# Delivering Energy Performance to the Financial Markets

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**ABSTRACT**

One of the challenges facing commercial building energy-efficiency programs is making the jump from facility manager-level support up the corporate decision chain to attain buy-in from senior management. The Environmental Protection Agency's ENERGY STAR® program has developed a set of organization-level energy & financial performance metrics that are designed to make energy management a strategic corporate issue. This paper will report on those metrics and their introduction to the marketplace.

## Introduction

The Environmental Protection Agency's ENERGY STAR Program developed the Energy Performance Metrics (EPMs) with support from Aspen Systems Corporation. EPMs are intended to provide senior corporate decision-makers with an easy and quick mechanism to assess their organization's energy financial performance relative to their competition and make investment decisions that better capture the breadth of compelling opportunities available. EPMs are also designed to attract the attention of financial analysts and institutional investors and thereby create additional incentives for corporate energy management investment.

Financial metrics are well established within corporate management practice and the financial sector. The practical benefits of metrics are that they are quantitative, generally simple in construction, and allow for relative comparison over time. New metrics are introduced to the analytic community on an ongoing basis. Recent examples include: economic value added (EVA), total business return (TBR), shareholder value added (SVA), and cash flow return on investment (CFROI). While these specific metrics continue to be evaluated by the academic community, market actors have found them useful in practice. Their utility in the market has been sufficient validation to this point.

EPA has developed a suite of financial metrics that allows industry-by-industry comparisons of corporate energy expenditures relative to other widely accepted key financial indicators. Using the EPMs, a company will be able to evaluate its performance against an aggregate of its peers within the industry. Similarly, a Wall Street financial analyst poised to make an investment decision can now evaluate a potential investment's energy management performance, risk exposure, etc. against the rest of the subject industry. Companies that have implemented more aggressive and successful energy management and environmental policies tend to outperform companies that haven't and will be able to simply and clearly communicate that superior performance to key financial stakeholders. This is largely unprecedented.

Mainstream financial interest in corporate environmental performance has been increasing significantly in recent years. The growth of the socially responsible investing

(SRI) market provides a useful lens through which to consider this. At the end of 1999, environmentally and socially screened investments represented over $2 trillion in the United States (Social Investment Forum, 1999). More recent estimates by the Social Investment Forum put the amount of assets invested through some type of environmental or social screen at nearly $3 trillion. Most of this represents assets in funds such as California pension funds that use traditional negative screening; for example, companies involved in the manufacture or sale of alcohol, tobacco or firearms would be excluded from an investment portfolio. The US market for traditional SRI funds such as those offered by the Calvert Group have been growing at about 100% per year for the past five years (Social Investment Forum). And where SRI funds were once the exclusive province of smaller, specialized firms like Calvert and Parnassus, in recent years major mainstream firms like Goldman Sachs, Credit Suisse First Boston and others have added SRI funds to their portfolios.

The issue of global climate change is an increasingly significant factor in the growing linkage between corporate environmental & financial performance. At a recent World Economic Forum in Davos, Switzerland, the world's top business leaders declared climate change to be the single greatest challenge facing the world and its economies in the new century. The Coalition for Environmentally Responsible Economies (CERES) issued a report in April 2002 examining climate change as a major driver of corporate risk management and financial performance (see references).

A survey of CFO Magazine readers suggests that high-level corporate financial decision-makers see electric energy as the least controllable of business costs, with half of them not involved in their company's decisions regarding energy use (Energy Cost Savings Council et al. 1998.) The EPMs will help bring this issue and associated opportunities therein, into focus.

## Description of Data Sources

The primary source of data used to create the metrics is a custom database provided by Dun & Bradstreet (D&B). This data is refreshed on a quarterly basis allowing EPA to analyze the most current annual information.

Many data sources/providers were investigated. These include DRI-WEFA, Standard & Poors (S&P) Compustat, in addition to D&B. The D&B data set was chosen for the following reasons:

- The availability of energy expenditure estimates at the facility level;
- The inclusion of private companies;
- D&B's unique "family tree" that allows for the aggregation of subsidiary and branch data up to the financial reporting level of the company.

