

A SELF TEST OF ORGANIZATIONAL APTITUDE FOR MANAGING ENERGY

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INTRODUCTION

Human, technical, and financial criteria all contribute to a manufacturer's ability to build wealth through energy management. Collectively, these attributes constitute a "culture" and receptiveness not only to energy management, but to operational efficiency in general. Manufacturers will enjoy a wider range of energy management options by nurturing several key organizational attributes, including staff awareness, competence, leadership, commitment, and removal of institutional barriers. This paper offers a typology and self test of corporate "aptitudes" for energy management. This discussion is based on the Alliance to Save Energy's observation and research.¹ Until these theories can be properly tested, readers are asked merely to consider this persuasive argument.

ORGANIZATION OF THIS PAPER

- I. List of Attributes that Facilitate Corporate-wide Energy Management.** This section introduces the organizational attributes that determine a manufacturer's ability to manage energy consumption.
- II. Prevailing Energy Management Strategies.** This is a review of common energy management strategies pursued by industry. What are the pros and cons of each strategy? Who
- III. Energy Management Pathfinding: Matching Strategies with Corporate Attributes.** How can manufacturers measure their aptitude for energy management? This section, in combination with the checklist in Appendix A, answers this question.
- IV. Conclusion**

¹ Since 2000, the Alliance's Industry Sector staff have (1) conducted over 40 workshops serving industrial energy users, each attracting 25 to 70 participants; (2) given presentations at 29 industry conferences; and (3) produced over 30 articles for trade press. All of these activities have generated communications with hundreds of individuals, all of whom add another dimension to the cumulative story of industrial energy management.

I. LIST OF ATTRIBUTES THAT FACILITATE CORPORATE-WIDE ENERGY MANAGEMENT

- **Fundamental business viability.** Companies that are the subject to merger or acquisition, labor disputes, bankruptcy, or severe retrenchment may have fundamental distractions that will interfere with the attention that energy management deserves. A preponderance of such conditions indicates management turmoil that makes energy management impractical.
- **Replication capacity.** Logical attributes for replication include (1) a multi-plant organization, and (2) general consistency in process activities and products across plants. Staff's ability to cooperate across sites and functional boundaries is crucial. Organizations must simultaneously engage many different professional disciplines and accountabilities to maximize their energy management potential.
- **Energy leadership (or "champion").** Successful energy improvements are usually led by an "energy champion," a manager that (1) understands both engineering and financial principles, (2) communicates effectively both on the plant floor and in the boardroom, and (3) is empowered to give direction and monitor results.
- **Energy market capability.** This dimension is straightforward: Does the corporation wish to purchase energy through ongoing market activity? If so, the corporation should be prepared to maintain sophisticated search and verification procedures to support its contracting activities. Purchasing decisions should reflect the collaboration of procurement, production, and plant utilities personnel.
- **Leadership intensity.** Quality of operations should be demanded, facilitated, and recognized by top officers of the corporation. Adoption of professional and industry standards are helpful in attaining this attribute. Energy-smart operations will hold employees accountable for adherence to energy management goals and other quality standards.
- **Pride intensity.** Energy efficiency is as much dependent of behavior as it is on technology. A positive, can-do attitude on the part of staff is helpful in attaining potential energy savings. Rewards and recognition can be harnessed to good effect.
- **Fiscal protocol.** The finance question is not always *how much*. Are purchase decisions made on first cost or life-cycle costs? Who in the organization pays, and who claims the savings? Do savings count only fuel bill impacts, or include the value of material waste minimization and greater capacity utilization? What criteria determine adequate payback?
- **Engineering protocol.** Successful energy management depends on an ability to understand energy consumption. This requires benchmarking, documenting, comparing, remediating, and duplicating success stories. Internal skills, procedures, and information services are engaged. The likelihood of building value through energy efficiency varies directly with the depth of these technical capabilities.

In the absence of an energy management process, energy expense control is reduced to one dimensional efforts. Many manufacturers (either wittingly or not) settle for something less than full energy efficiency potential due to a lack of time, interest, or understanding. The approach taken by individual manufacturers is very much a function of their organizational attributes and business culture.

II. PREVAILING ENERGY MANAGEMENT STRATEGIES

The aim of this section is to present the range of typical energy management strategies practiced by industry. Every manufacturer employs SOME energy management strategy, even if the choice is to do nothing about energy consumption. Consequently, every manufacturing organization adopts one or more of these strategies:

1. DO NOTHING. Ignore energy improvement. Just pay the bill on time. Operations are business-as-usual or "that's the way we've always done it." The result is essentially "crisis management," in that energy solutions are induced by fire-drill emergencies and undertaken without proper consideration of the true costs and long-term impacts.

WHO DOES THIS? Companies that do not understand that energy management is a strategy for boosting productivity and creating value. Or, companies that are subject to merger, buy-out, bankruptcy, union disputes, relocation, or potential closure. Or, companies that are extremely profitable and don't consider energy costs to be a problem.

