2 below. As a group, this segment of retail has slashed more than 12% of consumption from their portfolios since 2008, while big box retail still reflects a healthy reduction of more than 8% for the same period. Incentive programs have helped this sector, which targets a two-year or less payback for energy efficiency programs.

FIGURE 2: CONSUMPTION CHANGE BY VERTICAL MARKET SEGMENT



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Conversely, we see that the healthcare segment is relatively flat (outpatient) to increasing (inpatient) in consumption. According to the Environmental Protection Agency (EPA), healthcare is one of the most energy intensive industries in the U.S. Hospitals use more than twice as much energy per square foot as office buildings; however, cost increases cannot be offset, as they would in other industries, because healthcare facilities have set reimbursement rates. Healthcare organizations face significant revenue gaps created by shrinking budgets, declining tax bases, aging facilities, and growing energy costs. These facilities are constantly challenged to reduce costs, elevate the quality of care, and compete in the marketplace. By improving energy efficiency, hospitals can generate a new source of capital for investment in facilities, for expansion, or to increase the bottom-line.[2] Given that federal reimbursement reductions are looming, and margins are already razor thin, all hospital projects are undergoing increased financial review. Compounding the challenge is the fact that the average simple payback period for energy efficiency programs in healthcare is 3.8 years.[3]

Healthcare is one of the most energy intensive industries in the U.S. Hospitals use more than twice as much energy per square foot as office buildings.

The vertical markets that have undertaken initiatives such as proper commissioning/re-commissioning and startup of their HVAC systems have seen a favorable impact on energy consumption as well as increased consumer comfort. Re-commissioning HVAC systems, installing and optimizing building control systems to automatically tune HVAC systems to weather conditions, and new technologies—such as condensing boilers—have provided immediate improvements to the bottom line.

Reviewing this big data generates big-picture questions about these trends:

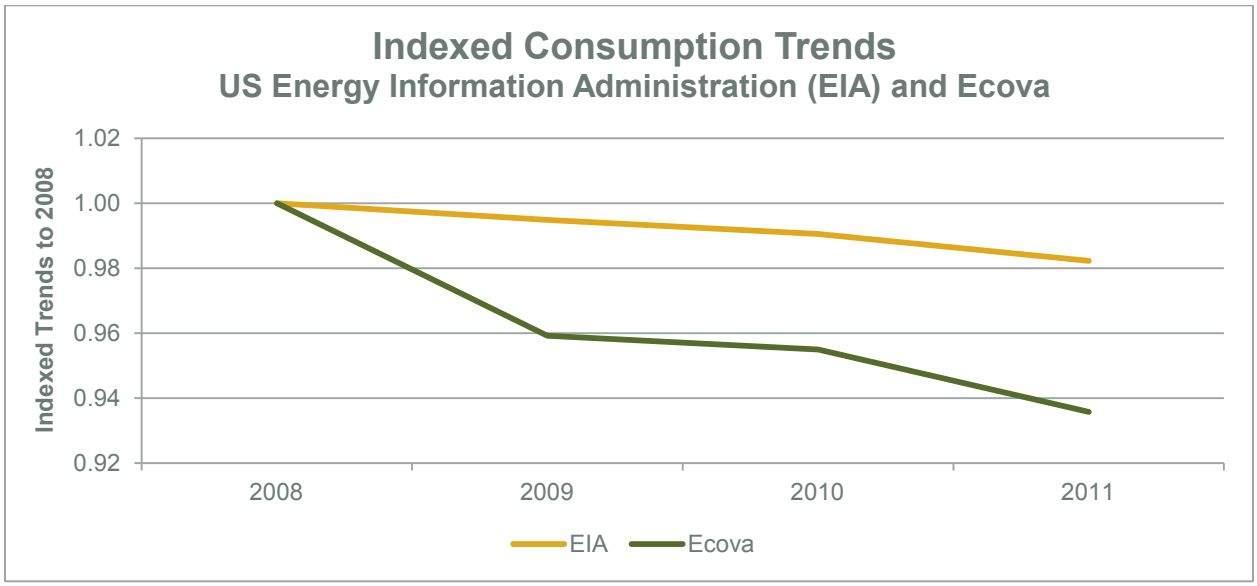
- Is kWh per square foot the optimum intensity metric for your specific industry?
- How did productivity changes or other factors specifically affect intensity in your portfolio?
- To what degree did energy efficiency projects decrease energy intensity?

This last question is a particularly relevant one. The Energy Information Administration (EIA) recently published a set of data that delineates the impact of electric utility demand-side management programs, including energy efficiency and load management effects on consumption across the U.S. for commercial establishments. Utilities worked diligently to provide energy savings incentives throughout the recession to assist their clients in cost cutting initiatives. That trend continues, with utilities launching a host of energy efficiency programs across the nation as our economy continues to recover.

[2] http://www.ashe.org/e2c/pdfs/energy/heg_ch1_introduction.pdf
[3] http://www.hfmmagazine.com/hfmmagazine/jsp/articledisplay.jsp?dcrpath=HFMMAGAZINE/Article/data/12DEC2011/1211HFM_FEA_TRENDS_sustainability&domain=HFMMAGAZINE

Figure 3 below shows the EIA calculation of consumption reduction from 2008 through 2011. The EIA figures reflect a total consumption reduction of approximately 2% compared to 2008.[4] The EIA attributes almost 45% of that reduction to utility-sponsored demand-side management programs (including energy efficiency programs and ensuing load management effects).

FIGURE 3: INDEXED CONSUMPTION TREND WITH EIA



Note: Ecova non-weather normalized data used for comparative purposes to EIA.

