

High Level Market Assessment of Enterprise Energy Management Systems

City of Boston

June 22, 2012



I. Executive Summary

Overview

Enterprise Energy Management Systems (EEMS) span a wide range of functionality, from asset-specific asset instrumentation and monitoring to corporate planning and governance. These systems provide organizations the ability to collect data on electricity, natural gas and water consumption, analyze usage patterns and trends, and provide reports on that analysis. Many systems expand beyond these basic capabilities to include analysis of more general sustainability issues including greenhouse gas emissions, solid waste, purchasing, and vehicle fuel use. The central premise of all systems is that better management of energy and other resources will result in lower costs.

The market for EEMS systems is very dynamic. Since its inception in 2008, the EEMS marketplace has seen a very high number of new entrants. These vendors include many "cleantech" start-up firms, established building management and instrumentation firms, information technology firms, and environmental health and safety firms. These firms have focused on enterprise energy management, data center and information technology energy use, or building management approaches.

Results and Recommendations

The purchasing agent for these systems has also evolved. Initially sustainability staff led the purchase and implementation due to business pressures to reduce emissions. But as the systems have developed greater complexity, and the roles required for a successful implementation more numerous, the purchasing stakeholders have expanded. Now, the purchasing decision and implementation and management includes a wide variety of functions including sustainability staff, IT professionals, facility managers and the finance and budget departments.

Basic vendor information and summaries of their offerings are presented, based on information in the public domain. Of industry leading vendors, the report presents HP's summary and analysis of the EEMS vendors' capabilities and strengths. While the data clearly indicates that several vendors share market leadership, it must be made clear that each vendor offering will vary greatly based on the specific customer, their needs and short and long-term goals.



II. Document Control

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1. Introduction

Enterprise Energy Management Systems (EEMS) span a wide range of functionality, from asset-specific asset instrumentation and monitoring to corporate planning and governance. EEMS software use focuses on three main patterns. These patterns are:

1: Analyze and report. Early user requirements for EEMS software focus on monitoring, analyzing, and reporting energy consumption and carbon emissions. Across all industry user groups, client adoption is focused on these capabilities, especially driven to save time and costs by automating the creation of carbon and energy reports required by governments and regulators, as well as for communication targeting shareholders, customers, and employees (e.g., annual sustainability reports, sustainability marketing materials). Nearly all vendors' products fulfill the requirements to analyze and report energy data.

2: Govern and act. This use pattern incorporates the fundamental requirements of analyze and report, but at a higher level of sophistication, often with the additional tracking of waste and water, and expanded interfaces with other systems. Using an EEMS system to govern and act requires additional capabilities such as enhanced purchasing and supply chain analytics; task and project portfolio management; and more comprehensive analytics capabilities, which assist companies to proactively govern and manage their corporate sustainability strategy. With the addition of these new capabilities, EEMS essentially morph into enterprise-wide energy and sustainability solution. While these enhanced capabilities make such systems more complex in terms of organizational structure of the system, as well as implementation requirements and data management, nearly all EEMS vendors believe this evolution in capabilities is an absolute and market-driven necessity.

Stage 3: Anticipate and align. This use pattern represents the convergence of business performance management and sustainability management capabilities, where EEMS software is no longer a separate technology from financial performance solutions — and vice versa. At this stage, solutions provide integrated management and reporting of financial and sustainability key performance indicators (KPIs), as well as integrated product portfolio management capabilities in order to align strategy and investment priorities from a dual financial and sustainability perspective. In addition, advanced analytics capabilities support the business in anticipating issues and backing decision-making. At this stage, solutions become enterprise-ecosystem solutions that help companies and their suppliers proactively manage their corporate sustainability strategies.



1.1 Basic EEMS Functionality

EEMS systems contain functionality areas that provide key capabilities for full implementation. These functionality areas are often called layers. EEMS systems may contain the following functionality layers:

1. Sense and monitor. These are domain-specific modules for gathering data from different classes of corporate assets including IT equipment; building heating, ventilating, and air conditioning (HVAC) and lighting; vehicles; manufacturing facilities; and people. This layer taps a disparate array of data sources, including automated or instrumented assets (electric meters, data center equipment, vehicles); links to offline data sources (like utility bills and spread sheets); and manual data entry of human activities (e.g., business travel and employee commuting).
2. Aggregate, analyze, and manage. This layer supports the collection and verification of information into a structured database. EEMS systems typically have a series of software connectors to tap into existing software and data sources like enterprise resource planning (ERP) systems, HR software, spread sheets, building management systems (BMS), and the like. It also supports the display of aggregated information in dashboard format, with business intelligence tools for analyzing, managing, and optimizing. Often this layer will include links to utilities' smart grid systems and/or carbon trading markets.
3. Govern and report. EEMS systems have moved from domain-specific to enterprise-wide functionality. Governance modules enable executives to define corporate policies, standards, and goals. The system will also link with other systems, including financial reporting and corporate social responsibility (CSR) management, and support data reporting of data in standard formats like the Carbon Disclosure Project and the US EPA's Climate Leaders program.
4. Aggregate and integrate data sources. Energy use and emissions data comes from a variety of data sources ranging from big enterprise databases to spread sheets to human input. Connecting, aggregating, and formatting data from these different sources is a critical middleware function of EEMS systems. Most often, EEMS are dependent on other systems like corporate ERP, building management, and IT



systems management. For example, EEMS systems can pull data about employees' travel-related emissions from a corporate travel database.

5. Ensure data quality. In the process of accessing and aggregating data, EEMS systems must also normalize the data so it can be properly compared, discard or otherwise account for anomalous data, and provide an audit trail so users can trace back data points in reports to their source if necessary. As pointed out in the Benchmarking Study (HP 2012), many EEMS customers were able to significantly cut energy costs simply by identifying errors in utility billing and eliminating double billings, making data quality functionality a critical aspect of any EEMS implementation.
6. Translate energy to carbon. Systems must translate energy use (electricity, travel, etc.) into estimates of resulting carbon emissions, based on databases of carbon factors, which calculate the carbon created by burning different types of fuel. In a forerunner of other vendor relationships, many systems incorporate an E-GRID or other emissions factors data set, which allows the system to convert electricity use to carbon emissions based upon the location, type, and cost of electricity generation that customer locations use.
7. Provide visibility and analysis. The energy and carbon data is only interesting and useful if users can display it in a simple and compelling format and analyze it to provide insight and recommendations for action. Some systems provide customizable, role based dashboards that allow different corporate functions — operations, IT, CSR, etc. — to view data in the way that is most relevant to them.
8. Model and optimize energy use. Part of the analysis function is the ability to create scenario based models of future energy use patterns, answering what-if questions about prospective changes in asset utilization, energy sources, and pricing impacts. IBM, for example, has helped customers use EEMS data to forecast the energy consumption of new, green data center builds.
9. Provide a return path. Some EEMS systems, especially those that are focused on building management create active, two-way linkage with underlying software and mechanical systems, so that users directly act on the results of monitoring and analysis. Format data for reporting. Many organizations today are buying EEMS to create reports for mandatory or voluntary carbon emissions reporting programs. Systems will have templates that match the reporting formats of the US EPA's



Climate Leaders program, the Global Reporting Initiative, and other efforts to standardize reporting metrics and formats.

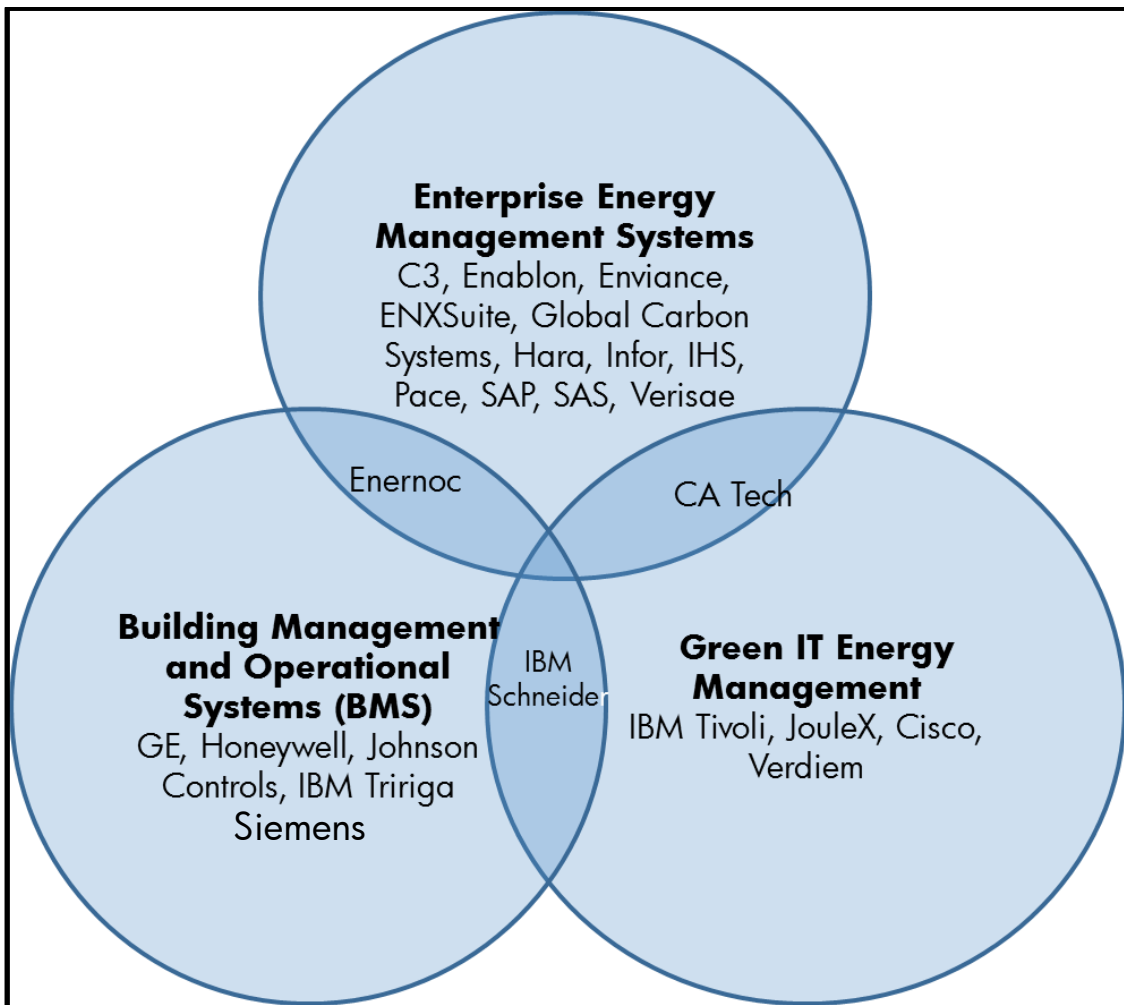
10. Monetize energy and carbon conservation. Some EEMS systems link companies' carbon management performance to markets for renewable energy or carbon trading markets where credits for energy conservation and/or carbon emissions reductions can be monetized.

2. Market Assessment of EEMS Systems

The market position of EEMS systems can be mapped to three overlapping spheres of focus (Figure 1). These spheres are:

1. Enterprise Carbon and Energy Management
2. Building Management Systems, and
3. Green IT Carbon and Energy Management Systems.

