The Future of Energy Management

To reduce operating costs and cut wastage, manufacturers must take their energy management optimization efforts beyond utility consumption monitoring and focus on the total work stream: building infrastructure, supply chains, product design, transportation, plant equipment and controls and smart metering.

Executive Summary

The global downturn is testing the resiliency of businesses across industries by putting pressure on margins and constraining operating options. The challenge is particularly difficult in the area of energy management, where rising utility costs, a lack of discounted tariffs and restrictive legislations are creating major headaches for the entire C suite. Amid the prolonged global economic downturn, businesses continue to see energy management as a concept limited to monitoring and controlling utility consumption and reducing leakage. Few businesses have successfully identified emerging energy management opportunities beyond utility consumption.

The scope of energy management should not only be limited to utility consumption by heating, ventilation and air conditioning (HVAC) systems in facilities or IT infrastructure, but must extend to optimization of waste management, building infrastructure, supply chain networks, product design, transportation networks and plant controls and equipment. Moreover, enterprises must embrace smart grid/meter systems and renewable energy sources to enact more effective cost-management strategies and utility consumption, thereby improving their long-term sustainability.

Current Operating Model

It has become imperative for businesses to build dedicated teams and departments to implement processes and technologies that can help reduce consumption. However, with numerous avenues of energy consumption to consider, such teams have been struggling to measure it, let alone control it.

Seeing this as an opportunity, some IT service providers, environmental consultants, energy consultants and technology manufacturers dealing in energy consumption monitoring services are building software products and suggesting process reforms that can help businesses monitor and control their energy usage. However, these services deliver only basic consumption data without any detailed analysis that traces the patterns of usage based upon various influencing factors, such as the impact of the weather or the scale of operations.

Currently, there is no single consolidated solution that addresses the entire gamut of energy management. Through this paper, we attempt to unearth all the major areas of energy management, the limitations of the current set of solutions and how by improving visibility across the value chain, businesses will be able to create an environment of accountability and achieve sus-
Sustainability goals. Efficient energy management can enhance the image of a company as a responsible green supplier to key stakeholders including investors, partners and customers.

Demystifying the Sources
An organization’s energy portfolio can be exceedingly complex and vast. In large and mid-size businesses, resources are treated as a free commodity since there are no restrictions and employees use them rather liberally. Due to this behavior, it is a challenge to find “where” resources are being used and, more important, wasted.

Figure 1 depicts an approximate energy consumption profile for a typical manufacturing organization.

In order to obtain detailed insight about location-specific or equipment-specific consumption of resources, organizations need to leverage technologies such as smart meters, sub-meters, building management systems and data loggers.

What Next?
Such location or equipment-specific consumption data can be coupled with other factors, such as consumption at a similar property, weather, number of employees, floor area equipment type, insulation type, etc., thereby empowering decision-makers to keep in check the consumption of energy resources.

Four variables that drive the concept of energy management are:
- Potential areas of resource usage.
- Opportunities within these potential areas that can be tapped to minimize resource usage.
- Stakeholders who need to own the implementation of candidate projects to address the opportunities.
- Potential benefits which the stakeholders and the organization stand to gain.

Figure 2 depicts the relationship between these four components and how they work together to maximize energy management benefits.

Scope of Energy Management

![Sample Energy Consumption Profile](image)

![Scope of Energy Management](image)
Shortcomings of Today’s Energy Management Products

The limited benefits of today’s energy management products can be attributed to ongoing economic pressures and regulatory-mandated reporting of carbon emissions that public companies must comply with.

It is incumbent on users to analyze their energy usage and interpret reasons for irregular peaks/troughs or understand the impact of consumption on the environment.

According to Forrester,¹ the energy management market is divided into three product segments with minimal overlap between them (see Figure 3). These products either address different classes of users with limited data, or provide detailed information of a specific area for a specific class of users. Many suppliers are rapidly moving into this market but none at this time provides an end-to-end solution to a variety of users. The three segments are:

- **Enterprise carbon and energy management:** This segment serves a set of executive/business users across various lines of a business. The platforms and systems that belong to this segment help users monitor and report aggregated energy consumption and carbon emissions across the corporation. However, due to limited analytical capabilities of products in this segment, there is a heavy dependence on external insights by an energy consultant/specialist. Clearly, these products can’t be sold in isolation and must be accompanied with consulting insights as a service provided by a third-party provider/systems integrator.

- **Operational carbon and energy management:** This segment comprises products that monitor and control equipment that consume electricity intensively such as heating, ventilation and air-conditioning units (HVAC) or major production units. These products are not integrated with other systems and do not provide any intelligent analysis capabilities. Such systems primarily monitor consumption data and only cater to facility managers who need to continuously monitor the performance of HVAC and intensive energy consumption units.