Overall, Ecova's client base has enjoyed a rate of consumption reduction of more than three times higher than indicated by the EIA for the total commercial sector as indicated in Figure 3 above.[5] The combination of intensive cost cutting with the assistance of Ecova as a partner, and new technologies coupled with utility incentives, has assisted in driving a new level of efficiency gains. There is also a tremendous side–benefit to these efficiency gains. According to CO_2 Scorecard analysts Shakeb Afsah and Kendyl Salcito, contrary to popular perception, 2012 data shows that the increased use of natural gas in the electric power sector is not the largest contributor of energy-related CO_2 reductions in the U.S. over the past year. Nearly 75% of the CO_2

Ecova's client base has enjoyed a rate of consumption reduction more than three times higher than indicated by the EIA for the total commercial sector

[4] http://www.greentechmedia.com/articles/read/federal-data-shows-sweeping-savings-in-energy-usage-by-us-building-sector?utm_source=Daily&utm_medium=Picture&utm_campaign=GTMDaily; and http://www.eia.gov/electricity/data/eia861/index.html

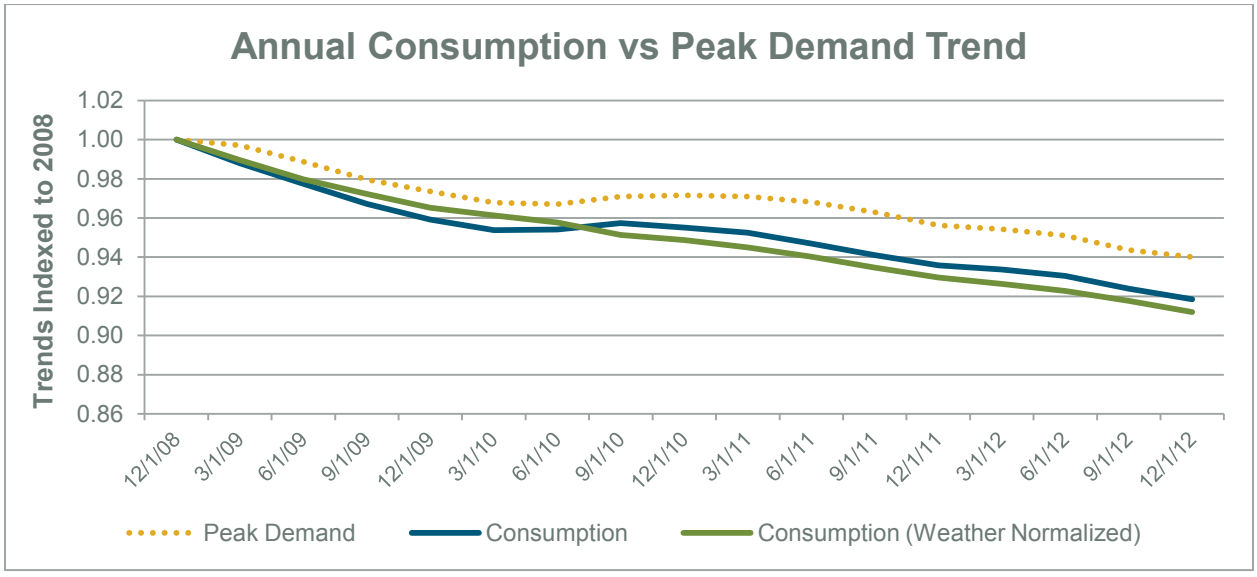
[5] EIA usage trend calculated using information from the Annual Electric Power Industry Report EIA form 861 for the Commercial Sector.

savings are attributable to economy-wide demand reduction driven by energy efficiency, conservation and the mild winter of the first quarter of 2012.[6]

ARE IMPROVEMENTS IN CONSUMPTION BEING MIRRORED ON THE PEAK DEMAND SIDE?

In conjunction with the reduction in electric consumption, we saw a corresponding 6% reduction in peak demand in 2012 as compared to 2008 as indicated in Figure 4 below. This underscores the uptake in utility sponsored demand side programs as reported by the EIA.

FIGURE 4: INDEXED CONSUMPTION VERSUS PEAK DEMAND TREND



A deeper dive into consumption trends by vertical market does reveal that a number of verticals are reducing their consumption without impacting peak demand by a comparable factor. If this trend continues, some commercial establishments could see their prices escalate in the near future due to the impact on load factor. Load factor (expressed in terms of percentage) is a measure of the uniformity and efficiency with which electrical energy is being used. The calculation is as follows:

Load Factor (percent) = [(Total kWh) / (# Days in Bill Cycle x 24 hrs. /day)] / [Peak kW Demand]

A good load factor (generally over 70) implies a more constant rate of electrical use, because peak demand (kW) is held to a minimum relative to total overall consumption (kWh). In essence, the lower the established peak demand in relation to consumption, the better the load factor, and the lower the relative cost for electric service.

[6] http://www.greentechmedia.com/articles/read/federal-data-shows-sweeping-savings-in-energy-usage-by-us-building-sector?utm_source=Daily&utm_medium=Picture&utm_campaign=GTMDaily

LOW LOAD FACTORS, INCREASED ENERGY COST

Electric service cost can increase on a number of fronts when load factors are low:

1. Peak Demand Charges: utility demand charges are levied because the maximum sustained demand for each commercial client represents a portion of the utility infrastructure that is dedicated to them. That utility infrastructure includes an allocation for a portion of the generating plants, the transmission lines, and other assets, which all require significant investment to install and maintain. If these assets are only occasionally used, the revenue from the actual usage is low while the maintenance and amortized costs for these assets remains the same, so demand charges are levied to stabilize the revenue stream.

2. Capacity Obligation Charges: in many deregulated price territories, a "capacity obligation" charge is factored into the commodity price a commercial client pays for electric service. This charge is designed to stabilize the revenue stream to ensure utility asset costs can be covered. As a commercial client's load factor begins to drop, capacity obligation costs rise, impacting the price a company pays for its energy, even if overall consumption has dropped.

3. Power Factor Charges: although often ignored as a controllable expense in commercial facilities, power factor charges, when present, are often calculated as a factor of peak load. Therefore, the higher the peak demand load, the higher the power factor charges.

The vertical markets that experienced the greatest erosion in load factor are indicated in Figure 5 below.