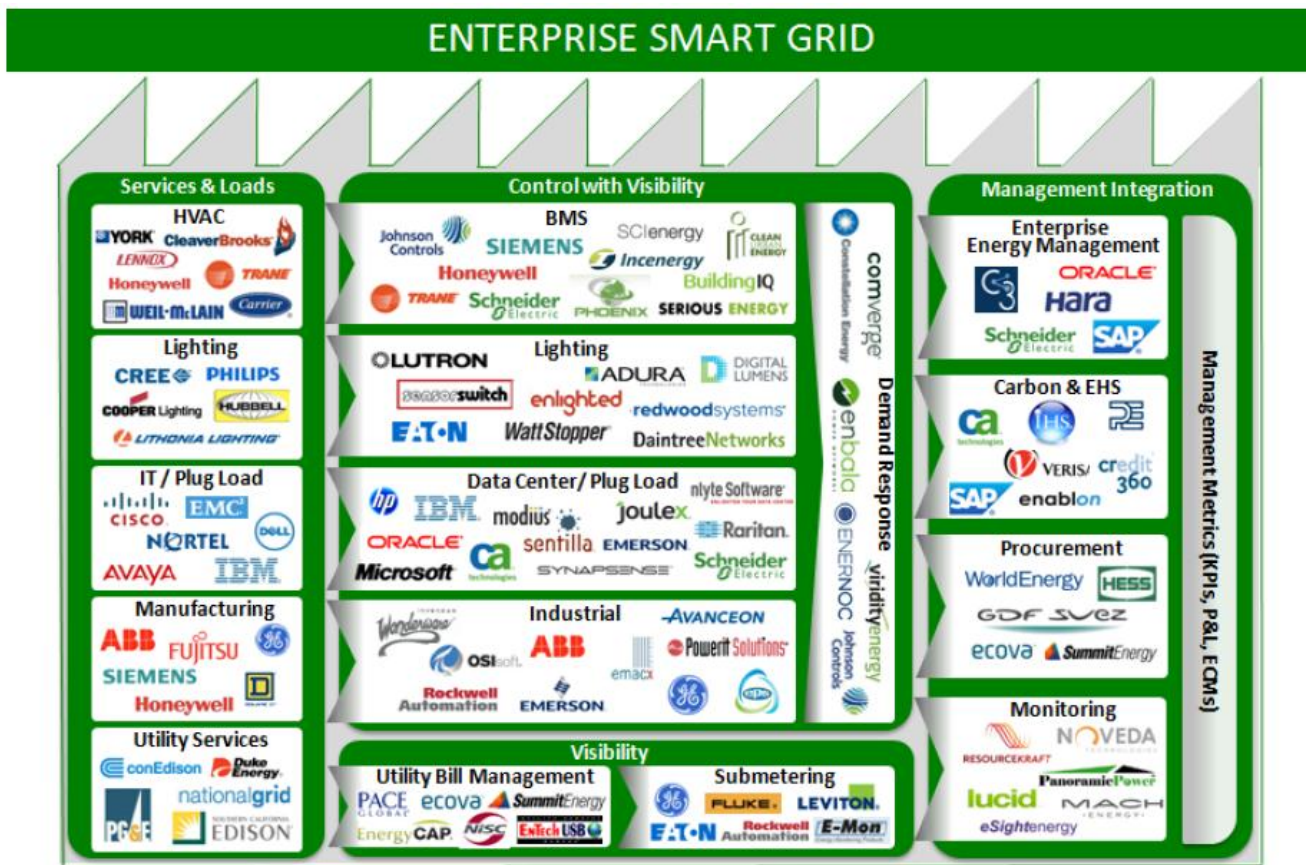
Because of the fluid nature of the market, and changing market pressures, vendors which have focused initially on one of these three spheres have worked to expand their customer base by expanding their services to existing customers, or by acquiring other firms with footholds in other spheres. For example, IBM has purchased Tririga to move into the Building management sphere, while ENXSuite, originally a pure EEMS vendor, developed building management and smart grid capabilities.



Adapted from Forrester, 2010 (not all vendors evaluated in this report are shown)

Figure 1. Mapping of EEMS System Approaches

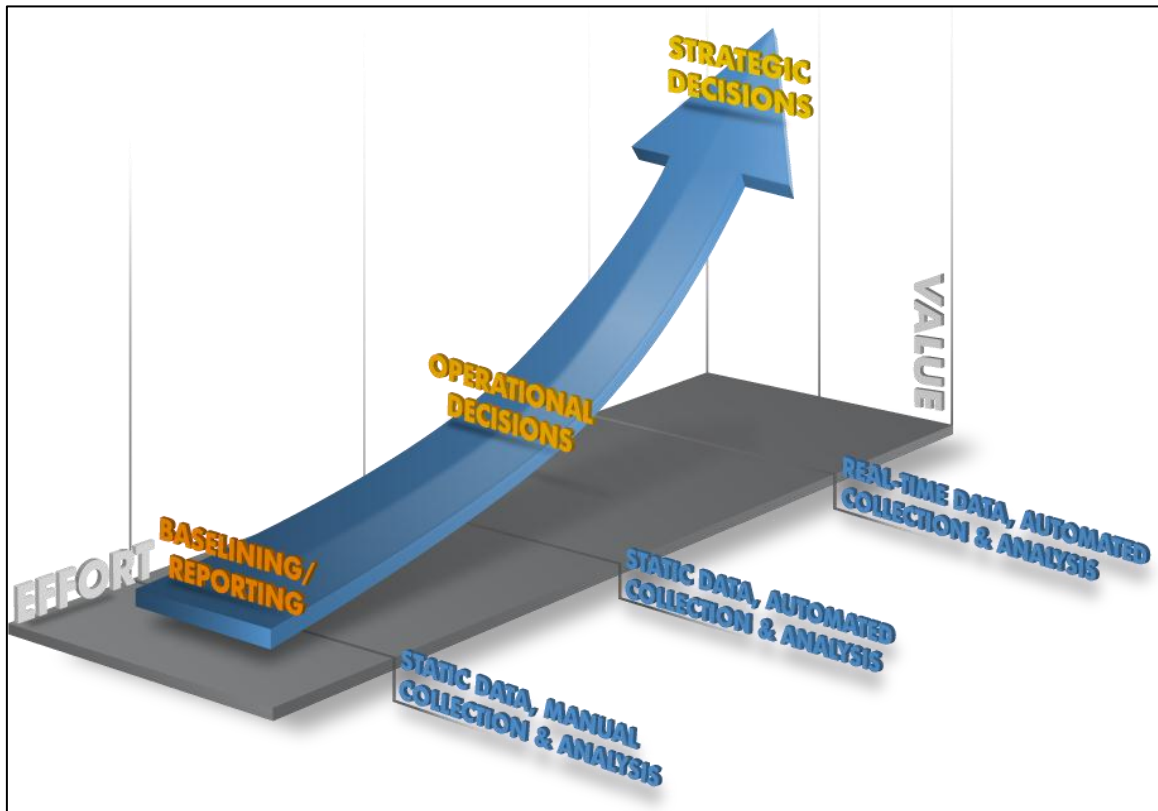
Most vendors recognize that they must provide an enterprise view, albeit one which integrates with the smart grid technologies to provide real time energy management. As a result, this report represents a snapshot in time. These spheres are breaking down as smart meter technology drives the industry towards a “Smart Grid” solution. The overall approach to vendors in the Smart Grid arena, of which EEMS is a part, is illustrated in Figure 2 (Groom Energy, 2012).



Source, Groom Energy, 2012

Figure 2. Enterprise Smart Grid Market and Vendor Structure.

Additionally, all vendors are moving to integrate data more effectively to maximize strategic value for their clients. This integration enables EEMS users to enhance their decision making analytics and strategic approach to energy management. Figure 3 illustrates how this integration is leading to more strategic solutions.



From Van Orsdol, 2012

Figure 3. EEMS Vendors Moving to Greater Complexity and Value



2.1 EEMS Systems-Early Market Implementation

Market researchers, such as Gartner and Forester estimate that only several hundred companies worldwide have implemented EEMS systems. But the classic signs of an early technology marketplace are apparent though the evolving offerings of vendors pioneering this space: competing and overlapping market definitions; a wide range of suppliers of different sizes and directions that are in or poised to be in the market; and confusion among buyers about what, why, how, and who will be investing. Buyers are clear that software especially aimed at reducing energy use and spending is a high priority. Firms which implemented EEMS systems in 2008, 2009 and early 2010 often had carbon tracking as a priority. However, as the global economy sputtered, and global conventions to manage carbon (and put a market price on carbon emissions) failed to materialize, the market drivers quickly moved from carbon emissions and sustainability to energy management and reducing the energy spend. Essentially all vendors of EEMS systems responded to these changes by configuring their systems to meet these market changes.

Enterprises in different industries have different levels of visibility and urgency about energy and carbon management. Today, many get by with estimating and modeling carbon use via spread sheets, while others instrument corporate assets to create more granular, real-time information. With continuing legislation and regulation occurring in particular "hot spots" such as the California, the Northeast RGGI states, the EU, provinces of Canada, Australia, and the UK, more and more large energy users will recognize the value of systematic tracking.



2.2 The Evolution of EEMS Product Functionality

Most vendors offer their solutions through multiple delivery options. Software-as-a-service (SaaS) represents the primary route to market for EEMS vendors, with many also offering their solutions as on-premise or hosted. EEMS vendors that incorporate their offerings with other environmental and sustainability software tools, on the other hand, still mainly provide on-premise solutions. The two principal pricing models for carbon and energy management software are based on the number of users and facilities deployed. A few firms, especially those targeting extremely large energy consumers, price their offerings as a percentage of total energy spend.

As EEMS systems have evolved quickly over the past several years, the market has seen a rapid movement in product functionality (Figure 4). These movements are centered on four key trends:

1. From energy and carbon to a broader scope of pollution and natural resources management. While most vendors today cover the basic capabilities of carbon and energy management, there are already quite a number of vendors that have expanded the information sources, analysis, and modeling capabilities of their software to the management of waste, water, and other resources.
2. From enterprise to entire value chain carbon measurement. Most of the EEMS solutions today offer a strong level of automation for scope one and two emissions, but rely primarily on manual data entry for capturing scope three emissions, especially those caused by companies' supply chains. Therefore, vendors are putting much of their attention and investment at the moment to advance their supply chain capabilities.
3. From descriptive to predictive analyses. EEMS software today primarily enables users to review descriptive information of energy consumption and carbon emissions. However, some vendors, are already providing more sophisticated capabilities where, for example, the system automatically identifies anomalies in the data (e.g., energy use in facility X is significantly higher than normal) and initiates alerts so that companies can respond faster to incidents, saving money and preventing associated risks. The next level of sophistication represents sustainability analytics, which predict future energy consumption and related carbon emissions, related to sustainability projects and any other investments to support decision-making and project prioritization. Vendors who produce other enterprise software solutions are, for example, looking to further integrate their



already existing business intelligence and analytics capabilities into their sustainability management solutions.

- 4. From pure software vendor to platform-based EEMS service provider. As EEMS evolve, organizations are looking for system capabilities which can be provided as-a-service from their suppliers. Organizations are unable to afford to dedicate entire teams with the appropriate set of skills to track and run energy and sustainability analytics. Compared with the past, where software and services were handled as separate capabilities, software and services are becoming much more integrated as result of the rising software-as-a-service paradigm.

		2008 to 2010	2011 to 2013
Supplier	Dominant supplier type	GRC/EHS Startups	Enterprise software companies
	Number of enterprise implementations	100s	1,000s
	IT supplier value proposition	Operating cost reduction	Company and product differentiation
	Principal buyer	Facilities GRC and CSR	IT
Buyer	Functionality requirement	Aggregation	Analysis
	Scope	Single facility	Enterprisewide
	Data source	Spreadsheets	Asset instrumentation
	Leading industries	Energy Public sector	Retail Consumer packaged goods

503 Source: Forrester Research, Inc.

Figure 4. Changing Vendor and Customer EEMS Dynamics



2.3 Roles Involved in Purchasing and Implementing EEMS

Who buys EEMS systems and who is responsible for implementing and managing these systems? Carbon and energy management has a broad array of stakeholders, each with a set of diverse business drivers. Few companies have a clear, single owner and operator of the system. Those with business motivations often do not have sufficient budgetary authority to purchase an EEMS system. Those with the authority, such as IT Departments, rarely have the responsibility to manage energy consumption or report on carbon emissions. This dichotomy makes it difficult for vendors to market their systems since the purchasing and enabling stakeholders are diverse. But it also directly impacts those that want to use the EEMS, creating governance bottlenecks and unaligned roles and responsibilities during both installation and subsequent use phases.

Forrester Research (2009) conducted a survey of purchasing and implementing agents in firms buying EEMS. This study showed that 20% of the world's largest companies have named a Chief Sustainability Officer. These CSO's are typically positions without large staffs or budgets and they rely on influence and a charter from the CEO to effect changes in operations. This was also seen in the Benchmarking Study (HP 2012) where a majority of implementers and users of EEMS in the municipal realm were sustainability managers almost exclusively within the Mayor's office. As a result, they are drivers in the decision to purchase a system, and the primary users of the system. But they do not make the purchasing decision which is the responsibility of experienced software buyers, namely the IT Department. In addition, sustainability staffs rarely possess the IT expertise required to integrate an EEMS into the organization's business process and legacy IT infrastructure.

Facility management teams own most of the energy assets. The Public Works, facilities or real estate organizations are typically managing the big energy-consuming assets of an organization: building HVAC and lighting, vehicles, as well as processing equipment such as water pumps. Facilities managers may have existing system(s) for monitoring the operation and maintenance status of some facilities and equipment, but these systems are not integrated across multiple sites nor are they linked in with other systems like financials or ERP. The facilities teams need to be directly involved in the purchasing decision, if for no other reason than they own domain-specific asset-monitoring systems that will be information feeders into an EEMS. The facilities organizations are also the group responsible for implementing energy efficiency opportunities which are identified or highlighted by the EEMS and thus have a primary role in implementing energy-saving projects.



The Information Technology (IT) departments invariably own the data management and processing functions within the organization. Like facilities, IT usually owns a set of assets that are large energy consumers (i.e. Data Centers). However, in many cases those intense energy consumption assets are not separately metered and the efficiency of those assets is secondary to other considerations. Most IT leaders are measured on metrics like system reliability and application uptime, not on energy efficiency or carbon footprint. However, the experience of several municipalities, as well as the experience of many large organizations, demonstrates that IT should play a very crucial role in an EEMS implementation. IT can ensure the chosen system integrates into the organizations' other systems, assess the security, data format and process issues, and serve the role of linking siloed departments to report and manage energy data.

The CFO, budget and audit department must own the financial implications of an EEMS system. Those organizations with a strong CFO or finance driven mandate to reduce energy spend and carbon footprint through greater operational and energy efficiency are often cited as being the most successful. The CFO also provides additional incentives for cross-departmental collaboration which is required for a successful EEMS. Since many key performance indices (KPI's) associated with energy conservation are financial in nature, the CFO serves in the crucial role of evaluating KPI's across the organization and ensuring that efficiency incentives are structured appropriately.