D&B is a well-respected information provider and has a rigorous data gathering and validation process. The typical data collection process employed by D&B consists of a combination of public filings and phone surveys. The information must then pass more than 2,000 information validations. These checks are then supplemented by mainframe data cleansing processes. The accuracy of the information provided is enhanced by randomly calling companies and reviewing the information compiled on their businesses. EPA has determined that D&B is virtually the only source for this organization-wide energy and

financial performance information and that its data set is of sufficient quality to provide meaningful comparisons.

**Data Organization**

The D&B data set is organized by using a family tree. This ties individual facilities and subsidiary organizations to an ultimate corporate entity, ensuring that energy data are matched with the appropriate corporate financial data. Each record carries a set of linkage elements, or a DUNS number, which helps identify the type of record it is, as well as its relationship to other records in the family tree. D&B also sorts each record by Standard Industrial Classification (SIC), facilitating grouping of records and companies into appropriate industries. A firm's primary SIC is determined by the proportion of revenues it receives from its operations, with the largest portion (50% or greater) determining the SIC.

**Energy Consumption Estimates**

The D&B proprietary energy model offers company-wide estimates of energy expenditures based on a model whose parameters were estimated using data from utility feeds. The model was estimated using actual natural gas and electricity consumption at the facility level, which was provided from eight electric utilities and six natural gas distribution companies. Energy consumption is estimated as a function of variables such as: square footage, energy intensity number of employees, sales, industry, and location. Using current information for these variables and regional weather data for the previous 12 months, D&B generates the corporate consumption estimates.

**Energy Prices**

Natural gas and electricity prices are supplied to D&B by Intelimap Inc[1]. The data are organized by individual provider and are reflective of average annual prices. The average prices differ between industrial and commercial customers; therefore the assignment of the prices depends on the primary SIC and local provider. Additional processing is done to ensure that the geographic composition of a given firm is taken into account by creating a weighted corporate energy price.

Weighted energy prices are created by first estimating energy consumption for the entire firm. Then, each domestic facility's consumption is multiplied by price to determine facility energy expenditures. This process is repeated for each of the firm's domestic facilities and is then summed to represent a total energy expenditure value for the firm. Finally, total energy expenditures are divided by total consumption to determine an average corporate energy price. This process is done for both electricity and natural gas separately

**Data Limitations**

While the energy expenditure estimates provide an appropriate level of accuracy for calculating industry norms, there are caveats. The energy prices are an annual average value. While this may not fully capture pricing issues such as time-of-use pricing and daily price

[1] For additional information see http://www.intelimapinc.com/

spikes, it is consistent with many price collection methodologies[2]. However, that being said, prices are not the primary goal of this project. The goal is to illustrate how meaningful changes in a firm's energy consumption can impact their financial performance. The D&B proprietary energy model used in the EPMs is also a component in D&B's Market Spectrum™ tool, one of D&B's primary commercial and financial analysis & prospecting tools. While not limited to assessing corporate energy use, Market Spectrum™ is used by major energy service companies to identify companies whose energy use patterns would indicate that they are potential clients for energy management services. EPA felt that this existing acceptance of the validity of D&B's energy model as a useful assessment tool would lend important credibility to the EPMs.

## Methodology- EPM Calculation

Using the data above, the EPMs are first calculated for individual companies and then industry norms are constructed. Table 1 illustrates the main variables used in calculating EPMs at the company level.