FIGURE 5: LOAD FACTOR CHANGE FROM 2008 BASELINE TO 2012:

Vertical Market Segment	2008 Load Factor %	2012 Load Factor %	Erosion
Warehouse and Storage	54.1	51.7	-4.4%
Medium Box Retail - 7500-25000 Sqft	59.4	57.0	-4.0%
Small Box Retail - 0-7500 Sqft	49.3	47.4	-3.9%
Service	44.1	43.4	-1.6%
Big Box Retail - 25000+ Sqft	53.4	52.7	-1.3%
Food Service-Casual Dining	53.4	52.8	-1.1%
Office - 50000+ Sqft	67.4	66.7	-1.0%

To determine the potential for improving load factor, a good first step is to analyze utility bills to identify the seasons during which the peak demand is the greatest. In general, the greatest demand for electricity occurs on hot days in the summer. For many facilities, the largest electric load is dedicated to space cooling, but this is not necessarily true for every facility. It is always best to observe operations at the facility to determine what equipment is causing the peak demand. Installing sub-meters in a small set of the poorest load factor sites is the most effective way to determine which equipment is driving demand. Once the contributing equipment loads have been identified, facility operators can determine what might be done to sequence or schedule events or processes in order to minimize the simultaneous operation of high wattage equipment. Other potential steps to improve load factor include:

- Arrange work schedules to reduce peak load by shifting some electrical use to other time periods
- Install higher efficiency lighting or space conditioning systems
- Utilize interlocks to prevent simultaneous operation of selected equipment
- Utilize heat and cool storage equipment to reduce peak load
- Utilize variable speed drives to enable staged motor starting and incremental speed reduction
- Stagger pre-heating times on process or space heating applications
- Stagger pre-cooling times
- Utilize demand controllers to limit kW demand in facilities where some power loads can be deferred
- Add off-peak energy usage
- Be aware of the scheduling of incremental events like maintenance or equipment testing—ensure these events are not conducted in times of high cost or high consumption

Overall load factors by vertical market segment are indicated in Figure 6 below.

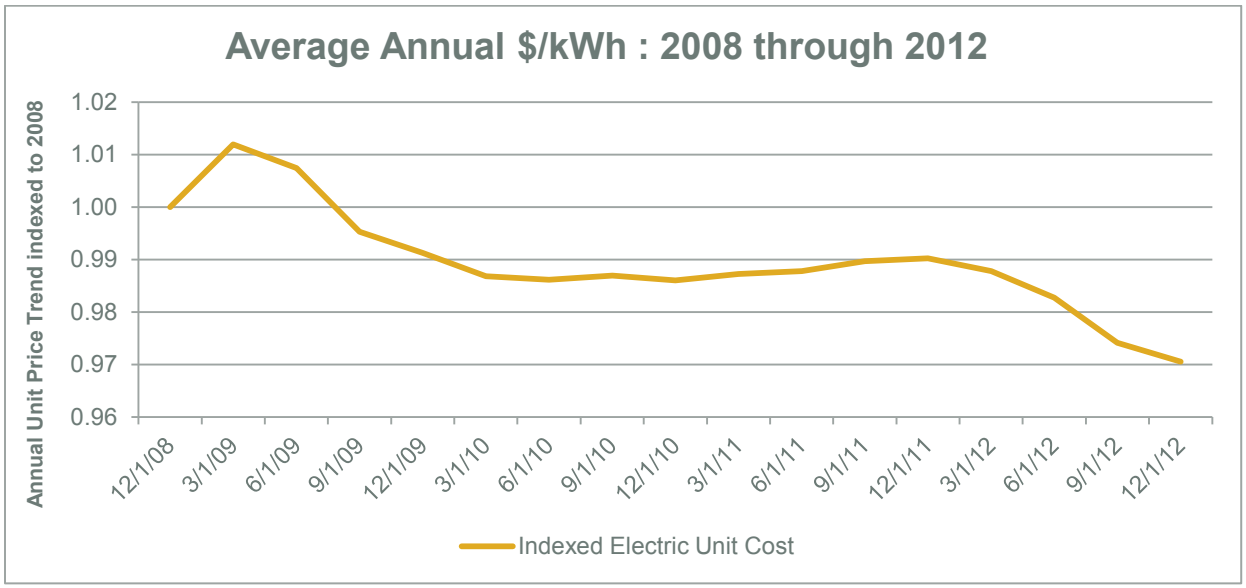
FIGURE 6: 2012 LOAD FACTOR AND LOAD FACTOR RANGES BY VERTICAL MARKET SEGMENT:

2012 Load Factor Range by Segment			
Segment	**Annual Average**	**Worst 10%**	**Best 10%**
Education	34.9	24.8	38.9
Food Sales Convenience Stores	70.3	63.7	77.5
Food Sales Grocery	73.1	66.5	79.9
Food Service Casual Dining	52.8	45.1	61.8
Food Service Quick Serve	57.2	43.1	70.6
Healthcare (Inpatient)	68.2	30.2	75.0
Healthcare (Outpatient)	64.4	32.9	74.5
Industrial	67.0	33.3	72.5
Lodging	65.3	49.5	72.5
Mercantile (Malls)	53.7	35.9	64.8
Small Box Retail 0-7500 Sqft	47.4	35.6	61.2
Big Box Retail 25000+ Sqft	52.7	45.2	66.2
Medium Box Retail 7500-25000 Sqft	57.0	40.4	66.1
Office - 0-10000 Sqft	48.1	32.6	60.6
Office - 10000-50000 Sqft	53.1	40.5	66.1
Office - 50000+ Sqft	66.7	41.5	75.7
Public Assembly	57.6	43.5	68.1
Service	43.4	20.7	53.2
Warehouse and Storage	51.7	34.3	68.6

WHAT IS HAPPENING WITH THE PRICE OF ENERGY?

Overall, clients have experienced a relatively predictable level of electric pricing since early 2010, with prices varying by only about 3% in total from 2008 as indicated in Figure 7 below. This has generated a steady state environment allowing for budget certainty, more simplicity in forecasting and development of fiscal period accruals, as well as ease of business case generation for energy efficiency projects.

FIGURE 7: ANNUAL ELECTRIC PRICE TRENDS 2008 (BASELINE) THROUGH 2012



Taking a deeper look into the relatively stable electric price curve, we see that the price trends are quite different in states with deregulated electric markets. In Figure 8 below, we see diverging trends in deregulated and regulated markets. While indeed the overall commodity price has decreased between 2008 and 2012, the manner in which deregulated and regulated markets are impacted is clearly different. In deregulated markets, we see an overall decrease in unit prices of 14%. In regulated markets, overall unit prices have increased 4%. This difference is due to factors such as:

In deregulated markets, we see an overall decrease in unit prices of 14%.
In regulated markets, overall unit prices have increased 4%.