3. Summary of EEMS Vendors

This section provides summary information on EEMS vendors that HP considers to be important in the marketplace. The goal of this section is to provide an overview of each vendor, contact information, capabilities, key clients, and basic product information. The data for this section comes from vendor materials, market research firms, demonstrations and other public and private sources. It must be noted that while every effort has been made to ensure the information is correct, the author has not formally evaluated each vendor offerings. Capabilities statements by the vendor, for example, regarding the capability of a system to integrate with PeopleSoft, are taken to be correct.

The information used in this section is derived from market research reports, and the vendors marketing information. The vendors in this summary are:

Building IQ	eSightEnergy	Noveda
CA Technologies	GE Intelligent Platforms	Siemens
C3 Energy	Fujitsu	SAP
credit360	Global Carbon Systems	Schneider Electric
Comverge	Hara Software	School Dude
Ecova	IBM	SClenergy
Enablon	IHS	Serious Energy
Energy Cap	Johnson Controls	Verisae
EnerNOC	JouleX	
EPS Corporation (Ameresco)	Lucid	

Table 1. List of EEMS vendors



Data was obtained for each vendor in the following categories:

- Vendor
- URL
- Headquarters
- Tagline
- Estimated number of employees/revenue
- Financing events in last 3 years
- Sales channel
- Product names
- Pricing /business model
- Implementation Methodology
- Sell proprietary hardware?
- Estimated number of customers
- Target customers
- Target customers applications
- Top verticals
- Geographic strengths
- Example customers
- Notable case studies on website
- Customers announced in 2011
- Notable energy services beyond EEMS
- Notable news in 2011
- Data input method

Categories where information was not obtained are indicated by "-". See summary table (Appendix B) for a full matrix of vendors.



3.1 Building IQ

Founded in 2009, out of a group of researchers working for the Australian government research facility (CSIRO), BuildingIQ is an energy management software company whose mission is to redefine the way energy is managed in commercial buildings. The company has been honored as Winner of the AIRAH Award for Excellence in Innovation, Tech23's Greatest Potential Award, and most recently Environmental Design + Construction and Sustainable Facility's Readers' Choice Award two years running and Connectivity Week's Building Award.



BuildingIQ's suite of software offerings are based on unique, patent-pending Predictive Energy Optimization™ technology. These offerings reduce peak and on-going energy cost and consumption, helping facility owners, managers and occupants get more value out of their existing HVAC energy systems.

3.2 CA Technologies

CA Technologies is a large, diversified IT company that sells software for sustainability, energy, and sub metering applications.

CA offers three main products dealing with energy management. These are:

CA ecoGovernance, an enterprise energy and sustainability management solution, is designed to help clients accelerate the drive towards sustainability by pursuing a systematic, governed approach. It enables clients to measure, report, analyze, and take action on energy, carbon, water, waste, materials and health & safety.

CA ecoMeter can help clients visualize, monitor, and better manage the use of energy in your data centers and facilities. As energy data becomes more important with the advent of cloud computing and virtualization, CA ecoMeter provides energy data points to help make intelligent decisions that can lead to increased operational efficiency and reduced consumption.

CA ecoDesktop helps organizations manage their desktop and PC power consumption by helping reduce wasted energy and increasing staff productivity by automating the management of large desktop estates using a proven inventory-based approach. The solution provides a visible 'Green IT' initiative that lowers operating costs, reduces carbon emissions and minimizes energy consumption.



3.3 C3 Energy

Founded in 2009, C3's mission is to enable customers to increase profitability and cash flow by optimizing their enterprise energy management strategy. The firm was founded by Tom Siebel, founder of Siebel Systems, and a group of senior managers from that firm. The firm is noteworthy in having on its board of directors a number of prominent government and political figures.

C3 offers a family of software solutions that help companies to understand, optimize, and report on their energy use and greenhouse gas emissions, in order to reduce cost, risk, and environmental impact. C3 customers include very large energy users, such as Dow Chemical, as well as utilities.



3.4 Credit 360

Credit360 is UK-based firm with many Corporate Sustainability Report (CSR) and carbon-reporting customers and expanding into energy and Environmental Health and Safety (EHS).

Energy and Carbon solution helps clients gather data from across your business, calculate your emissions across scopes 1, 2 and 3 using established protocols and GHG conversion factors and create performance reports and dashboards. The forecasting and planning tools help manage energy reduction initiatives and visualize the impact of different scenarios on your long term performance. By increasing the information available regarding carbon footprints which may include yearly/quarterly/monthly/daily data, clients can take steps to manage it, cutting both emissions and budgets.

Key features and benefits

- Flexible tools that help you work out your major impact areas and track your impacts across energy and travel
- Flexible estimations methodologies for when you can't get all your data
- Real time meter reading and management for when you can
- Import files or feeds from existing enterprise reporting platforms
- In-built carbon factor management across global carbon factor sets
- Planning and reporting on reduction initiatives



3.5 Converge

Comverge is a publicly traded demand response vendor that also sells an EEMS product. Their focus is building management systems, utility programs and demand response. Intelligent energy management solutions build upon demand response, enabling two-way communication between providers and consumers – giving everyone the insight and control needed to optimize energy usage. Beyond just reducing the energy load, this new approach cuts costs, integrates other systems, and allows for the informed decision-making that will power the smart grid.

Intellisource is an energy management solution built upon demand response, enabling two-way communication between providers and consumers – giving everyone the insight and control needed to optimize energy usage. Beyond just reducing the energy load, this new approach cuts costs, integrates other systems, and allows for the informed decision-making that will power the smart grid.

An end-to-end intelligent energy solution delivers:

- Two-way, real-time communication between utilities and customers
- Better energy control
- Insights into problem areas that require maintenance
- More predictable energy loads
- Rapid and flexible responses to changing conditions
- Automated energy management
- Faster, easier service changes
- Improved management across the grid
- A bridge to the promise of the smart grid



3.6 Ecova

Formerly Advantage IQ, Ecova is a leader in utility bill management and has been aggressively expanding its offerings with acquisitions.

Ecova serves utility and facility managers, helping them save money and resources which are critical business goals. From energy, water and waste to telecom, lease and carbon management, Ecova provides accurate information and advice, as well as the expertise and service implementation you need to improve efficiency, lower expenses and enhance reputation. Using insights based on consumption, cost and carbon footprint data spanning thousands of utilities, hundreds of thousands of business sites and millions of households, Ecova provides 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.



3.7 Enablon

Enablon is one of the world's largest Sustainability & EHS vendors that also offer a complete carbon and energy management suite. Its solutions target Corporate Responsibility, Energy & Carbon Management, QEHS Performance and Governance, Risk & Compliance.

The Enablon GHG and energy management software addresses companies' needs in terms of collection, monitoring, analysis and overall management of greenhouse gas emissions. It provides a set of tools allowing companies to comply with legal requirements (national regulations, quota directives) and to deliver on voluntary initiatives.



3.8 Energy Cap

Energy Cap is a leading provider of utility bill management software. For more than 30 years, EnergyCAP software has helped users get value from energy data.

EnergyCAP, enables you to:

- Improve utility bill processing
- Produce energy and GHG reports
- Simplify budgeting, EDI, A/P
- Verify energy saving projects
- Acquire ENERGY STAR ratings
- Calculate sub meter chargebacks

EnergyCap has two tools which help enterprises manage energy bills. These are:

EnergyCAP® Enterprise: An enterprise energy management software for utility bill processing and energy reporting. Choose the features that meet your complex needs.

- Fortune 1000, college, university, large government
- Typical user pays and manages hundreds or thousands of monthly utility bills
- Network client-server with Web reporting
- Interfaces: EDI, Accounting, Metering, ENERGY STAR
- Audits, benchmarks, chargebacks, M&V, accruals, and more.

EnergyCAP® Express

Fully online energy efficiency software for managing utility bills and energy data. Start using it quickly and easily, today.

- College, town, small county, business
- Great way to introduce energy management to your organization
- Includes ENERGY STAR, weather data, greenhouse gas tracking, benchmarking, reporting, and energy dashboards
- Automatic utility bill auditing.



3.9 EnerNOC

EnerNOC is the leading vendor of demand response solutions and has become a full-service energy provider via acquisitions. Its focus is on Billing Verification, Demand Side Management and Building Management software and services. EnerNOC helps commercial, institutional, and industrial organizations use energy more intelligently, pay less for it, and generate cash flow that benefits the bottom line through our complete suite of technology-enabled energy management solutions.

EnerNOC's EfficiencySMART™ solution delivers continuous energy savings by leveraging the powerful combination of energy management expertise, advanced technology platform, and energy market access. With expertise in commercial, institutional, and industrial environments, EnerNOC helps to cut your energy costs, while maintaining or improving your productivity. EfficiencySMART addresses the entire lifecycle of energy efficiency needs from planning to implementation to measurement and verification.

To ensure that recommendations and energy data become energy savings, these activities need to be integrated; otherwise, your efforts simply become an expensive collection of fancy reports, pretty dashboards and data storage costs. An integrated approach ensures that energy efficiency investments deliver savings year after year. EnerNOC's energy management application platform, coupled with the industry's most experienced energy professionals, has helped save millions of kWh and BTUs, translating to millions of dollars for our customers.

Ensure lasting results

One time projects—a plan, an audit,—can deliver big results. But buildings aren't static and results drift over time. EfficiencySMART Insight arms you with powerful web-based meter-analytics, profiling, and fault detection tools that leverage real time data to identify and rank energy efficiency opportunities. EfficiencySMART Insight can be deployed at the building level, comparing energy usage patterns across multiple facilities, or at the system level, tying into building management systems or SCADA systems to identify usage anomalies. Data is presented in intuitive, easy-to-use dashboards. Energy efficiency measures are outlined and quantified by EnerNOC's team of analysts, and delivered in periodic, user-friendly scorecards, so that you can ensure your resources are deployed where they will have the highest impact.



Manage Risk and Make Smarter Purchasing Decisions With SupplySMART. In competitive energy markets, developing the right energy purchasing strategy can be a complex challenge. If your organization wants to manage risk and secure the right price for energy, SupplySMART™ can help. We guide you through the steps necessary to choose the right energy supplier, and we leverage detailed data about your energy consumption to create an energy strategy tailored to your specific needs. With over \$2 billion already under management, our team of seasoned analysts is ready to help you choose the right option to match your long-term supply strategy.

Supply options simplified

SupplySMART demystifies your competitive energy purchases. EnerNOC takes care of the end-to-end process so that you can stay focused on running your business. From education to execution, you see what we do every step of the way, and we work with you to measure, manage, and mitigate risk associated with energy purchases.

A better way to manage bills

Studies show that two percent of bills contain errors. By utilizing EnerNOC's real-time energy monitoring capabilities, SupplySMART can help you avoid overcharges. With SupplySMART Utility Bill Management, you gain improved bill transparency to help you track cost figures and potentially identify outliers and mistakes.



3.10 EPS Corporation

EPS Corporation has real-time energy management applications mainly used by manufacturing companies. EPS Corporation was acquired by Ameresco in 2011. EPS delivers comprehensive energy management solutions on both sides of the meter that drive energy efficiency, leverage renewable energy and achieve profitability and sustainability goals for our commercial, industrial, institutional and municipal customers.

Ameresco's AXIS energy data analysis system provides effective energy data analysis can be the difference between invoice management that simply gets the bills paid and invoice management that reduces costs and changes the way a company consumes energy. Ameresco's approach to data capture, bill validation and energy analysis is multi-dimensional, using both Comparative and Correlative Analysis on Optical Character Recognition (OCR) data values drawn from energy bills. Using this analysis, we can identify which locations may need more in-depth analysis for potential rate optimization or even repair, replacement or realignment of energy consuming equipment.

Comparative Analysis

Comparative analysis involves two principal types of comparison: simple and conditional. Both methods use bill-to-bill values at the invoice and meter levels. Simple comparison is used for dates, date ranges and to verify the existence of required rate schedule data. Conditional comparison is used when specific data types or elements can only be compared with a limited history of account/meter data, or when a specific set of account rules apply.

Correlative Analysis

Correlative Analysis involves pattern matching and variance differentiation (PMVD), which provides the most comprehensive identification of data inaccuracies. Normalizing meter data, applying weather adjustments and comparing multiple regressions allows Ameresco AXIS to uncover usage patterns and exceptions. By looking closely at variances in trends, as well as account-based minimum, maximum and mean thresholds, Ameresco AXIS can identify potential exceptions and refer them to Ameresco account analysts for further investigation.



Rate Review and Analysis

As new bills are processed, Axis can verify all the current bill data against historical rates and calculations. If the rate schedule name or any of the calculations vary, an exception is generated and the bill is sent to an analyst for further review and client communication. If it is determined that current rates and rate schedules are not optimized, Ameresco provides rate optimization and utility rate consulting as core services; we identify ideal rates and supply by leveraging our local utility relationships and our knowledge of retail access in every region and regulatory climate.

The other significant product is Ameresco's AXIS Utility Bill Management System. Utility bill management is often viewed as a mandatory, time-consuming process that offers limited business benefits. Ameresco AXIS® Invoice Management eliminates this perception for commercial and industrial companies, government, and institutions by helping them to streamline this process and to identify new opportunities for energy and cost savings during utility bill processing that lower utility costs and reduce environmental impact.