PROs: You don't have to change behavior or put any time or money into energy management.

CONs: You don't save anything. Income is increasingly lost to uncontrolled waste. Because you don't inventory your energy usage, you are exposed to volatility in energy markets. You are less prepared to adapt to evolving emissions compliance agendas, and you are less capable of spotting opportunities presented by new technologies. Because you don't monitor anomalies in energy flow data, you are more susceptible to lapses in mechanical integrity and plant reliability.

2. PRICE SHOPPING. Switch fuels, shop for lowest fuel prices. No effort to upgrade or improve equipment. No effort to add energy-smart behavior to daily O&M procedures.

WHO DOES THIS? Companies that "don't have time" or "don't have the money" to pursue improvement projects. Or, these companies truly believe that fuel price is the only variable in controlling energy expense.

PROs: You don't have to bother plant staff with behavioral changes, or create any more work in the form of data collection and analysis.

CONs: Lack of energy consumption knowledge exposes the subject company to a variety of energy market risks. You don't know where your waste occurs, nor do you identify opportunities to boost savings and productivity. You are also exposed to energy market volatility and emissions and safety compliance risks.

3. OCCASIONAL O&M PROJECTS. Make a one-time effort to tune-up current equipment, fix leaks, clean heat exchangers, etc. Unable/unwilling to make capital investments. Revert to business-as-usual O&M behavior after one-time projects are completed.

WHO DOES THIS? Companies that are insufficiently organized to initiate procedural

changes or make non-process asset investments. They cannot assign roles and accountabilities for pursuing ongoing energy management.

PROs: You spend very little money when just pursuing quick, easy projects.

CONs: Savings are modest and temporary because you don't develop procedures for sustaining and replicating your improvements. Familiar energy problems begin to reappear. Energy bills begin to creep back up.

4. CAPITAL PROJECTS. Acquire big-ticket assets that bring strategic cost savings. But beyond that, day-to-day O&M procedures and behavior are business-as-usual.

WHO DOES THIS? Companies that lack the ability to perform energy monitoring, benchmarking, remediation, and replication as a part of day-to-day work. However, they have the fiscal flexibility to acquire strategic assets that boost productivity and energy savings.

PROs: Obtain fair to good savings without having to change behavior or organize a lot of people.

CONs: Forfeit savings attributable to sustained procedural and behavioral efforts. Also, savings from the new assets may be at risk if adequate maintenance is not applied.

5. SUSTAINED ENERGY MANAGEMENT. Merge energy management with day-to-day O&M discipline. Diagnose improvement opportunities, and pursue these in stages. Procedures and performance metrics drive improvement cycles over time.

WHO DOES THIS? Companies with corporate commitment to quality control and continual improvement, well-established engineering and internal communications protocol, and staff engagement through roles and accountabilities.

PROs: Maximize savings and capacity utilization. Increased knowledge of in-plant energy use is a hedge against operating risks. Greater use of operating metrics will also improve productivity and scrap rates while reducing idle resource costs.

CONs: You need a lot of in-house talent, cooperation, and a capable energy "champion" to do this.

It is beyond the scope of this paper to comment on which strategies are predominantly encountered in industry. Anecdotal evidence suggests that all industrial energy management strategies can be categorized per one of these five selections. It is also possible for firms to practice multiple strategies simultaneously, for example "price shopping" for low-priced fuel commodities in concert with a "capital projects" focus.

It should be noted that most of the ten of the experiences documented in the Alliance's corporate energy management case study series can be categorized as "sustained energy management." As such, these companies integrate energy management with day-to-day operating procedures and accountabilities.

III. ENERGY MANAGEMENT PATHFINDING: MATCHING STRATEGIES WITH CORPORATE ATTRIBUTES

This section will build on the theory of corporate receptiveness to energy management, as presented above. The energy management strategies available to a manufacturer are a function

of its organizational attributes, as summarized in Table 1. Note that this is currently presented as theory.

Table 1: THEORY: MATCHING CORPORATE ATTRIBUTES TO ENERGY MANAGEMENT STRATEGIES	ORGANIZATIONAL ATTRIBUTES							
	FUNDAMENTAL VIABILITY	REPLICATION CAPACITY	ENERGY CHAMPION	ENERGY MARKET CAPABILITY	LEADERSHIP INTENSITY	PRIDE INTENSITY	FISCAL PROTOCOL	ENGINEERING PROTOCOL
STRATEGIES FOR SINGLE-SITE ENERGY REDUCTION:								
Do Nothing								
Price Shop				REQUIRED				
Capital Projects	REQUIRED				REQUIRED		REQUIRED	REQUIRED
Occasional O&M Projects	REQUIRED				REQUIRED	REQUIRED		
Sustained Energy Management	REQUIRED		REQUIRED		REQUIRED	REQUIRED		REQUIRED
STRATEGIES FOR REPLICATING ENERGY REDUCTION AT MULTIPLE SITES:								
Do Nothing								
Price Shop		REQUIRED		REQUIRED				
Capital Projects	REQUIRED	REQUIRED	REQUIRED		REQUIRED		REQUIRED	REQUIRED
Occasional O&M Projects	REQUIRED	REQUIRED	REQUIRED		REQUIRED	REQUIRED		
Sustained Energy Management	REQUIRED	REQUIRED	REQUIRED		REQUIRED	REQUIRED		REQUIRED