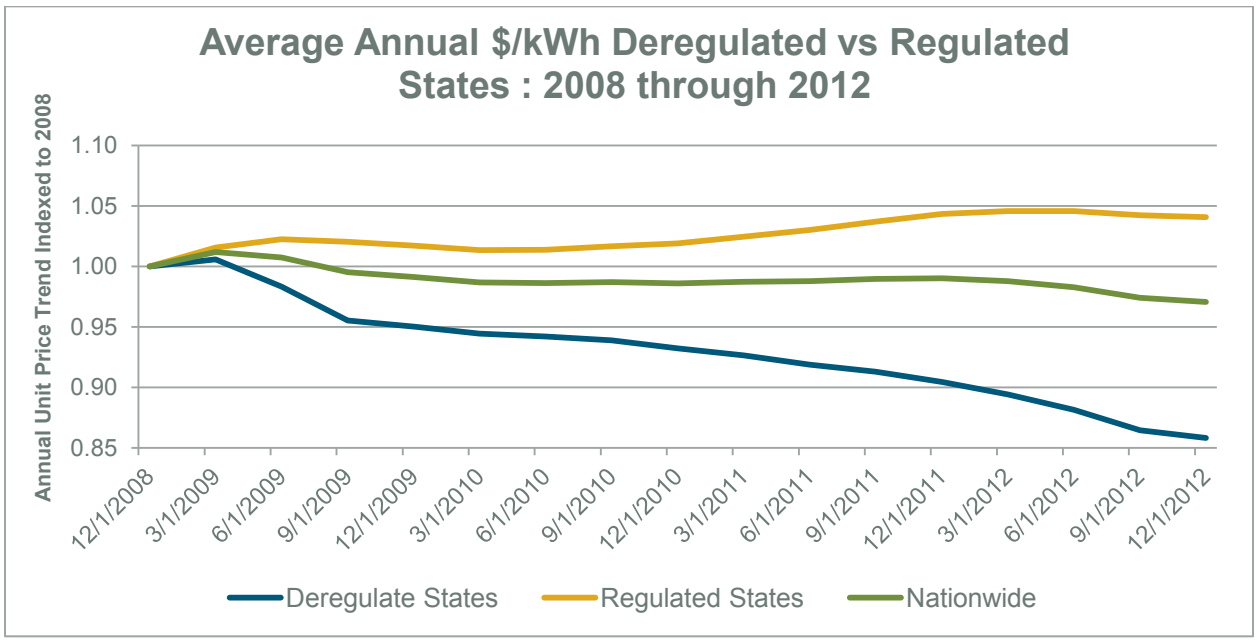
- In deregulated markets, clients are able to take advantage of market opportunities driven by decreasing commodity rates more quickly.
- In regulated markets, decreases in commodity prices take longer to impact end-user unit prices based on the purchasing patterns of the regulated utilities and regulatory lag common in many regulated pricing models.

UTILITY INFRASTRUCTURE COSTS COME HOME TO ROOST

While the decrease in commodity prices has largely masked increases in utility infrastructure costs, we anticipate that will soon change. Today, we have a complex patchwork system of regional and local power plants, power lines and transformers that have widely varying ages, conditions, and capacities.[7] Overall, aging transmission and distribution infrastructure poses increasing obstacles for the power industry. Industry-wide run-to-failure policies have left large portions of utilities' transmission and distribution infrastructure rapidly approaching or exceeding expected service lifetimes.[8] The aging of equipment explains some of the equipment failures that lead to intermittent failures in power quality and availability. The capacity of equipment explains why there are some bottlenecks in the grid that can also lead to brownouts and occasional blackouts. During the past decade, electric energy infrastructure has improved through an upturn in investment, and the negative economic impacts noted in studies of 10 and 20 years ago have been partially mitigated. However, more investment is needed to further reduce the incidence of service disruptions to households and businesses. The need to maintain and update existing electric energy infrastructure, to adopt new technologies, and to meet the demands of a growing population and evolving economy over the next 30 years will impose significant requirements for new energy infrastructure investment.[9]

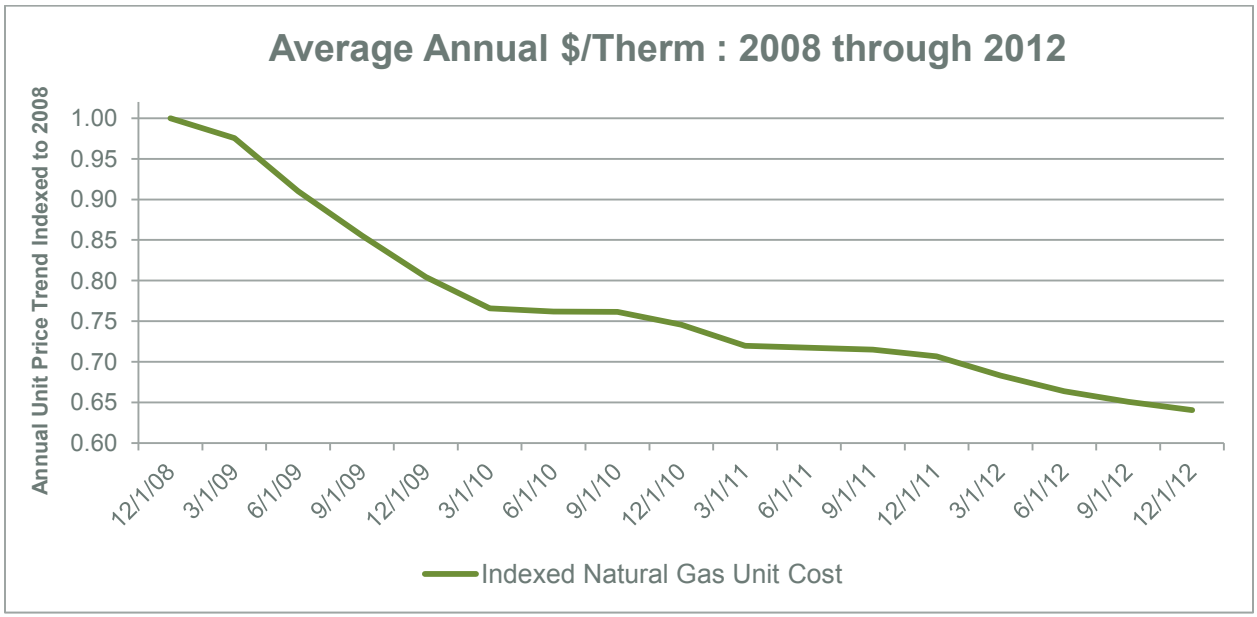
[7] http://www.asce.org/uploadedFiles/Infrastructure/Failure_to_Act/SCE41%20report_Final-lores.pdf
[8] http://www.euci.com/pdf/0812-aging-td.pdf
[9] http://www.asce.org/uploadedFiles/Infrastructure/Failure_to_Act/SCE41%20report_Final-lores.pdf

FIGURE 8: ANNUAL ELECTRIC UNIT PRICE TRENDS: DEREGULATED VS. REGULATED STATES 2008 (BASELINE) THROUGH 2012



Natural gas prices have exhibited a much steeper drop (~36%) since 2008, as outlined below in Figure 9.