**Table 1. Data Manipulation and Metric Calculation**

| Identifier | Variable | Derivation | Source |
|---|---|---|---|
| (A) | Sales Volume | Income Statement | Dun & Bradstreet |
| (B) | Net Income | Income Statement | Dun & Bradstreet |
| (C) | Depreciation & Amortization | Income Statement | Dun & Bradstreet |
| (D) | Cost of Goods Sold | Income Statement | Dun & Bradstreet |
| (E) | General Operating or Selling Expense | Income Statement | Dun & Bradstreet |
| (F) | Fixed Assets | Balance Sheet | Dun & Bradstreet |
| (G) | Electricity Consumption | Modeled | Dun & Bradstreet |
| (H) | Natural Gas Consumption | Modeled | Dun & Bradstreet |
| (I) | Electricity Price (corporate avg.) | Modeled | Dun & Bradstreet |
| (J) | Natural Gas Price (corporate avg.) | Modeled | Dun & Bradstreet |
| (K) | Cash Flow | (B) + (C) | Calculated |
| (L) | Total Operating Expense | (D) + (E) | Calculated |
| (M) | Natural Gas Expense | (H) * (J) | Calculated |
| (N) | Electricity Expense[3] | (G) * (I) * 10 | Calculated |
| (O) | Total Energy Consumption | (M) + (N) | Calculated |
| (P) | Energy Sales Index | (O) / (A) | Calculated |
| (Q) | Energy Operating Index | (O) / (L) | Calculated |
| (R) | Energy Income Index | (O) / (B) | Calculated |
| (S) | Energy Exposure Index | (O) / (K) | Calculated |
| (T) | Energy Asset Index | (O) / (F) | Calculated |

[2] For example, the Energy Information Administration collects annual natural gas prices using annual revenue and consumption. Further detail can be found at http://www.eia.doe.gov/oss/forms.html#eia-176

[3] This factor is used to ensure that consumption and prices are expressed in the same units. While natural gas and electricity consumption are measured differently (i.e. MMBtu and mWh) once they are multiplied by their respective prices the result is a consistent total expenditure value.

**Energy Sales Index (ESI)**

This looks at the relationship of energy expenditures to sales by calculating the amount spent on energy for every dollar of sales. This is an overall measure of energy efficiency and intensity, both within an industry and a firm. Industries that use a great deal of energy in production or sales will have higher Energy Sales Index values. Within an industry, firms that use energy more efficiently will have lower values.

**Energy Operating Index (EOI)**

It shows the portion of expenses that are going to energy by comparing energy expenditures to operating expenditures. Energy expenditures can be reported in several expense accounts. In manufacturing, energy can be part of the cost of goods sold. In other sectors, energy can be part of Selling, General, and Administrative (SG&A) expenses. Controlling expenses, including energy expenses, is always important, but is particularly critical for industries with low profit margins.

**Energy Income Index (EII)**

This metric relates energy expenditures directly to a firm's financial bottom line by comparing energy expenditures against Net Income (a determinant of profit levels). Lower values indicate that firms are spending less on energy for every dollar of net income they generate.

**Energy Exposure Index (EEI)**

The EEI provides a "relative risk" comparison of energy exposure index to other firms by relating energy expenditures to cash flow from operating activities. Firms with strong, stable cash flow can use these funds to undertake capital spending programs. Energy is a cash expense. Reducing energy bills frees up cash for other outlays or profits.

**Energy Asset Index (EAI)**

This measure provides a relative comparison of energy expenditures to a firm's asset base. Investments in energy efficiency upgrades improve the short-term operations of a firm through reduced operating expenditures and improve the long-term asset value of the firm. In the simplest form this can occur through increased retained earnings. Increasing asset value provides the base for growth in revenues.

**Translating Metrics to Industry Level Aggregates**

Industry norms are created by using company level metrics and are organized by industry. These norms are based on a nonparametric framework, the focus of which is on the relative rank of individual firms. This framework was chosen after initial evaluation indicated that, in some instances, the mean values of a metric differed significantly from the median. "When the population is highly skewed (e.g., in studies of family incomes, store

sales, and manufacturers' inventories), the population median is located more in the center of the distribution than the population mean and thus may be a more meaningful measure of location" (Neter et al.). An additional benefit of this framework is that financial analysts understand the concept. The use of medians and quartiles provides a means to standardize the process of displaying and interpreting comparison tables. While nonparametric methods reduce the need for identifying and reducing outliers, we remove "extreme" outliers to depict the data graphically. The procedure used to determine whether or not an observation is an outlier is based on Tukey's method (Tukey, 1977).