- **Information and communication technology carbon and energy management:** This segment refers to the systems that IT administrators leverage to closely monitor the energy consumed by information technology infrastructure such as data centers, PCs and servers. These systems do not have any analytical capabilities and only focus on the consumption of energy by the IT infrastructure.

As can be deduced now, none of the platforms or products aligned to the three segments of energy management has capabilities to intuitively analyze the impact of energy consumption or provide any insights on opportunities to save. Hence, it is incumbent on users to analyze their energy usage and interpret reasons for irregular peaks/troughs or understand the impact of consumption on the environment.

**Energy Management: An Advanced Approach**

Understanding the changing needs of the market over the years, there is evidence that providers of energy management products and services have started taking stock of their offerings in order to include additional reporting and analytical features.

Clearly, the aim is to help businesses achieve a wider objective. In fact, some companies are seriously considering an extension of their current capabilities; for instance, CA has recently added enterprise sustainability metrics to its existing product, ecoMeter.²

While that may be one way of effecting better energy management, some providers are heading

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¹ Forrester Report
² CA ecoMeter
Key Metrics Across the Value Chain

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<th>Value Chain</th>
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**Metrics for Operations — Facility and Resources Management**

- Energy usage due to IT infrastructure.
- Energy usage due to HVAC.
- Energy usage due to transport of goods.
- Energy usage for managing inventory.
- Energy usage by equipment.
- Energy usage due to changing external factors — temperature, humidity, etc.
- Time to manufacturing due to product design.
- Energy usage due to changing internal factors — flow rate, pressure, etc.
- CO₂ footprint due to waste.
- Reduction in CO₂ footprint based upon mix of recyclable material used.
- CO₂ footprint due to transportation of finished goods.
- Energy usage for storage of finished goods.
- CO₂ footprint due to reverse logistics for recycling programs.

**Operations**

- Energy usage due to IT infrastructure.
- Energy usage due to HVAC.
- Energy usage comparison between facilities.
- Energy usage based upon number of people, floor area, working hours, etc.
- CO₂ footprint due to employee travel.
- Forecast energy usage if energy efficient products are installed.
- Usage based upon renewable and nonrenewable fuel composition.
- Energy usage as per time of use.
- Estimation and validation of bills.
- Energy usage against industry benchmarks.

**Conclusion**

Clearly, manufacturers stand to benefit greatly from technologies that various energy-management service providers are implementing to deliver an automated platform (with intelligent alerts and modeling tools) for data collection, consolidation and analysis.

With some of these new methods, the energy management market will advance to provide intelligent analysis once energy usage data is seamlessly integrated with other systems across work streams, such as supply chains, plant controls, financial reporting systems, material planning and product design, waste management, facility management and smart grid/meters.

The best way to achieve such advancement in the industry is perhaps consolidation through acquisitions of niche energy management consulting companies by large ERP or IT product companies.

Small players offering niche services will eventually realize that the only way to avoid becoming obsolete with the change in paradigm is to be acquired by larger companies since most businesses seek enterprise-wide solutions with a broader set of capabilities than mere energy monitoring.

down the path of integrating their product lines to offer a single solution. A case in point is IBM, which is trying to address the issues raised in a forum, Green Sigma™ Coalition, formed by like-minded companies. This forum aims to help organizations become more efficient and sustainable. IBM seeks to create intelligent systems that optimize resources, including smart grids, water and traffic, not only at the macro level but to also provide time-relevant data to gain insights and inform forward-looking decisions.

Such new capabilities can reduce the dependency of businesses on external agencies/consultants.

Taking such approaches can enable companies to automate, monitor and control the two-way flow of energy from power plant to plug, create transportation systems that optimize traffic flow and decrease CO₂ emissions, provide advanced portfolio/task management capabilities, use predictive analytics for better management of resources and suggest corrective action.

These can be achieved by addressing key challenges that can be measured by collecting metrics across an organization’s value chain (see Figure 4).
This will help unlock a new environment for energy management that will empower businesses to leverage sustainability investment opportunities within their value chain. They will be able to develop custom dashboards and reports and share relevant metrics with their customers, regulatory authorities and investors – leading to greater accountability.

As an outcome, businesses will not only be able to lower costs and increase efficiency, but they will cap wastage and pollution, leaving a cleaner environment and more abundant resources to future generations.

Footnotes


About the Author

Anupam Gehani is a Senior Consultant within Cognizant Business Consulting’s Engineering and Manufacturing Solutions Practice. He has six years of consulting and business analysis experience, working with U.S., UK and European customers. His areas of expertise include delivering transformation projects that entail vital processes in the utilities and industrial automation space. Anupam holds an M.B.A. from SP Jain, Singapore, and a bachelor’s degree in chemical engineering from Mumbai University, India. He can be reached at Anupam.Gehani@cognizant.com.

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