FIGURE 9: ANNUAL NATURAL GAS PRICE TRENDS 2008 (BASELINE) THROUGH 2012



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End user natural gas prices have decreased directly as a result of the lower commodity prices for natural gas. Unlike electricity, changes in natural gas commodity prices are reflected much more quickly in the retail market. As an interesting counterpoint, natural gas infrastructure costs have seen a significant increase during this time.

Ecova's electricity outlook is for national average increases of 2%-4% ($.003 to $.004/kWh) from 2012 to 2013 and again to 2014.

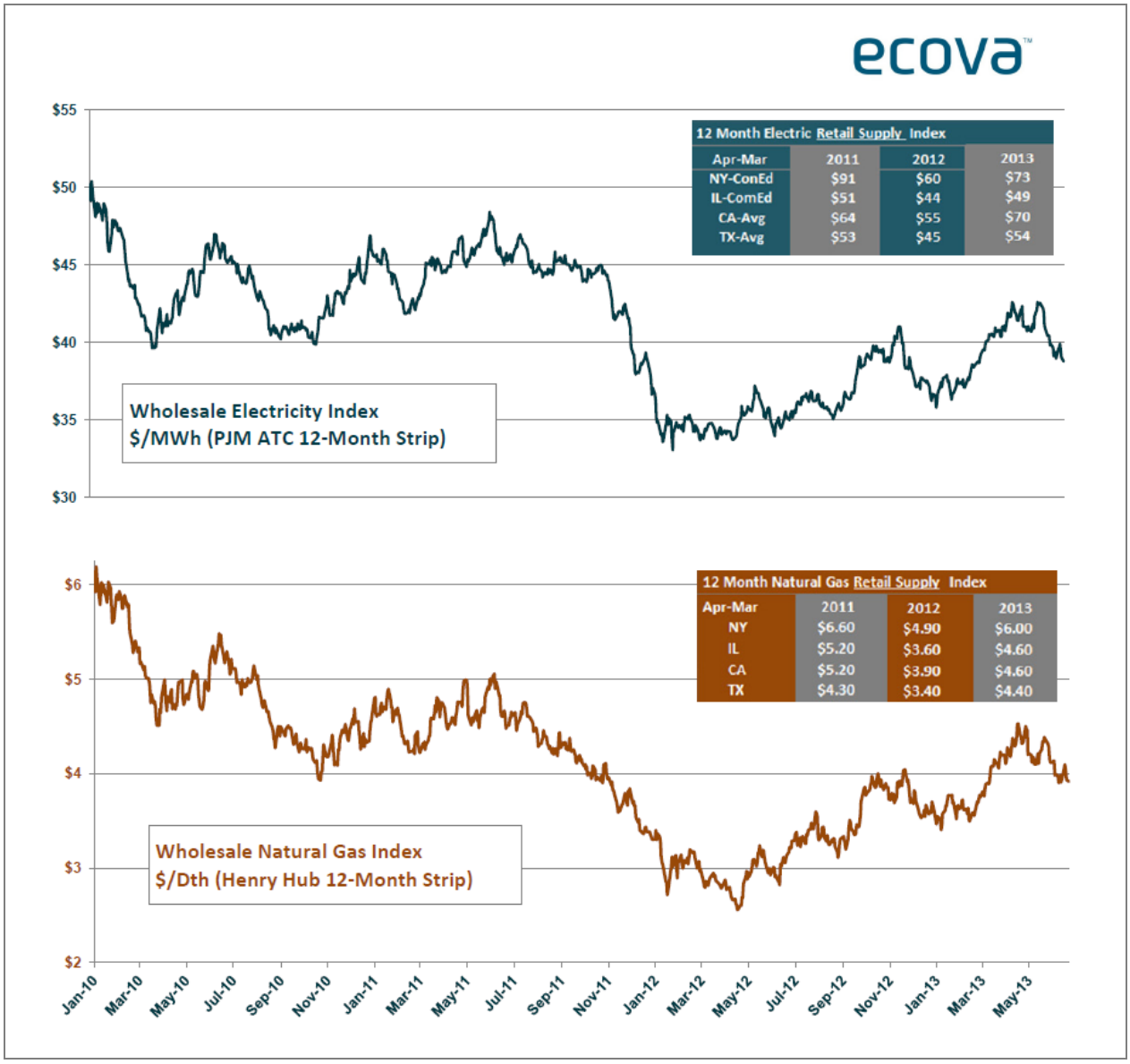
However, the price environment is poised to change. After several years of flat to declining prices owing to a nearly "Perfect Storm" of global recession, increases in building efficiency investment and simultaneous dramatic increases in shale gas production, retail electric rates are on the rise again. Ecova's outlook is for national average increases of 2%-4% ($.003 to $.004/kWh) from 2012 to 2013 and again to 2014. But beyond this gross average, some sites may see as much as $.01 to $.015/kWh annual impact in 2013 over 2012 where capacity prices, grid congestion, high use of natural gas for electric generation, deregulated contracts, or increasingly prevalent regulated fuel cost pass-throughs allow retail prices to move more abruptly.

Our natural gas outlook is for overall national average increases of 5%-10% from 2012 to 2013 and again to 2014.

Natural gas prices are moving up as well. Our outlook is for overall national average increases of 5%-10% from 2012 to 2013 and again to 2014. However, some sites will see as high as $1.00 to $1.25 per Dth where regulations or contracting allow for quick pass-through of commodity costs.