## How EPMs Relate to Corporate Performance

The focus of EPMs is to relate energy expenditures to a firm's operating performance (how well management uses its assets and capital), business risk (the variability of a firm's sales and production costs) and growth potential (the amount of resources retained and the return earned on those resources) (Reilly, 1994). The metrics EPA has developed addresses each of these areas as illustrated by the following table:

**Table 2. Applicability of the Financial Metrics**

| Energy Performance Metric | Operating Performance | Growth Analysis | Risk Analysis |
|---|---|---|---|
| Energy Sales Index (ESI) | ✓ | **NA** | ✓ |
| Energy Operating Index (EOI) | ✓ | **NA** | ✓ |
| Energy Income Index (EII). | ✓ | ✓ | ✓ |
| Energy Exposure Index (EEI) | ✓ | ✓ | ✓ |
| Energy Asset Index (EAI). | ✓ | ✓ | **NA** |

NA = Not Applicable

Typically, energy efficiency projects have been evaluated on an individual project basis. This set of financial metrics focuses on how these projects impact a firm's overall financial performance and relates to the goal of increasing shareholder value. Assuming that, for a public firm, stock price is the appropriate measure of shareholder value, how can one use the metrics to measure the impact of a given project on the value of a company's stock?

A common valuation technique used by stock analysts is to multiply net income by price earnings multiple (P/E ratio). Since the P/E ratio is the market's perception of the future growth opportunities of the firm or its industry, we can assume that this is constant[4]. Thus, we only need to focus our analysis on how energy efficiency projects would impact net income. There are two countervailing forces at work. First, the decrease in cash outlays for energy resulting from an energy efficiency project will have a positive impact on net income. The cost of the project itself, however, presumably will have a negative impact. To achieve a positive result, the energy savings during the first year of project implementation need to be greater than the initial cost of the project. This standard analysis suggests that the only energy efficiency projects worth undertaking need to have a payback period of one year or

[4] This assumption is for simplicity. The P/E ratio is actually a function of a firm's return on equity, which is related to its ROA.

less. A more detailed approach to evaluating the impact of these projects on a firm's value would be to focus on how a particular project affects the firm's asset base and de-emphasizes its capital structure. A common measure of a firm's profitability that emphasizes longer-term impacts over capital structure is Return on Assets.

Return on assets (ROA) is defined as net income divided by average assets. This is a more complete and forward-looking measure of profitability and the value generated by a firm as opposed to net income. It de-emphasizes a firm's capital structure and dividend policy. ROA can be further defined as operating profit margin multiplied by asset turnover (sales divided by total assets).

For example, a company identifies itself in the third quartile for each metric and feels that installing a chiller would help to reduce its spending on energy. How would the cost of upgrading and the resulting energy savings impact this firm's metrics and its ROA? The numerator (energy expenditures) is expected to decline after implementing a project for all of the metrics. The impact on the denominator is harder to assess. Table 3 illustrates how an energy efficiency upgrade project would affect a firm's EPMs, holding other factors constant. Realizing that no firm operates in a vacuum, this illustrates only those factors that result directly from a particular energy efficiency upgrade.

**Table 3. EPM Movement in Response to a Reduction in Energy Consumption**

| Energy Performance Metric | Expected Change |
|---|---|
| Energy Sales Index (ESI) | Decrease |
| Energy Operating Index (EOI) | Decrease |
| Energy Income Index (EII) | Possibly Increase |
| Energy Exposure Index (EEI) | Possibly Increase |
| Energy Asset Index (EAI). | Decrease |

**ESI** would likely decrease due to a decline in total energy spending. Sales volume should not be directly impacted. In the long run, however, there could be a positive impact on sales derived from the demand for "green" products and services.

**EOI** would also likely decrease due to lower energy expenditures, but may also yield a decrease in the denominator due to lower operating and maintenance costs for the new equipment.

**EII** could possibly increase. The cost of acquiring the new equipment could result in a decline in net income in the current period. Some of this current period spending may be offset by the higher operating income resulting from the decline in energy expenditures. (This interaction highlights the importance of evaluating the full suite of metrics. If we only considered EII, the results would be counterintuitive with equipment upgrades possibly resulting in a higher metric value.)

**EEI** could also increase for the reasons given above. However, since cash flow includes depreciation, the purchase of the equipment would be partially offset by the increase in depreciation.