As a secure web-based service, Ameresco AXIS is a complete solution for organizations juggling multiple invoices from repeatable bills, such as gas, electric, water, sewer, waste, communications and logistics; particularly in a distributed environment, such as a university campus or an enterprise with facilities spread across the United States. Ameresco AXIS offers comprehensive data reporting for each location in an organization and fully automates utility bill management and information capture, with advanced technology that provides faster access to accurate data.

The technology behind Ameresco AXIS reduces the risk of human error in utility-bill management, while providing the expertise and personal review of Ameresco's specialists in both the utility and energy management industries.

With the use of the Ameresco AXIS system, customers receive:

- Web-based services with no additional software or hardware requirements
- A multidimensional approach to audits, including both comparative and correlative analysis of each bill
- Additional analytical support from an experienced account analyst who is assigned to your account
- Service provider contact for resolution and/or clarification of bill anomalies
- Data available for viewing and exporting within 24 hours from receipt of invoice



3.11 eSight Energy

eSight Energy Group Limited provides energy management software solutions in the United Kingdom and internationally. The company, founded in 2008 has teamed with several building management system controls companies.

eSight® suite equips the user with an impressive array of tools for managing all aspects of energy-related data. Being fully web-enabled, eSight® is available as both a SaaS (software as a service) model, or installed directly to a client site. It delivers the ability for data to be automatically imported into eSight® from nearly any device or system: from building automation systems to data loggers, supplier data to manual entry, controls systems to production systems, data via oBIX and OPC, even from spread sheets.



3.12 GE Intelligent Platforms

GE Intelligent Platforms is a division of GE that offers software, control systems, services, and expertise in automation and embedded computing.

GE Intelligent Platforms sells Proficy, a premise-based, hardware-agnostic energy and controls software for manufacturing and commercial applications. GE offers a unique foundation of agile and reliable technology providing customers a sustainable competitive advantage in the industries they serve, including energy, water, consumer packaged goods, oil & gas, government & defense, and telecommunications.



3.13 Fujitsu

Fujitsu announced on 14 May, 2012 the development of Enetune, a cloud-based energy management system (EEMS) service to be available starting at the end of June. The service collects energy data from all of a company's business locations, including leased or rented buildings and retail locations. By consolidating and centrally managing this data in the cloud, businesses can bring integrated and cross-sectional clarity to their energy usage.

According to the press release, Enetune makes it possible for customers to shift from a conventional model in which improvements are individually implemented for each location to a new approach of performing central energy management for all buildings. As a result, companies will be able to compare and evaluate power usage efficiency across multiple business locations and implement effective countermeasures. In addition, through power demand forecasting capabilities employing the latest technology from Fujitsu Laboratories Limited, the new service enables customers to implement countermeasures, such as relying on energy storage devices and generating power internally during times when power demand is expected to peak, and to use remote control and automatic control capabilities. This also helps businesses to avoid exceeding power levels specified in their electric utilities agreements.

In order to flexibly respond to a variety of changes in the power usage landscape in Japan, including an overburdened power supply, rising electricity costs and revised energy-conservation laws, businesses are increasingly facing a need to further enhance energy management with the aim of streamlining utilize of energy.

Recently, attention has been focused on the conventional model of addressing the efficiency of energy usage in individual buildings owned by companies, requiring a strong reliance on the skills and know-how of individual building managers. This has also made it difficult to evaluate energy usage efficiency across multiple locations, thereby resulting in an imbalance in the improvement levels for different buildings. One effective approach for addressing these challenges is to centrally compare and evaluate energy data from multiple buildings and then roll out a common set of effective countermeasures at each of the locations.

Beginning in late June, Fujitsu will be offering Enetune, a cloud-based EEMS service that supports enterprise energy management and provides companies with the essential ability to optimize and improve the efficiency of their energy usage.



3.14 Global Carbon Systems

Australian-based Global Carbon Systems focuses on energy and sustainability solutions with a strong base of municipalities, education and property management clients. Well established in Australian market but new to US market. Recent big win at Microsoft highlighted the firm's capabilities.

Global Carbon Systems Enterprise Sustainability Platform (ESP) is a web-based platform providing real-time tracking and reporting of carbon, water, gas and electricity use based on data sourced from utility providers, supplier reports and internal business systems.

City governments are able to benchmark performance on standard asset categories such as offices, data centers, libraries, pools, schools, sports fields and community centers. With powerful data management and the right decision support tools, clients can increase efficiency, reduce costs and deliver sustainable outcomes that transform your business. The ESP represents a comprehensive solution that streamlines the capture and reporting of all quantitative and qualitative source data across your energy, carbon, environmental and social responsibility portfolios.

ESP focuses on automated Metered Energy Monitoring (data from utility operated electricity, gas and water meters, Building Management Systems , SCADA systems, Manufacturing and Production systems, and ERP Platforms.

ESP Energy Management Tools provide analysis and insight into how consumption and costs can be reduced through better management, as well as load shedding and demand management, energy use and outside temperature correlation, degree day heating and cooling.

Energy Efficiency tools provide simple to use Gantt charts that links actions to individual projects, providing tracking of individual energy efficiency projects including ROI and payback periods, portfolio analytics to compare all project types, consolidated program analysis and reporting, project scenario modeling to optimize investment decisions.

Building Energy Ratings. ESP can provide reports and ratings calculations in line with methodologies and algorithms from globally accepted programs, such as Energy Star and LEED.

Bill & Tariff Analysis through full bill verification engine that applies published tariff rates against interval meter readings to perform financial grade bill recalculations, reconciliation and reporting with utility invoices.



Measurement & Verification is supported by a range of data collection tools and reports that enhance measurement and verification such as: surveys and reports to support the measurement and quantification of actual savings associated with energy efficiency programs, tracking of measurement and verification activities conducted during the reporting period, and capture and analysis of electricity meter and sub-meter data.



3.15 Hara Software

Hara is a venture-backed firm that acquired a number of customers for carbon management and has expanded to focus on energy. Hara's approach establishes a new enterprise system of record, one that transforms energy management from chasing monthly utility bills and massive amounts of data collection scattered across the enterprise, into an aggregate of actionable energy and sustainability information that directly correlates to business metrics. Hara was one of the first EEMS systems on the market in 2009, and quickly captured a large number of clients including municipalities.

Organizations at the forefront of energy and sustainability efforts are realizing the need for historical and real-time data, establishing benchmarks and standardizing energy management processes. Fortune 500 companies and leading municipalities are implementing Hara's solution suite in order to keep up with both financial and non-financial pressures around energy efficiency and sustainability.

Hara provides unparalleled domain expertise in energy, sustainability and software sectors. Our leadership and development teams are focused on providing value to our customers that is identifiable, transparent and sustainable over time. Hara energy management solutions provide organizations with auditable transparency, visibility, insight and financial control to optimize their energy and resource use, increase operating profits and enhance sustainability.



3.16 IBM

IBM has two main software offerings for EEMS systems which are derived from acquisitions. These are Tivoli IT energy Management and Tririga.

Tivoli IT Energy Management. Increased demand for IT capacity to support business growth, increased energy use, rising energy costs and environmental concerns are fueling the need for an energy efficient infrastructure – within the data center and beyond. Building an infrastructure that is green and energy efficient is not only important strategically, but it is equally important to help meet operational goals and satisfy marketplace expectations and demands. As organizations seek new ways to become more energy efficient and environmentally aware, managing and reducing energy consumption and greenhouse gas emissions not only helps the environment, it makes for good business.

IBM Tririga. Tririga delivers environmental and energy management software to reduce energy consumption and meet sustainability goals. IBM TRIRIGA environmental and energy management software identifies worst-performing facilities, generates higher returns from energy efficiency projects, and accelerates implementation of the top-three tactics used to achieve facility energy reduction goals.



3.17 IHS

For nearly 50 years, IHS has helped customers harness the power of information to improve their business results. Focused on heavy industry, IHS is a large software and information company with a very strong set of EHS products, which have been extended for energy management.

IHS energy software provides end-to-end coverage of fuel types and markets, delivering analysis, research, technical information, forecasts and modeling solutions for the oil and gas, coal, power and clean energy communities. The IHS Energy & Carbon Solution addresses the need for emissions management in an increasingly regulated environment. IHS helps clients manage everything from mandatory reporting program, such as those imposed by the US EPA, to cap and trade programs, such as EU ETS and RGGI. IHS coverage spans the entire GHG program from compliance to emissions trading, even accounting for emissions from your supply chain. It calculates emissions down to individual equipment and rolls up data corporate-wide.



3.18 Johnson Controls

Johnson Controls is a global diversified technology and industrial leader serving customers in more than 150 countries. Johnson Controls produces products, services and solutions to optimize energy and operational efficiencies of buildings; lead-acid automotive batteries and advanced batteries for hybrid and electric vehicles; and interior systems for automobiles.

Panoptix™ is a complete building efficiency solution that combines the latest technology with Johnson Controls expertise and puts it all at your fingertips. It's an innovative new approach that enables building owners and operators to optimize building efficiency and performance more quickly, easily and cost effectively than ever before.

The Panoptix solution includes four key components:

- An open technology platform that makes it easy to collect and manage data from disparate building systems and other data sources such as meter and weather data
- A suite of cloud-hosted building efficiency applications that work with any building management system, including Metasys® by Johnson Controls
- Live Guide™ on-line and telephone support, plus on-site building and energy services, to help customers improve energy and operational efficiency
- An on-line Panoptix Connected Community of peers and experts committed to sharing best practices, news and resources.



3.19 JouleX

JouleX is a venture-backed start-up selling EEMS, initially focused on data center and office applications.

Joulex Energy Manager allows clients to create policies to automatically and remotely manage power for distributed office equipment (powering down when idle/not needed), identify power hogs across the enterprise and upgrade to more power-efficient models or devise a virtualization strategy to support Sustainable Procurement™ practices, use Load Adaptive™ Computing and Networking capabilities to dynamically align capacity with demand across network and system infrastructure, optimize virtualization and cloud computing environments, support demand response programs with policies that include IT equipment, provide business and energy context to capacity planning, and produce corporate sustainability reports.



3.20 Lucid

Founded in 2004, Lucid is a privately held cleantech software company and a pioneer in providing real-time information feedback to teach, inspire behavior change, and save energy and water resources in buildings. Lucid sells a graphically focused energy information monitoring system used by many companies and educational institutions.

Lucid's Building Dashboard allows customers to:

- View, compare and share building energy and water use information in real time on the web.
- Browse profile pages designed specifically for buildings, companies and schools.
- Create community-wide comparisons, join in real-time energy reduction competitions and explore green building features with Apps.
- Set up budgets, examine breakdowns by floor or end use, identify periods of high consumption, check weather forecasts and more with Widgets.
- Instantly search for buildings across the Network. Connect seamlessly with other social networking websites and feeds to automatically post updates to your personal profile page



3.21 Noveda

Noveda Technologies is a NJ-based start-up that sells EEMS for energy and water monitoring.

Noveda offers software as a service (SaaS) solutions to help reduce energy and water usage, optimize performance of renewable energy systems, and reduce the carbon footprint for customers across commercial/retail, industrial, government, education, and utility sectors. Noveda also offers real-time collaboration tools that leverage social media to educate and empower stakeholder communities and make the smart grid a reality today.



3.22 Siemens

A leading utility bill management and procurement provider, Pace Global was acquired by Siemens in January 2012 and will be operated as a distinct business unit.

Siemens' solution focuses on:

- Expert utility invoice and bill auditing and management.
- Comprehensive tax and tariff analysis.
- Management and recommendations for energy budgeting.
- Energy and carbon data analysis and reporting.



3.23 SAP

SAP is large global software company with a variety of energy management solutions that are tied to its financial and operational products.

SAP's Carbon Impact provides insight into energy consumption. The system utilizes SAP's enterprise financial system, as well as equipment within the company's facilities.



3.24 Schneider Electric

A large global company, Schneider Electric sells solutions to utilities and companies in a wide variety of applications and markets. Schneider recently acquired Summit Energy.

Schneider provides enterprise energy management software systems by providing an ION EEM server at your site or hosting power system data for you. Both capabilities provide detailed reports about the health of your energy and power system.



3.25 School Dude

School Dude is a system focusing solely on schools and universities. School Dude's clients tend to small to medium size schools or school districts.

School Dude's energy management system provides utility tracking & auditing, consumption analysis, building automation integration, tracking of Energy Star ratings, and conservation planning.



3.26 SClenergy

Formerly Scientific Conservation, SClenergy is a start-up focused on commercial energy management applications that purchased Servidyne, a large energy services last year.

SClenergy's cloud-based Software-as-a-Service applications provide the visibility that enables accelerated and sustained building performance. Each application provides an essential component of the building performance equation, including energy, systems, and maintenance or workflow. When combined, the SClenergy cloud is powerful in enabling building engineers to lower operating expenses, reduce the building or portfolio's environmental footprint, and enhance occupant satisfaction.



3.27 Serious Energy

Serious Energy is a very well-funded start-up that has acquired 8 firms and sells solutions from advanced windows to energy management to energy project financing.