A high level view of wholesale electric and natural gas pricing trends is presented in Figure 10 below:

FIGURE 10: 12 MONTH ELECTRIC RETAIL AND NATURAL GAS SUPPLY TRENDS

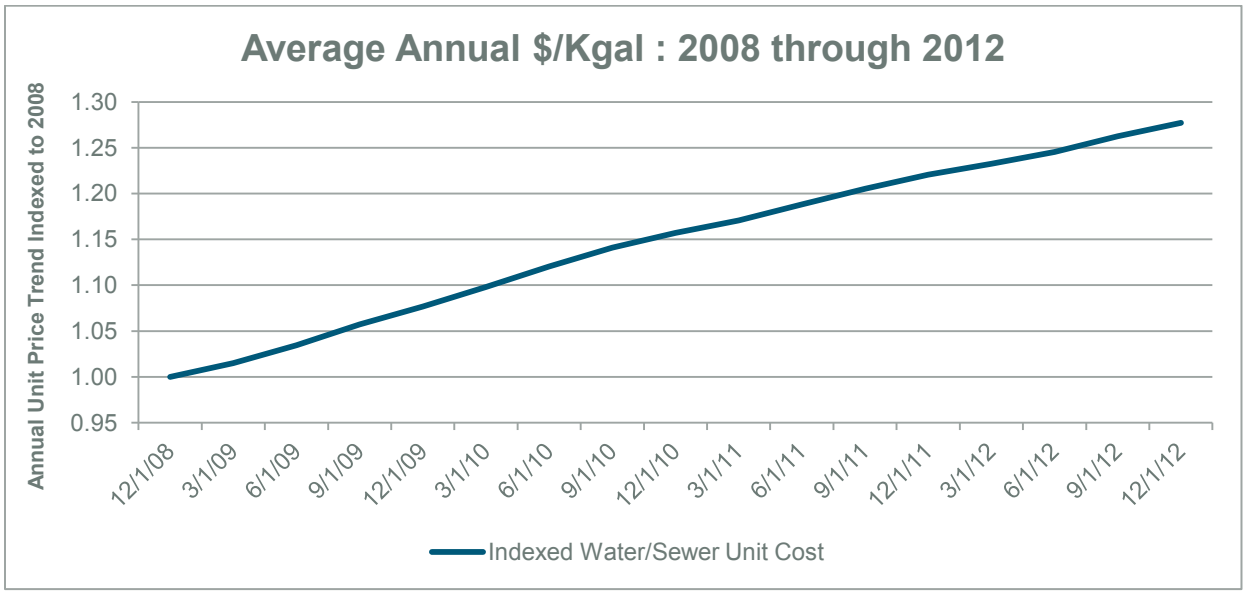


WHAT IS HAPPENING WITH THE PRICE OF WATER/SEWER?

One of the more startling findings is the trend in water and sewer prices, which have climbed by almost 30% since 2008 as indicated in Figure 11 below. The expectation is that prices will continue to rise, driven by water availability issues in many parts of the country, along with the crisis facing the water and sewer infrastructure as outlined below.

One of the more startling findings is the trend in water and sewer prices, which have climbed by almost 30% since 2008

FIGURE 11: AVERAGE ANNUAL $/KGAL PRICE TREND FROM 2008 (BASELINE) THROUGH 2012



The primary drivers for this sharp spike in $/Kgal include the following material risks:

1. Water Availability: within the next decade, 36 states self-report expectations for local, regional or statewide water shortages. This shortage is not just a challenge for the U.S.: the 2030 Water Resources Group ("Charting Our Water Future") indicates that just 20 years from now, global water requirements will be "a full 40% above the current accessible, reliable supply." The impact factors include:
    a. Drought
    b. Increasing populations in water stressed regions
    c. Climate change
    d. Energy product water demands

2. Deferred Infrastructure Investments: the American Water Works Association recently estimated that replacing the nation's *pipes alone* will cost $US 1 trillion over the next 25 years. Most of this will come from ratepayers, who pay as much as 99% of all money that is spent on water supply systems, according to the U.S. Conference of Mayors.[10] The recession curtailed much of these needed improvements, and the work required is extensive. Investments are needed across many states, and include reaching buried distribution pipelines for replacement, enhancing water treatment and storage facilities, sewer replacements, storm water management improvements, and implementing water recycling initiatives. CAPEX budgetary restraints and rising CAPEX costs for technology implementation to drive efficiencies continue to compound the challenge, even as the economy turns the corner. The aging infrastructure also brings with it increased operating costs, which further compounds the availability of cash for CAPEX.

> Just 20 years from now, global water requirements will be "a full 40% above the current accessible, reliable supply."

3. Lack of Regulations to Require Changes to Existing Equipment: there are no federal regulations in place that mandate changes to existing equipment. This puts the burden back onto local and state governments, which are facing their own challenges in allocating already slim budget dollars due to the recession. Debt, deficit, and disinvestment are overwhelming the political debate in most states and in Washington, D.C. Moreover, the intricacies of regulatory requirements faced by water utilities, along with the rising cost of supplies and equipment for water infrastructure, make fixing the nation's water system even harder.[11] The American Society of Civil Engineers (ASCE), which has been ringing the infrastructure alarm bell for years, titled its most recent report on the water and wastewater sectors "Failure to Act." The report, published in December 2011, estimates a national "gap" between what is being spent and what is needed to be $US 84 billion by 2020.[12]

What are companies doing to ensure that water use is understood and optimized? A recent study by Verdantix found that documented water strategies are common: 90% of water-intensive firms and 64% of non-water intensive firms have a documented water strategy in place. Reporting on water usage is now a generally accepted best practice across most of corporate America. However, targets for water performance are still not the norm – even in water-intensive firms, almost 60% have yet to set a water

[10] Buried No Longer: Confronting America 's Water Infrastructure Challenge", American WaterWorks Association, 2012

[11] http://www.circleofblue.org/waternews/2012/world/americas-water-infrastructure-shows-its-age-the-national-debate-about-how-to-pay-for-repairs/

[12] http://www.circleofblue.org/waternews/2012/world/americas-water-infrastructure-shows-its-age-the-national-debate-about-how-to-pay-for-repairs/

performance benchmark.[13] One of the major challenges is that firms are still struggling with understanding the return on investment (ROI) from their water management strategy, which makes the creation of a sound business case for water initiatives even more complicated. When one reviews the percentage change in the $/Kgal by market segment in Figure 12 below, it is clear that developing and executing on proven water reduction initiatives, coupled with water stewardship across water-intensive industries, must become a critical focus for executive leadership.