**EAI** would likely decrease, as the majority of energy efficiency upgrades are of a capital nature, and would increase the book value of a firm's assets. The likely reduction in

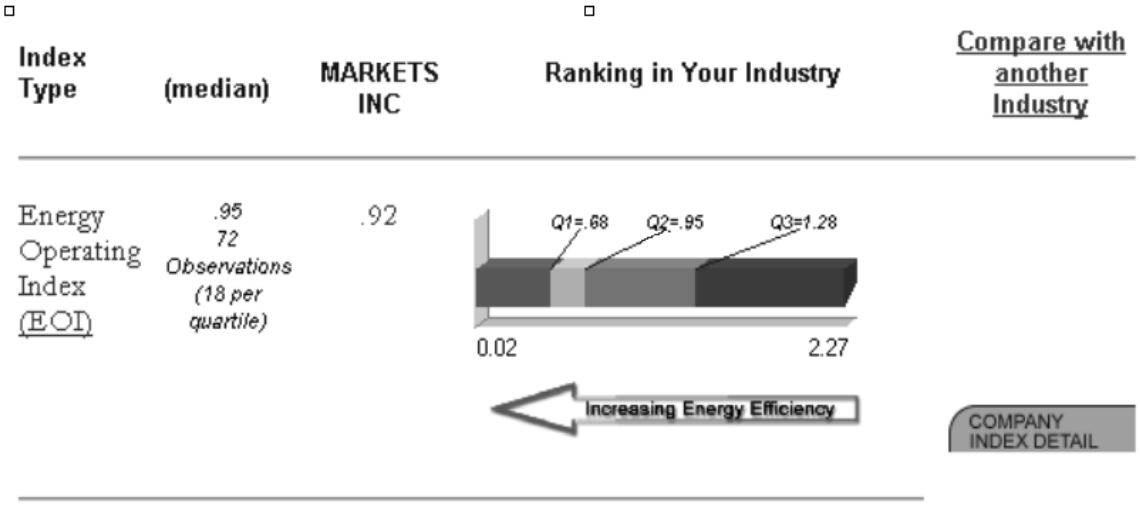
both energy expenditures and the increase in the value of the asset base would cause the value of the index to decrease.

## Reading the Metrics

The energy performance metrics are presented in a quartile display. All of the data for one metric and industry is displayed in a bar graph. In this display, a lower value indicates better performance (less money spent on energy per dollar of a particular financial variable.)

Figure 1 illustrates how the data are presented using the Energy Operating Index for grocery stores. Data for 72 companies are define the industry-wide range. This example was calculated using only companies with at least $50 million in annual revenues. Each of the four quartiles includes 18 different companies. The companies in the highest-performing quartile range from an EOI of 0.02 to 0.68. The 18 companies in the lowest-performing quartile range from 0.28 to 2.27. The median value is 0.95.

**Figure 1. Sample Energy Performance Metric Display**




## Conclusion

The five metrics discussed above are not intended to be EPA-owned. Rather, ENERGY STAR believes that its job is to introduce and promote the metrics to the corporate and financial communities and to encourage broad usage of the metrics. The purpose of this research is not for the federal government to set performance targets for an industry sector or company relative to any of these performance scales. Rather, the value of the metrics is their use in formulating a broad, quick assessment of energy expenditures in an industry or for specific companies.

In exploratory discussions with potential corporate users and Wall Street analysts, EPA has received a great deal of positive feedback and interest in the EPMs. Corporate users are eager to benchmark themselves – as an organization – against their competition. Financial analysts are constantly seeking new sources of insight that can help distinguish between potential investments or that can help explain past corporate performance. The

analysts that EPA has spoken to are enthusiastic about EPMs' potential contributions to those objectives.

ENERGY STAR believes that market – corporate and financial sector – acceptance of EPMs will increase the number of companies that evaluate and manage energy use and energy efficiency as strategic issues. In turn, those companies will be more likely to initiate or increase their level of cost-effective energy efficiency investments, further reducing the pollution that contributes to global warming.

The EPMs represent an initial attempt to provide a suite of metrics that illustrate the importance of energy decisions to corporate financial performance. Clearly, additional research is warranted and may lead to refinements of the metrics.

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