SeriousEnergy Manager Platform is an enterprise energy efficiency cloud-based service, SeriousEnergy Manager makes it easier for those overseeing the business of building ownership and the operation of building facilities to make smarter, faster, and more cost-effective energy-related decisions. SeriousEnergy Manager combines both building intelligence and building energy management applications, offering powerful insight for both financial and operational decision-makers.



3.28 Verisae

Verisae sells asset and energy management solutions and has particular strength in retail.

The Verisae software products are sold and delivered via Software as a Service (SaaS) delivery model. Verisae combines software, implementation, and infrastructure, along with service and support to create solutions that can be rapidly implemented for clients. Being SaaS, Verisae hosts, manages, and provides access via a secure connection over the Internet to our applications at our facilities rather than our customer's.

Verisae delivers a suite of Sustainability Resource Planning (SRP) services. SRP covers the core functions of sustainability needs by combining multiple business processes and systems into one database to use across the enterprise. These modules help to manage and optimize facilities, the assets in those facilities, the energy those assets consume, the carbon emissions they emit, and the people who manage and maintain them. SRP is delivered in software as a service (SaaS) model and provides real-time information.



4. Determination of Market Leaders

Out of the 28 EEMS vendors described in section three, 14 vendors stood out as market leaders. To determine which vendor was to be considered a market leader, we sourced data from analyst firms Gartner, Forrester, Verdantix and Groom, who have evaluated the relative strengths of various EEMS vendor offerings. Each analyst firm uses their own method in ranking EEMS vendors. The following excerpt from a Verdantix market study serves as an example of the types of criteria that is used in determining market leading vendors:

1. Energy and carbon management - What are the advisory or implementation capabilities related to energy and carbon management strategies? This includes energy and carbon management software implementation and energy management systems integration. What is the customer evidence?
2. Facility energy management - What are the advisory or implementation capabilities related to facility-level (offices, stores, distribution centers, manufacturing plants) energy management technology strategies? What is the customer evidence?
3. Sustainable data centers - What are the advisory or implementation capabilities related to sustainable data center technology strategies? What is the customer evidence?
4. Environmental compliance - What are the advisory or implementation capabilities related to environmental compliance technology strategies? What is the customer evidence?
5. Sustainability performance management - What are the advisory or implementation capabilities related sustainability performance management technology strategies? This includes process design for sustainability data collection and business intelligence tools for sustainability performance. What is the customer evidence?
6. Renewable energy - What are the advisory or implementation capabilities related to renewable energy IT strategies? This includes data management for wind farms and IT systems for integration of solar to the grid. What is the customer evidence?
7. Low carbon transport - What are the advisory or implementation capabilities related to low carbon transport technology strategies? This includes city cycle schemes, IT systems for car sharing and logistics optimization. What is the customer evidence?
8. Climate change IT services - What are the advisory or implementation capabilities related to climate change technology strategies? This includes climate change computer modeling and IT systems for climate change risk analysis. What is the customer evidence?
9. Smart meters - What are the advisory or implementation capabilities related to smart meter technology strategies? This includes smart meter implementation and smart meter network operations management. What is the customer evidence?



10. Smart grid - What are the advisory or implementation capabilities related to utility and network operator smart grid technology strategies? This includes smart grid security and demand response projects. What is the customer evidence?
11. Water stewardship - What are the advisory or implementation capabilities related to water stewardship technology strategies? This includes water scarcity computer models and water data management. What is the customer evidence?
12. Sustainable cities - What are the advisory or implementation capabilities related to sustainable city technology master plans? This includes technology strategies for more sustainable cities and master plans for sustainable city technology. What is the customer evidence?

Based on this information, the HP has taken those results, and combined them into a comparison which ranks those 15 vendors across 9 categories:

1. commercial building energy data capture
2. IT and data center energy data capture
3. manufacturing plant energy data capture
4. primary energy data capture
5. on-site energy generation data capture
6. IT system integration (ability to interface with other IT systems)
7. market data capture
8. master enterprise data management
9. workflow and task management

4.1 Results Summary

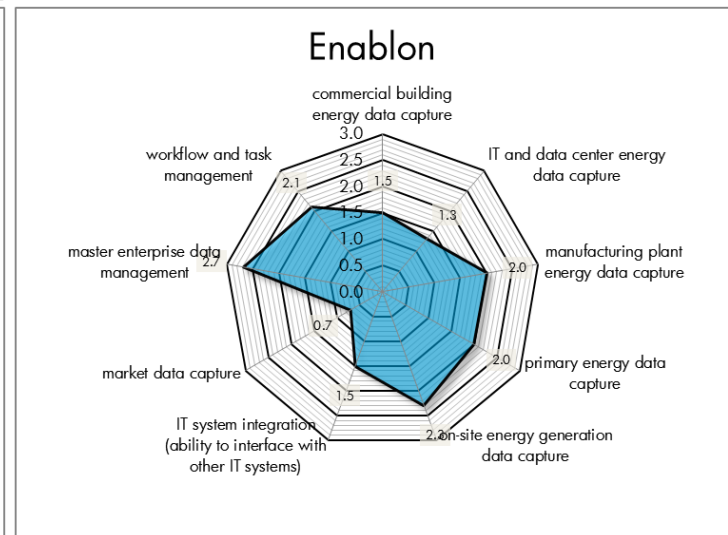
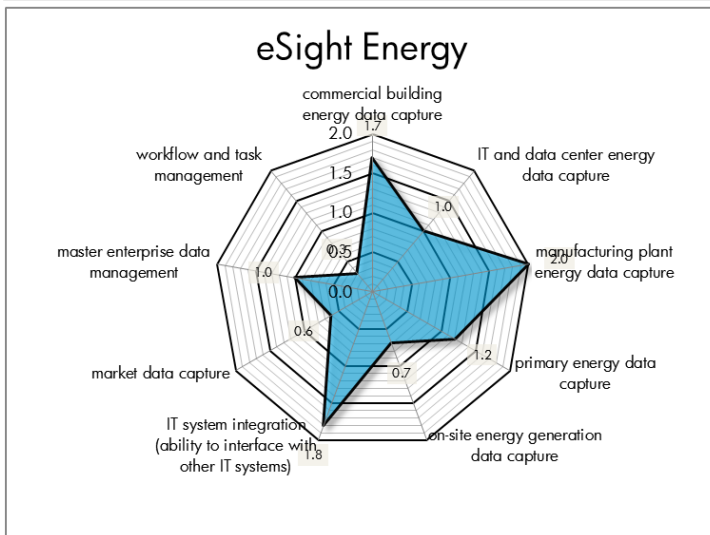
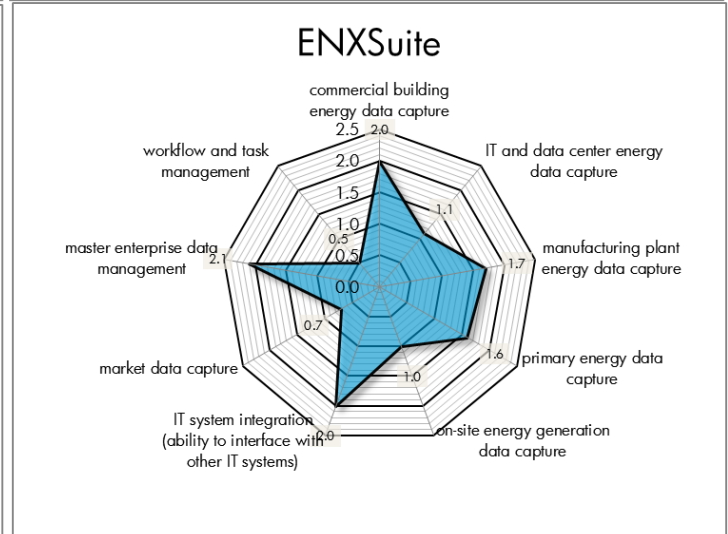
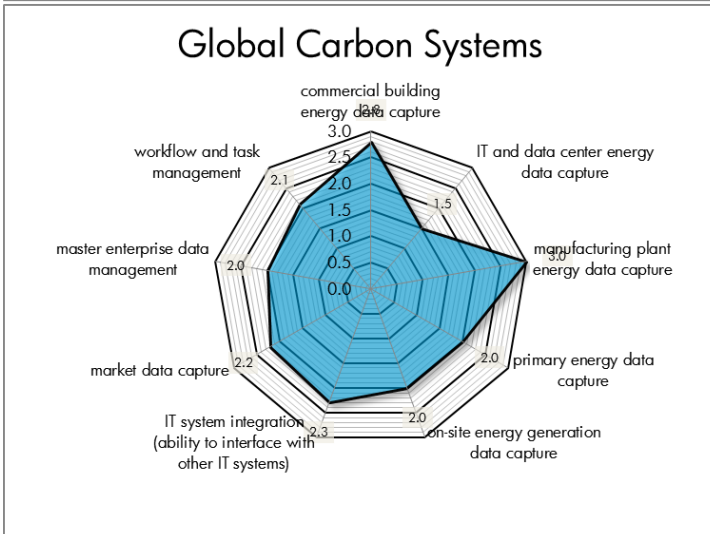
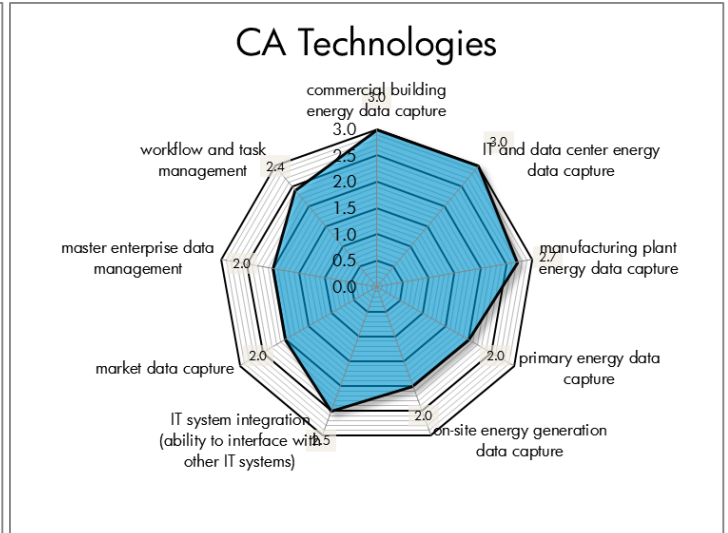
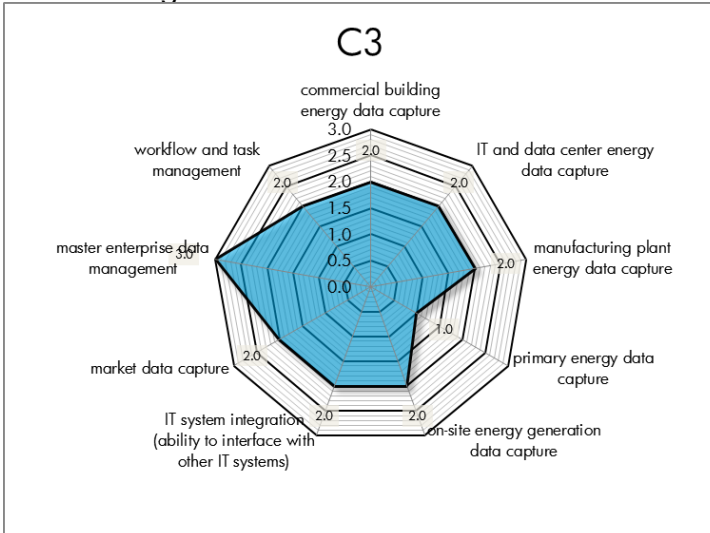
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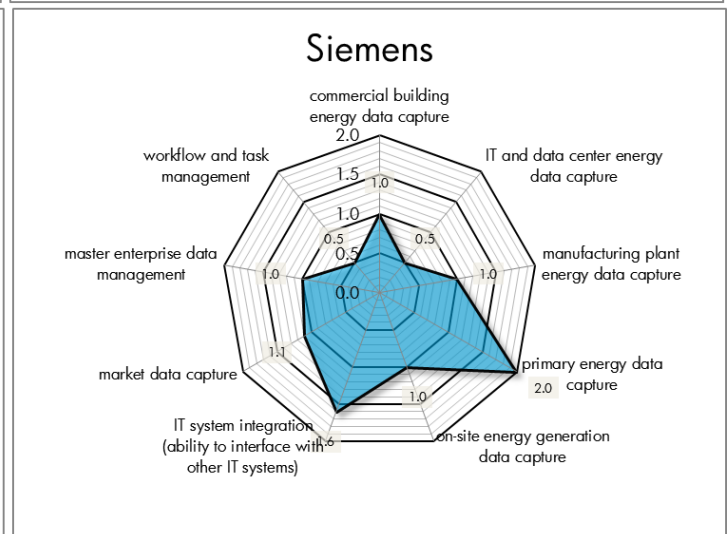
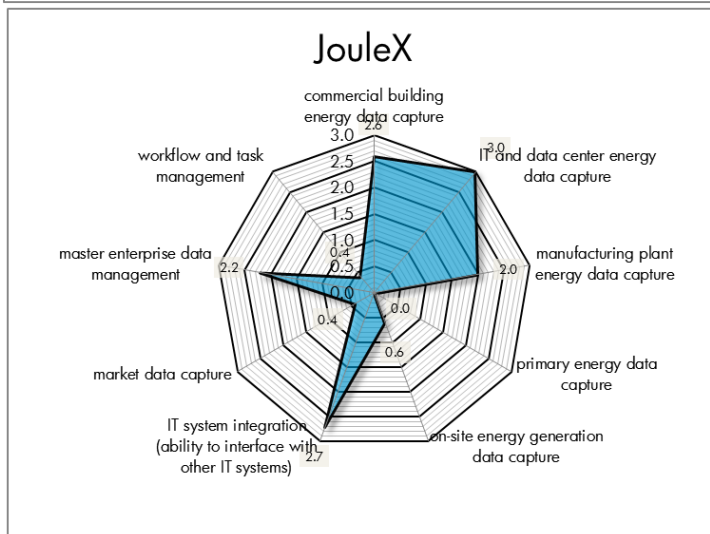
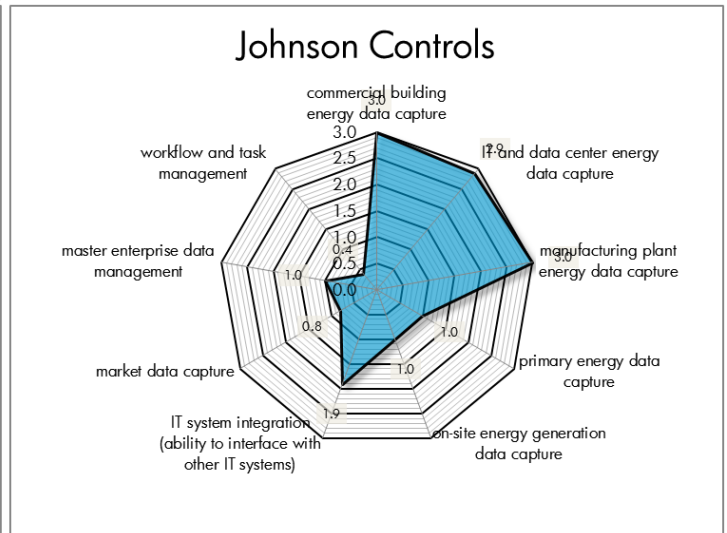
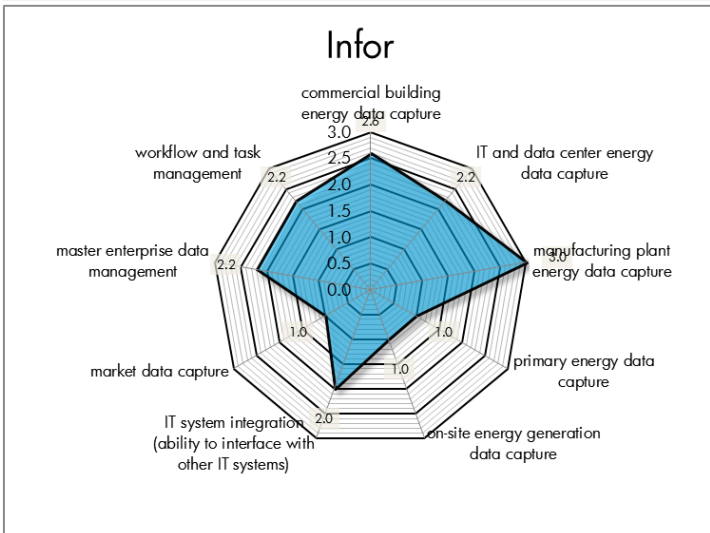
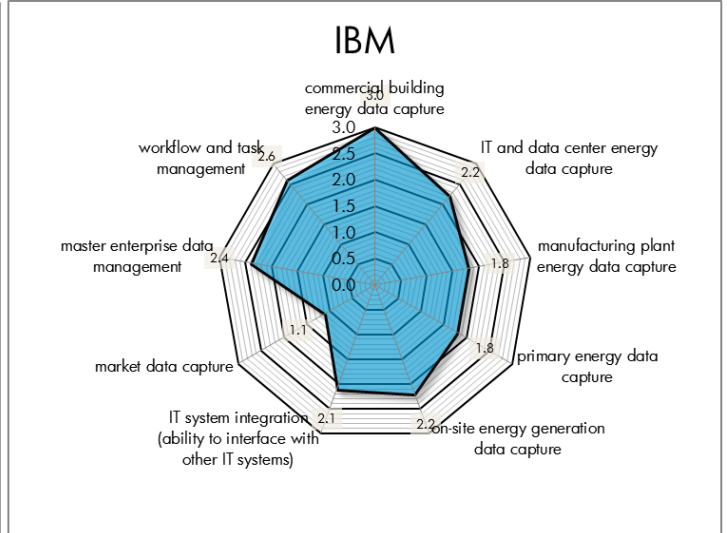
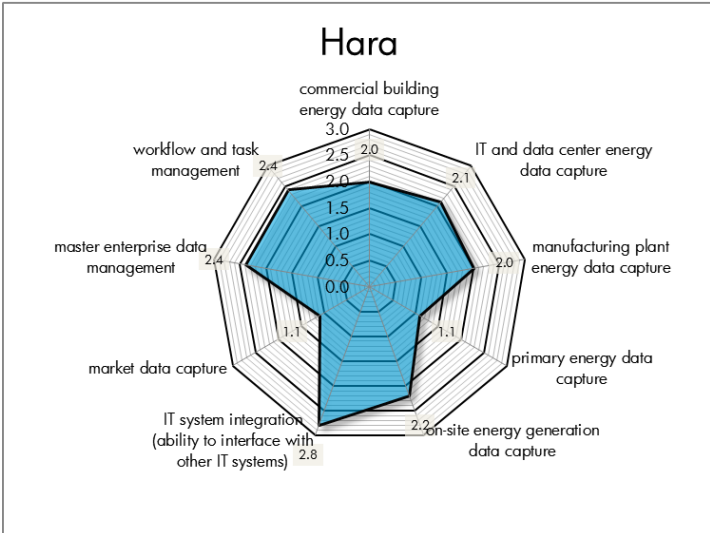
- C3
- CA Technologies
- (Global) Carbon Systems
- ENXSuite
- eSight Energy
- Enablon
- Hara
- IBM
- Infor
- Johnson Controls
- JouleX
- Siemens
- SAP
- Schneider Electric