FIGURE 12: PERCENTAGE INCREASE IN $/KGAL FOR ECOVA CLIENTS FROM 2008 (BASELINE) THROUGH 2012

2012 vs 2008 Water Unit Price % Change Market Segment	2012 $/Kgal	2008 $/Kgal	% Change
Small Box Retail 0-7500 Sqft	$11.960	$8.864	35%
Healthcare (Inpatient)	$11.433	$8.949	28%
Warehouse and Storage	$11.779	$8.539	38%
Medium Box Retail 7500-25000 Sqft	$11.481	$8.666	32%
Service	$10.948	$8.882	23%
Big Box Retail 25000+ Sqft	$9.609	$7.445	29%
Food Sales Grocery	$8.988	$7.322	23%
Healthcare (Outpatient)	$9.172	$7.123	29%
Mercantile (Malls)	$8.871	$7.357	21%
Education	$9.264	$6.940	33%
Food Service Quick Serve	$8.985	$6.891	30%
Food Sales Convenience Stores	$8.831	$6.748	31%
Lodging	$8.735	$6.706	30%
Food Service Casual Dining	$8.448	$6.774	25%
Office - 10000-50000 Sqft	$8.436	$6.615	28%
Office - 0-10000 Sqft	$8.392	$6.639	26%
Office - 50000+ Sqft	$8.452	$6.163	37%
Public Assembly	$7.832	$6.149	27%
Industrial	$6.688	$5.473	22%

[13] Verdantix: The State of Global Corporate Water Strategies, February 2012

ENERGY MANAGEMENT IS CHANGING, WITH SIGNIFICANTLY GREATER POTENTIAL FOR ROI

Ecova is energized by the opportunity to expand the use of its Energy Data Warehouse to empower companies to navigate the demands of our energy—and carbon—constrained future.

Using the Energy Data Warehouse, Ecova and its clients conduct detailed baseline and trend analyses, forecasting, and advanced analytic and measurement and verification processes. When combined with on-the-ground engineering expertise and, increasingly, equipment and facility metering and remote monitoring and controls, these tools allow companies to effectively manage energy at all levels of their organization.

The ability to capture and analyze unprecedented amounts of building envelope data holds the key for energy managers to unlock the next generation of energy-saving projects for their companies and organizations. Big data is the critical foundation to moving beyond incremental improvements for significantly greater savings.

BIG DATA: ECOVA'S ENERGY DATA WAREHOUSE

For this benchmark report, Ecova gathered insights from its Energy Data Warehouse, a massive information inventory that incorporates more than 2.5 billion points of data from 17 business sectors with varying energy usage profiles spanning more than a decade.

Ecova's patented data warehousing and analysis process collects information directly from clients' utility bills, ensuring a timely, accurate, foundational stream of information flowing directly into the Energy Data Warehouse. Notably, the process allows for a more accurate and current energy picture than self-reported data, with constant updates that provide a continuous picture of energy trends and consumption. Our system retrieves the data from each utility invoice, and the information is reflected in the database the next day. The Ecova Data Warehouse also captures important information that is not part of its utility expense management services, such as site and asset details and other energy and resource consumption data, including the capability to collect 15-minute interval data and data from clients' Energy Management Systems. This detailed information helps companies develop comprehensive cost and consumption and sustainability reports, and supports outlier investigation and execution.

A rigorous audit process protects the integrity and accuracy of the information in this closed-loop process.

UNPRECEDENTED SCOPE AND DEPTH

The Energy Data Warehouse leverages information and daily detailed insight from more than 25,000 MW of electricity demand reaching back more than a decade. With information constantly flowing today from more than 700,000 facilities, the warehouse incorporates consumption and cost data from just over 8% of the total U.S. industrial and commercial electric load, making Ecova's energy management portfolio among the largest in the United States. As an energy management solution company that works with both utilities and facilities — including 40% of the nation's top retailers — Ecova brings unique depth and insights to help energy managers prioritize projects.

A sampling of critical database components includes:

- **Energy consumption:** In depth and verifiable energy consumption data efficiently captured from actual utility bills and, increasingly, fed continuously and in real-time into Ecova's system at the more detailed and controllable asset level.
- **Energy cost and rate codes:** Comprehensive utility-bill unit-cost data augmented in deregulated markets with integrated procurement contracts management.
- **Energy demand:** In addition to consumption data, peak demand metrics captured during utility bill analysis.
- **Load factor:** An indication of how steady electric load is over time.
- **Weather:** The ability to customize portfolio-specific weather-normalization coefficients to isolate true drivers of cost and consumption variations.
- **Indexing variables:** Data about major drivers of facility energy demand, such as production units, transaction counts or sales volume.

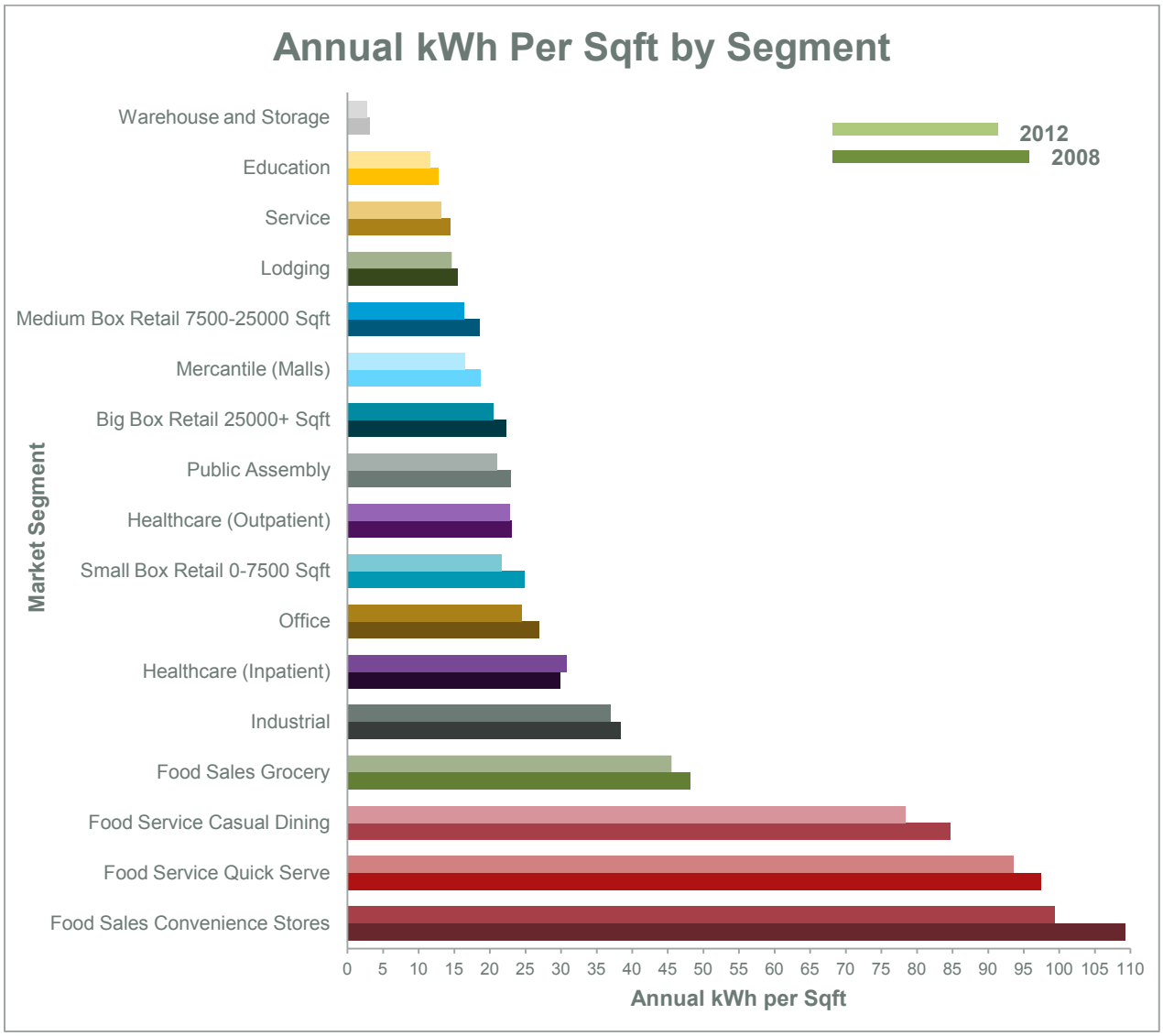
In addition to this set of constantly updated data, Ecova continues to build database depth through facility audit and engineering services for a more detailed understanding of particular facilities and portfolio groupings.