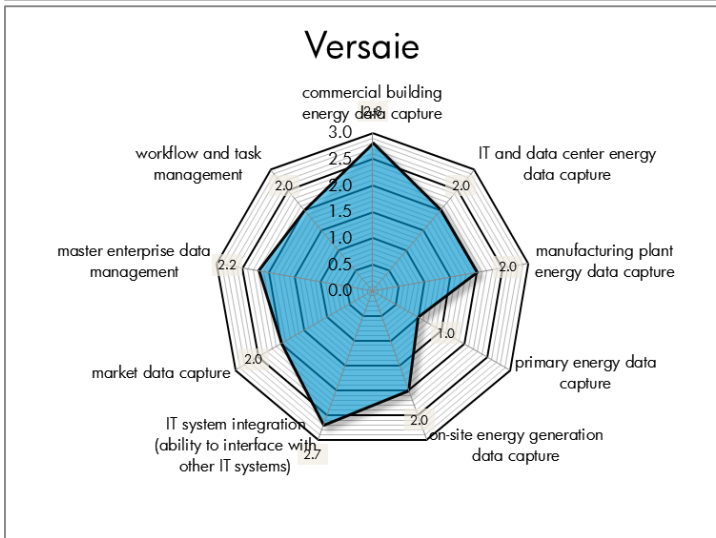
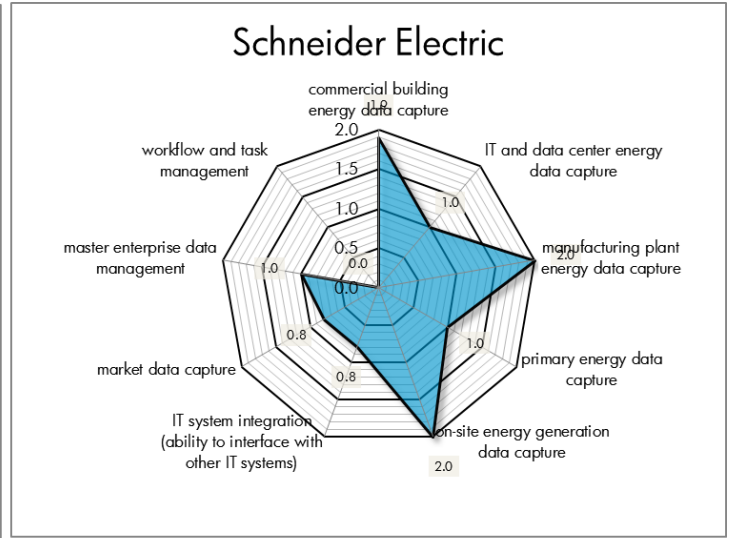
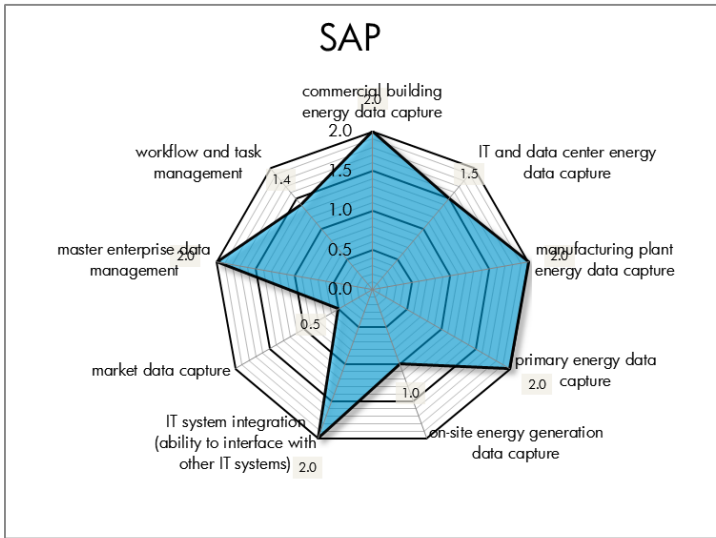


- Verisae

In this analysis, the EEMS vendors were scored on a 3 point scale, with 2.0 – 3.0 being leaders in the category, 1.0 – 2.0 being strong in the category, and less than 1.0 as being weak in the category. The following radar graphs (Figures 5 to 19) depict the final scoring:







Figures 5 to 19. Assessment of EEMS Vendors

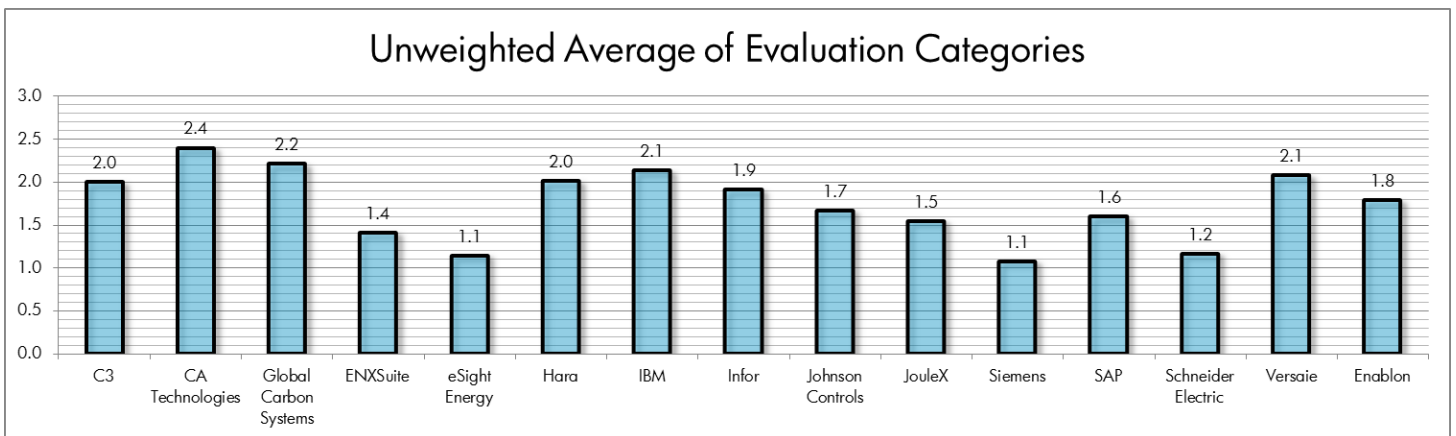


Figure 20. Unweighted Average of Evaluation Categories



5. Conclusions and Next Steps

This report provides a high level overview of the leading EEMS systems. The strengths and weaknesses of each system must be weighed (Figure 20) and evaluated in regard to the City of Boston's goals, existing energy and financial management systems, cost, and depth of team involved both in the implementation and day-to-day operation of the system. Additionally, the City would benefit from a series of demonstrations from many of the mentioned vendors. This approach will help educate staff on the actual use, graphical capabilities and other characteristics of the many systems.

Subsequent to vendor demonstrations and familiarization with the marketplace, the City of Boston should develop a functional requirements document that outlines necessary requirements and features that EEMS vendors can review and respond to with a preliminary offering.



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Note: Some of the documents used in this report are only available for purchase or by subscription. These are indicated by (P).



7. Appendices

7.1 Appendix A: Definitions

Functional Area	Description	Key Features
Utility Bill Management	Utility bill management vendors aggregate utility bills across multiple facilities, provide centralized reporting, search for billing errors, and may pay invoices on behalf of their customers. Capabilities for carbon management and energy procurement have been recently added.	Manual data entry service Bill analysis Optional bill payment
Submetering	A range of hardware and software solutions exists for monitoring electricity, gas, steam, and other utility services. Monitoring ranges from PLC level integration in industrial systems to individual equipment. Submetering solutions come with both hardwired and wireless capabilities.	Monitor electric, gas, steam, etc. Often physical devices with many metrics captured. Typically very little if any data storage or analysis.
BMS	BMS systems principally monitor and control HVAC—but occasionally lighting or security. Historically, BMS have been based on proprietary hardware, but open protocols use is growing. Start-ups have products that extend the accessibility and control of BMS systems.	Control temperature and other HVAC-related assets Remote monitoring and control Fault detection
Lighting	Traditional panel and fixture-based lighting control systems have normally been hardwired additions to existing lighting systems. Newer systems provide greater energy savings functionality, lower implementation costs with wireless connectivity and integration into an EEMS.	Lighting control Wireless network Occupancy sensors
DataCenter/Plug Load	Energy use from computers, office, and lab equipment is a	IT asset tracking ticketing Power usage and monitoring



	growing expense for many firms. New products helping IT managers address energy management needs of data centers.	Optimization and capacity planning
Industrial	Manufacturing processes are very energy intense and usually dwarf the energy use by associated manufacturing-related buildings. Industrial energy management is typically very specialized and often tied to equipment reliability and uptime.	Equipment-specific control Extend of existing physical controls Bad equipment/actor identification Human Machine Interface (HMI)
Demand Response	Demand or load response vendors offer an EMS to track energy use at one or multiple facilities. DR payments often finance sub meters and the EEMS. These systems are purchased by Operations or Facilities.	No capital or cash outlay required Sub meters to establish baseline and verify peak reduction Alerts and optional controls
Enterprise Energy Management	Enterprise Energy Management is a new category of capabilities addressing needs at the corporate level for cross-site visibility of energy planning, energy use and cost, benchmarking, capital planning, and energy efficiency projects.	Corporate-level energy planning; energy use and cost tracking; energy modeling; energy project tracking; energy cost allocation
Carbon and EHS	EHS and carbon vendors have modules for energy tracking based on utility bill data. Many of these products have capabilities for Enterprise Energy Management.	Carbon and CSR reporting; enterprise carbon accounting; supply chain reporting; EHS compliance
Procurement	Energy procurement is typically a service-orientated functional area. Firms such as World Energy offer reverse auctions for commodity contracts in select geographies, while energy brokers offer direct connection to commodity providers.	Commodity contracts; RFP; hedging
Monitoring	Monitoring provides real-time display and alarming of energy use often with easy-to-view graphics and kiosks.	Energy use displays and reports; Kiosks Optional alerts; Benchmarking overtime and across buildings



7.2 Appendix B: Vendor Comparison Matrix

	Building IQ	CA Technologies	C3 Energy	Credit 360	Comverge	Ecova
URL	www.buildingiq.com	www.ca.com/ecoSoftware	www.c3-energy.com	www.credit360.com	www.comverge.com	www.ecova.com
Headquarters	Sidney, Australia and San Mateo, CA	Islandia, NY, US	San Mateo, CA	Cambridge, UK	Norcross, GA, US	Spokane, WA, US
Tagline	Next Generation Energy Management	energy. sustainability. agility.	A 360 Degree View on Your Sustainability Performance	A 360 Degree View on Your Sustainability Performance	.	Total energy and sustainability company that helps clients see more, save more, sustain more
Estimated number of employees/revenue	40 employees/-	./-\$4 B revenues	100 employees/\$3m revenues	40 employees/\$3m revenues	600 employees/\$110m revenues	./-\$100m
Financing events in last 3 years	\$1.2 million	Publicly traded company	No outside investment reported	No outside investment	Publicly traded	none
Sales channel	Direct and through selected resellers	Direct and Partnerships	Direct and through selected resellers and utilities	Direct and through selected resellers	Direct	Direct
Product names	Predictive Energy Optimization	CA ecoMeter, CA ecoGovernance, CA ecoDesktop	C3 Energy , C3 Sustainability , C3 Mitigation , C3 Incentives, C3 Foundation	Energy and Carbon	IntelliSOURCE	Expense & Data Management, Energy Supply Management, Facility Optimization, Sustainability,
Pricing /business model	Annual software license for SaaS software	Software license or subscription	Annual software license for SaaS software	Annual software license for SaaS software	Demand response fees, software services	Software license plus services
Implementation Methodology	External SaaS	.	External SaaS	External SaaS	.	.
Sell proprietary hardware?	No	No	No	No	No	No
Estimated number of customers	Unknown	~ 50 Energy & Sustainability customers	10	95	Hundreds	639, including 24% of the Fortune 500
Target customers	Municipalities, facility management companies	Large companies, Mid-sized companies, Small-to-large Service Providers, managed service (hosting) providers	Large companies. Over 80 clients with revenues >\$1B	Large companies. Over 80 clients with revenues >\$1B	Companies and utilities	Midsize to large companies with more than 50 sites. Utility companies
Target customers applications	Commercial building optimization	Operational energy management; enterprise energy management; corporate sustainability; IT	Sustainability data management energy & carbon reporting, sustainability performance	Sustainability data management energy & carbon reporting, sustainability performance	Demand response, utility programs, energy management	Utility bill processing & analysis, energy & facility optimization, energy supply management, real-time
Top verticals	Construction and engineering	Financial, Telecoms, Professional Services, MSP, Retail, Hospitality, Food/Beverage,	Utilities	Banking and finance, construction and engineering, utilities, support services, telecommunications, and Europe (specifically UK, Netherlands, Germany, Sweden, Norway, and Denmark) and Americas	Commercial and industrial, government	Retail, food service, hospitality, banking
Geographic strengths	Australia, North America	Global	North America	US	US	US and Canada
Example customers	Investa Property Group, The City of Perth,	Citi, Bank of America, Verizon, Barnes & Noble, Coca-Cola Refreshments, Avnet, Capgemini,	Adobe, Pacific Gas and Electric, Constellation Energy, Pella	McDonald's, Barclays, Staples, Prologis, Philips, Deutsche Telekom, Novo Nordisk, Westpac, and	University of Maryland	Staples, Rite Aid, Nordstrom, Alaska Airlines, Progress Energy, Shell, Pitney Bowes, Jack in the Box, Arizona
Notable case studies on website	Investa Property Group, The City of Perth, Lend Lease,	Cap Gemini, Lockheed Martin, Municipality of Fredericia, StratITsphere, Logicalis, Tesco, Datotel	Pacific Gas and Electric, Constellation Energy, Pella	Danske Bank, Linde Group, McDonald's	Limited Brands, Mount Sinai Hospital, Central Bucks School District, Shaw Industries Group	GameStop, Staples, California Pizza Kitchen, NV Energy
Customers announced in 2011	.	Avnet, Coca-Cola Refreshments, HealthNow, Columbia Sportswear, Bank of America, and BBVA	.	.	.	Cintas, Rite Aid
Notable energy services beyond EMS	.	.	.	.	.	Engineered audits and efficiency project identification, energy rebate and tax incentive processing, Acquired Building
Notable news in 2011	.	.	.	.	.	Knowledge Networks (real-time EMS), Acquired energy management firm Prenova,
Data input method	Import files or feeds from directly from meters	Meter data	Import files or feeds from existing enterprise reporting platforms, directly from meters and utility reports.	Import files or feeds from existing enterprise reporting platforms, directly from meters and utility reports.	Direct meter reading	Meter data, utility bills

	Enablon	Energy Cap	EnerNOC	EPS Corporation	eSight Energy	GE Intelligent Platforms
URL	www.enablon.com	www.EnergyCAP.com	www.enernoc.com	www.ameresco.com	www.eSightenergy.com	www.ge-ip.com
Headquarters	Paris, FR, and Chicago, IL, US	State College, PA, US	Boston, MA, US	Costa Mesa, CA, US	Schaumburg, IL, US UK headquarters is eSight Energy Group	Charlottesville, VA, US
Tagline	Enabling the Sustainable Company	The best-selling energy management software for over 30 years	Get more from energy	Clean Green Sustainable	Save up to 20% or more on energy bills with eSight, the most advanced, yet intuitive energy management suite	Sustainable Manufacturing – Reduce the consumption of key utilities to reduce costs and meet sustainability
Estimated number of employees/revenue	300 employees/-	40 employees/-	-\$280m	-/-	-/-	1850 employees/\$136m revenue
Financing events in last 3 years	Raised \$15m in 2011	No financing events; company is privately funded from sales of products and services; no debt; no equity	Public, IPO 2007	N/A	-	Publicly traded company
Sales channel	Direct and indirect via local resellers	Direct Sales and Resellers	Direct, and through utility partners and other channel partners	Direct	Direct, Indirect	Direct & channel
Product names	Enablon Energy and Carbon Management Suite	EnergyCAP Enterprise, EnergyCAP Express, EnergyCAP Professional, GreenQuest powered by	DemandSMART, EfficiencySMART, CarbonSMART	Axis	eSight Enterprise, eSight Subscription, eZdash	Proficy Proficy for Sustainability Metrics
Pricing /business model	SaaS and On-Premises	Annual or perpetual license	DemandSMART – Revenue sharing, EfficiencySMART – Software license fees plus services, CarbonSMART –	Software license plus services	Premise and Hosted/SaaS	Product license
Implementation Methodology	-	External SaaS cloud	-	-	-	-
Sell proprietary hardware?	No	No	No	No	No	No
Estimated number of customers	300	1,500 organizations	4750	N/A	N/A	500,000 installs globally
Target customers	Global Corporations (1B+) and large corporations (250M-1B)	Larger organizations that receive 300 to 50,000 utility bills a month. New SaaS product (EnergyCAP Express)	Midsize to large companies	Midsize to large companies	Commercial office, government, retail	Resource intensive manufacturing – e.g., Food & Beverage, Consumer Packaged Goods
Target customers applications	EHS Management and Compliance, Sustainability Performance Management, Carbon Management	Energy management tracking, reporting and analytics, utility bill management	Demand response, energy management platform, energy efficiency, energy procurement services, carbon	Enterprise Energy and Carbon Management	Energy Management , Alerts , Utility bill verification , Conversion to carbon and KPIs	Operational Excellence – connecting plant information and execution systems across the enterprise to drive
Top verticals	Oil & Gas, Manufacturing, Utilities, Process industry, Food and Beverage, Transportation, Services	City, county, state governments; higher education; property management; energy	Manufacturing and industrial, education, commercial property, cold storage, high tech,	Food and beverage, consumer products, discrete manufacturing	Property Management and Manufacturing	Discrete Manufacturing Food & Beverage Manufacturers Consumer Products manufacturers
Geographic strengths	North America and Europe	US and Canada	Most in North America. UK, and beginning in 2011, Australia	Most in North America. Some in Europe	Global Organization, with a focus on North America, United Kingdom & Europe (EMEA)	Global
Example customers	Accenture, Anglo American, ANZ, Baxter International, Bombardier, Carrefour, Centrica, L'Oréal, Schneider	University of California system, BJ's Wholesale Clubs, Burlington Coat Factory, UniFirst Corporation,	AT&T; Commonwealth of Massachusetts; General Electric; Stop & Shop; Sears; Morgan Stanley; Partners	Dean Foods, Kraft Foods, Butterball	Airbus, Prairie Farms, Porto Cupecoy, Emerson, Pfizer, Eli Lilly, Liberty Property Trust, University of Texas Medical	AB InBev, AkzoNobel, Bolletje, Kao Brands, General Motors
Notable case studies on website	Raised \$15m	Forest City Enterprises, University of Kansas, Utility Management Corporation	Cabot Creamery; BGC Australia; Harpoon Brewery; Rio Tinto; Leggett & Platt; Washington Real Estate	-	Pacific Controls, Pfizer, Liberty Property Trust, Carlsberg, and Ricoh Arena	-
Customers announced in 2011	-	-	Bay State Milling; Kimberly-Clark; Bonneville Power Administration; Seaport Hotel and World Trade Center;	Kraft Foods, Butterball	Cascade Energy, Airbus, AllState, WSP Environment & Energy, Lean-Green LLC	Argon ST, Bolletje, Constellation Energy, General Motors, Harris, Kao Brands, S3 Development,
Notable energy services beyond EMS	-	-	Energy audits, benchmarking, commissioning, continuous commissioning, program	Automated Demand Response, Energy Projects Implementation, Energy Procurement Advisory	-	-
Notable news in 2011	-	-	Acquired Energy Response	Acquired by Ameresco in 2011	Appointed new US president	-
Data input method	Data collection directly from meter's via Enablon's UDI program or directly from the utility.	Data Input from utility is verified by EnergyCap. Data can also be inputted into EPA Portfolio Manager for EPA	Directly from meters	Meter data, utility bills	Spreadsheets, BMS, data loggers,	Machinery and meters