When added together, the scope and depth of the data provide energy managers with unparalleled insights to drive operational improvements and savings throughout their organizations. The size of today's big energy warehouses and the analytic tools companies like Ecova continue to enhance are changing the way energy is managed to optimize consumption and reduce companies' environmental footprints.

ELECTRICITY CONSUMPTION TRENDS, 2008–2012

The chart and graph below reflect a view of energy intensity — as measured by kWh per square foot — from Q4 2008 to Q4 2012, gleaned from the massive amount of data Ecova analyzed from more than 150,000 facilities across 17 different sectors. The information below includes sector-by-sector segmentation for companies to gain deeper insight and benchmark against their industry's average intensity.

CHART 1: ENERGY USE INTENSITY (EUI) BENCHMARKS BY SECTOR, INDEXED TO Q4 2008



Each sector represented in the chart and graph deserves more detailed and unique consideration, but for the purpose of this report, Ecova's analysis presents an aggregated cross-industry perspective. Ecova hopes this view into energy use intensity will prompt conversations about how to identify and prioritize new savings opportunities.

PUTTING BIG DATA TO USE: HOW ENERGY MANAGERS CAN BENEFIT FROM ANALYTIC INSIGHTS

Big data helps companies identify, prioritize and evaluate projects for greater ROI

For large companies with multiple locations, big data holds the key to prioritizing energy operational improvements and identifying further attractive initiatives. One size does not fit all, and effective analysis of unique site locations, trends, weather and other factors can help companies maximize their return on energy management investments.

Effective analysis of unique site locations, trends, weather and other factors can help companies maximize their return on energy management investments.

Expanded Ecova benchmarking service

To make the power of this big data actionable for clients, Ecova is expanding its Energy Performance Report to include vertical market data from the Ecova Data Warehouse in the fall of 2013. The new service will allow for local and regional peer energy performance comparisons, providing greater benchmarking options for clients who currently use Ecova's Energy Performance Reporting service. New features such as mapping that will allow drill down into regional benchmarking and ranking by square footage will enable Ecova clients greater ability to identify and take action to solve their energy management challenges.

Other important tools for energy managers include:

- **Baseline and Trend Analysis:** One of the most fundamental energy management activities is establishing cost and consumption baselines to track over time. Trend analysis can help energy managers gauge absolute energy consumption and energy intensity, both critical metrics for evaluating risk and performance.
- **Forecasting:** Companies need to understand not just historic cost and consumption trends, but also future energy cost, consumption and environmental projections that affect risk and profitability.

- **Facility Benchmarks:** Creating standards for similar venues and facilities can significantly help organizations identify energy hot spots and determine best practices.
    - **Internal benchmarks** help identify positive and negative portfolio outliers with an emphasis on targeting facilities for improved energy performance.
    - **External benchmarks** provide a performance gauge for companies relative to competitors within the same vertical market segment.
- **Advanced Analytics:** Energy managers can isolate and fine-tune distinct data sets—adding parameters such as business productivity, weather and other important metrics—to determine and identify highly targeted solutions.
- **Measurement and Verification:** Reducing energy consumption can involve upgrading infrastructure and/or encouraging occupant behavior change. In any event, measurement is essential to determine what's working and what's not. Especially with pilot programs, getting precise data helps organizations make cost-effective portfolio-wide investments with confidence.

Energy management is changing. The ability to leverage massive amounts of data brings significant opportunities for companies looking to strengthen their bottom line, improve environmental performance and mitigate risk. With increasing pressure for optimizing the performance of facilities and reducing carbon impacts, energy managers should commit resources to obtaining and leveraging big data to their benefit. Each sector and portfolio of facilities brings unique considerations. The Ecova Energy Data Warehouse—incorporating actionable insights from more than 2.5 billion points of data—can provide diverse sectors and companies with powerful tools to see more, save more and sustain more.

ABOUT ECOVA

Ecova is *the* total energy and sustainability management company whose sole purpose is to see more, save more and sustain more for our clients. Using insights based on consumption, cost and carbon footprint data spanning thousands of utilities, hundreds of thousands of business sites and millions of households, we provide fully managed, technology-optimized solutions for saving resources, which in turn increase returns, lower risks, and enhance reputations. Ecova is the largest non-regulated subsidiary of Avista Corp (NYSE: AVA and avistacorp.com). For more information, visit the company's website at ecova.com, on LinkedIn at linkd.in/ecovainc, or follow Ecova on Twitter at @ecovainc.

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