	Global Carbon Systems	Hara Software	IBM	IHS	Johnson Controls	JouleX
URL	www.globalcarbonsystems.com	www.hara.com	www.ibm.com	www.ihs.com	www.johnsoncontrols.com	www.JouleX.net
Headquarters	Sydney, AU	San Mateo, CA	Armonk, NY, US	Englewood, CO, US	Milwaukee, WI, US	Atlanta, US
Tagline	Powering Business Sustainability	Energy.Sustainability.Value.	Let's Build a Smarter Planet	-	Helping People Achieve	Enterprise Energy Management
Estimated number of employees/revenue	-/-	70 employees/-	430,000 employees/\$100B revenues	5500 employees/\$120m revenues	160,000 employees/\$41B revenues	75 employees/-
Financing events in last 3 years	Privately funded	Raised \$45m	Publicly traded company	Publicly traded company	Publicly traded company	Raised \$17m in 2011
Sales channel	Direct and Partners	Direct and partners (HP, PWC, others)	Direct and indirect	Direct, Partners	Direct	Direct and Indirect
Product names	Enterprise Sustainability Platform	Hara Energy and Sustainability System of Record	IBM Intelligent Building Management (real-time monitoring), TRIRIGA Real Estate and Facility	IHS Greenhouse Gas & Energy Management Solution	Metasys (BMS system), Panoptix (SaaS offering with online community)	JouleX Energy Manager for Data Centers JouleX Energy Manager for Distributed Offices, JouleX Energy
Pricing /business model	SaaS license	Software license plus services.	License; premise or hosted	Software license plus services	Hardware and services contracts	Per Device or Data Center size subscription model
Implementation Methodology	-	SaaS (external cloud), Internal cloud, server based.	-	-	-	-
Sell proprietary hardware?	No	No	No	No	Yes	No
Estimated number of customers	110	55	Over 1,000 customers for real state and facilities management with these 3 products	Approximately 1,690 customers of our enterprise EHS & Sustainability Solutions. Of these,	Hundreds	200
Target customers	Organizations that are reporting under compliance or voluntary carbon programs and large energy	Midsize to large companies	Organizations (public and private) managing medium to large portfolio of buildings	Large, energy intensive companies	Commercial and industrial	Midsize to large enterprises and government organizations
Target customers applications	Energy management, carbon management, environmental management, sustainable supply chain collaboration,	Enterprise Energy Management, Sustainability, Carbon Management	Energy management and optimization; continuous commissioning; maintenance & asset management; project	Energy, carbon, and sustainable asset management	BMS, energy service contracts, sustainability	Energy management, sustainability reporting, carbon tracking
Top verticals	Banking and finance, corporate property management, education, government, fast-moving	Retail, Finance, Real Estate, Healthcare, High Tech	Commercial office buildings, Retail, Federal/State & Local Government, Manufacturing, Hospitals	Oil and Gas, Utilities, Manufacturing	US and Europe	Financial Services, Public Sector, High Tech
Geographic strengths	Market leader in Australia. Offices now established in North America, Europe, and Asia.	North America. Some in Europe, Japan	Global	Mostly in North America, but some in Europe and Asia	More than 1,300 locations worldwide	The Americas, Europe, Japan, China, Australia
Example customers	City of Sidney, City of Brisbane, Southern Sydney, Region of Councils, University of Adelaide, Akzo Nobel,	Applied Materials, Abbott Labs, Bloomberg, Dell, eBay, Harvard University, Hasbro, Safeway, Rackspace,	The Gap, Tulane University, Dick's Sporting Goods, ExxonMobil, Walt Disney, Marriot	Cenovus, ExxonMobil, Chevron, Shell, Duke Energy, PSEG, Suncor, ADM, Boeing, General Motors	-	AmeriPride, University of Maryland Baltimore County, Sparkasse
Notable case studies on website	Colliers International, Metcash, CSIRO, Ramsay Health, St John of God Healthcare	Akamai, Safeway, EMD Millipore, Palo Alto, Las Vegas, Philadelphia	Tulane University, IBM Rochester, Venetian Hotel	Cenovus	-	Sparkasse
Customers announced in 2011	Microsoft, Ramsay Health, Tenix	Avaya, Aflac, Alcatel-Lucent, Dell, Diebold, eBay, Hasbro, HP, Molex, Sungard, United Natural Foods, US Bank,	US Dept. of Homeland Security, Tulane University	-	-	AmeriPride
Notable energy services beyond EMS	-	Opportunity assessment and identification, energy spend analysis, KPI identification, submetering strategy	-	Energy and environment strategic consulting services and market research for climate change and	Manufacturer of equipment and controls and sells services for heating, ventilating, air-conditioning,	-
Notable news in 2011	-	Series C Funding \$25m , Ray Lane announced as chairman , New CEO announced	Purchased TRIRIGA	Acquired Dyadem operational risk management firm	Launched Panoptix, Bought demand response vendor, Energy Connect, for \$32m	Secured \$17m in financing
Data input method	Data can be input from utility operated electricity, gas and water meters, Building Management Systems,	Data input through EDI, SAP, Peoplesoft, Excel csv files	Meter data, ERP systems,	ERP systems, meters, EDI	Meter and equipment feeds.	Communications protocols with equipment.

	Lucid	Noveda	Pace Global	SAP	Schneider Electric	School Dude
URL	www.luciddesigngroup.com	www.noveda.com	www.siemens.com	www.sap.com	www.schneider-electric.com	www.schooldude.com
Headquarters	Oakland, CA, US	Branchburg, NJ, US	0	Waldorf, DE	Rueil Malmaison, FR	Cary, NC
Tagline	-	Save. Sustain. Stay Ahead	Gain competitive advantage and sustainability by reducing your energy costs, consumption, and risk	The Best-Run Businesses Run SAP	Global Specialist in Energy Management	We're passionate about your success.
Estimated number of employees/revenue	-/-	-/-	360,000 employees/€73.52B revenues	59,000 employees/€14.2 B revenues	110,000 employees/\$25B revenues	-/-
Financing events in last 3 years	\$1.5m Series A	\$3.3m grant from NJ Clean Energy Manufacturing Fund; Series A financing in 2011	Publicly traded company	Publicly traded	Publicly traded company	No outside investment
Sales channel	Direct	Primarily channel partners.	Direct	Direct, Partners, VARs	Direct and indirect	Direct and through selected partners
Product names	Building Dashboard	EnergyFlow Monitor (Monitoring energy and water use) , SunFlow Monitor (Monitoring electricity from	ECM Hub, includes Energy Zone: energy data management, ecolink: carbon and sustainability	SAP Carbon Impact OnDemand, SAP Manufacturing Integration & Intelligence (MI)	Struxureware Energy Online , Struxureware Energy Advance , Struxureware Energy Expert , Struxureware	Energy Manager
Pricing /business model	SaaS	SaaS	Monthly management service fees	License and SaaS	Hardware, service contracts	Annual software license for SaaS software
Implementation Methodology	-	-	-	-	-	External SaaS
Sell proprietary hardware?	No	No	No	No	Yes	No
Estimated number of customers	200	Monitor 20+ million square feet of real estate and 100+ MW of solar PV installations	~50	160000	Hundreds	5,500 Institutions
Target customers	Institutions, commercial	Multi-building managers and/or multiple solar site developers/installers	50% of our clients are Fortune 500 companies (or equivalent)	Manufacturing, commercial	Utilities and companies	Schools and Universities.
Target customers applications	Monitoring for BMS, facility management, lighting, on-site generation, and plug loads	Energy and water use monitoring, Renewable energy production monitoring, Stakeholder	Energy management, procurement, utility bill management, carbon inventory reporting	Manufacturing (shop floor to top floor)	For companies, building automation, corporate energy management, data center, security management	Utility Bill paying, utility bill auditing
Top verticals	Institutions and commercial	Government, Utilities, Education, Commercial property/retail stores, ESCOs, Energy Consultants	Consumer products, discrete manufacturing, food & beverage	Manufacturing, utilities, process industries, Consumer Products	Oil and gas, marine, food and beverage, minerals and mining, hotels, commercial office	Education
Geographic strengths	US	US, UK, Israel, India	Most in North America. Some in Europe	Global	Global	US
Example customers	Google, Yahoo!, Fidelity Investments, University of Chicago, Princeton University, Brown University,	Bayer, Newark Public Schools, PSE&G, GSH Group, Atlantic City Utilities Authority (ACUA), Liberty	Alcoa, Bayer, Corning, Chevron, Procter & Gamble, Halliburton Company, Dresser-Rand,	Valero, DeBeers, Air Products, Dow Corning	Ford	St Petersburg College, Cincinnati Tech, Collins Center, Northern Iowa University, Westerville, City
Notable case studies on website	DPR Construction, Deerfield Academy, Hamilton College	Liberty Science Center, GSH Group	University of Maryland	Valero, De Beers	-	Cape Cod Academy, Brick Township, Washington Elementary School, Susquehanna Valley, St
Customers announced in 2011	-	Bayer, Greenbaum-Rose	-	DeBeers	-	-
Notable energy services beyond EMS	-	-	Utility Invoice and Bill Auditing, Supply Management , Energy Demand Services,	-	-	-
Notable news in 2011	Energy reduction campus competitions	Completed Series A financing, Acquired energy efficiency company, MakeMeSustainable	Siemens acquired Pace Global (January 4, 2012)	-	Acquired Summit Energy	-
Data input method	Real time energy meters.	Smart meter	Direct data from meters and utility data.	SAP, manufacturing equipment, meters.	Meter data.	Import files or feeds from existing enterprise reporting platforms, directly from meters and utility reports.

	SClenergy	Serious Energy	Verisae
URL	www.sclenergy.com	www.seriousenergy.com	www.verisae.com
Headquarters	San Francisco, CA, US	Sunnyvale, CA, US	Minneapolis, MN, US
Tagline	Mining the Fifth Fuel	Focused on Building Performance Solutions for comfort and energy efficiency	Complex Organizations Reduce Energy & Maintenance Cost by 2% to 35%, While Improving
Estimated number of employees/revenue	180 employees/-	-/-	175 employees/\$15m revenue
Financing events in last 3 years	Raised \$38m (total) and Series C in Q4 2011	Raised \$155m	Organic Growth / Self-Funded
Sales channel	Direct and indirect	Direct and Channel Partners	Direct, Partners, and Resellers
Product names	SCltrack (energy consumption tracking) , SClwatch , Intelligent Retro-commissioning (IRC) ,	SeriousEnergy Manager	Facility Analytics Solutions , Energy Management Solutions , Carbon Emissions, Refrigerant Gas, Compliance
Pricing /business model	Software as a Service	Software subscription (SaaS) and services	SaaS licensing plus consulting services
Implementation Methodology	-	-	-
Sell proprietary hardware?	No	No, but does sell its own windows product	No
Estimated number of customers	N/A	N/A	65+
Target customers	Mid to large companies	Corporate Facilities, REITs	Retailers & Manufacturers w/ \$1B in revenue
Target customers applications	Energy management, Retro-commissioning, Maintenance management	Energy Monitoring, Baselineing, Advanced Energy Analytics (FDD), Control, Operations & Maintenance,	Business (operations) Intelligence; Energy Management; Facility & Equipment Maintenance;
Top verticals	Commercial Real Estate (office buildings), Retail, Healthcare,	Government, Technology, K-12 Schools, Universities and Community Colleges, Retail	Grocery Retail, Big Box Retail, Manufacturing, Facilities Management, & Education
Geographic strengths	Most in North America. Some in Europe, Australia, Japan	North America and Europe	North America and United Kingdom; some deployments in Europe and Asia
Example customers	General Electric, Intel, Neiman Marcus, USAA, Frito-Lay, Jones Lang LaSalle, Santa Clara County, City of	City of Newark, City of Scottsdale, NetApp, Echelon, Aviat Networks, Santa Clara University, DeVry University,	Walmart, Tesco PLC, HEB, Target, Sainsburys, ThyssenKrupp, Costco, Raytheon, Safeway, Toyota
Notable case studies on website	Neiman Marcus, Glenborough, Childress Klein, Hyatt, Santa Clara County	DeVry University, Harker School	Fresh & Easy, Lund and Byerly's
Customers announced in 2011	General Electric, Intel, City of San Antonio, Cobb County, Georgia Building Authority, Lennox International	-	ThyssenKrupp Elevator Americas, U.A.E. Petroleum Institute
Notable energy services beyond EMS	Retro-commissioning, LEED consulting, ENERGY STAR labeling, Energy Efficiency retrofits	Energy Command Center (ECC) Services (24/7 monitoring), Building upgrade Service and project	Energy Strategy & Consulting, Site Asset Surveys, and Equipment Registry Management
Notable news in 2011	Acquired Servidyne, Renamed company to SClenergy from Scientific Conservation	Acquired Agilewaves	-
Data input method	Meter data and utility data.	Meter data, building management systems	Not specified.