SOURCE: The Alliance to Save Energy

EXAMPLES FOR INTERPRETING THIS TABLE:

- A manufacturer should have attained the attributes of “fundamental viability,” “leadership intensity,” “fiscal protocol,” and “engineering protocol” in order to effectively pursue *capital projects* as a single-site energy reduction strategy.
- Alternatively, a manufacturer that has attained “fundamental viability,” “replication capacity,” “leadership intensity,” “pride intensity,” “engineering protocol,” and has an “energy champion,” should be capable of pursuing both the *occasional O&M projects* and *sustained energy management* strategies across multiple sites. In this instance, the company may wish to start with the lesser strategy (O&M projects) and evolve into the practice of sustained energy management.

This typology presumes that energy management for multi-site organizations is more demanding than for single-site companies. Accordingly, adoption of a certain strategy by a multi-site organization requires all the organizational attributes that a single-site organization would be expected to muster, plus the capacity to replicate.

Managers that are contemplating improved energy management are encouraged to consider the case study results and theory presented in this paper. To act on this information, the steps are:

1. Refer to Appendix A, “Determining an Organization’s Aptitude for Energy Management.” Note which organizational attributes have been substantially attained by the subject company.
2. Compare the attained attributes to the information in Table 1. The presence (or absence) of certain attributes determines which energy management strategies are available to the subject company.

3. Use these findings to understand what the subject organization can or cannot achieve in terms of energy management.

Keep in mind that this exercise indicates what a manufacturer can expect from energy management, given its *current* organizational attributes and business culture. There may be a desire to evolve to a higher level of energy management than what the current organization allows. What if a manager wants to advance energy management in his or her organization? There are windows of opportunity. An obvious example is when energy market turmoil brings top management's attention to fuel costs. Also, take advantage of annual planning sessions or strategic reorganizations to propose the kind of organizational processes needed to practice sustained energy management. Remember that energy cost control is as much dependent on people as it is on technology.

IV. CONCLUSION

Volatile energy markets are here to stay. So are competitive and regulatory pressures. Energy price movements will put some manufacturers out of business, while others will decide to move offshore. Surviving manufacturers will not only provide superior products and service, they will maximize value through operating efficiencies. Energy efficiency is an indispensable component of wealth creation.

Energy procurement strategies such as shopping for low energy prices and supply contracts are only partial solutions to soaring energy expenses. Management of consumption is an underappreciated opportunity. While technology is the foundation for managing consumption, it is the human dimension makes technology work. Organizational procedures, priorities, and accountabilities are crucial to energy management.

A manufacturer's ability to manage energy consumption is ultimately a function of organizational attributes and corporate culture. This paper advances "energy management pathfinding" concepts. Appendix A presents the criteria that define seven distinct organizational attributes needed for energy management. While sustained, day-to-day energy management is recommended for providing the greatest and most durable value, it is also the most demanding in terms of operational character. Many companies will find that they are suited for strategies that are less challenging, but may also provide less value. The same management diagnostic presented in this paper serves as a pathfinder for matching organizational characteristics with appropriate energy management strategies.

APPENDIX A

DETERMINING AN ORGANIZATION'S APTITUDE FOR ENERGY MANAGEMENT

This Appendix serves two purposes:

1. To further define the organizational attributes that a manufacturer needs to pursue energy management as a continuous-improvement process, and
2. To determine if a subject organization has substantially attained each of the organizational attributes listed ("Fundamental Viability," "Replication Capacity," etc.).

Please see below. For each attribute, a number of conditions are posed in a bulleted list. When considering a subject company, ask: *are most or all of these conditions true?* If yes, then the subject company has substantially attained that attribute. The degree of attainment for each attribute varies directly with the number of considerations that can be affirmed for each attribute. There are no scores, *per se*. If the subject company has attained a majority of the bulleted considerations listed under an attribute, consider that attribute to be substantially attained.

The range of topics covered by these conditions would be best answered by a high-level manager or perhaps a team of managers. After this exercise, note all the attributes that have been substantially attained. Compare those results to Table 1. That Table indicates which energy management strategies are available to the company, given its organizational attributes.

Fundamental Viability:

- Your plant capacity is generally stable or growing.
- Your company is NOT CURRENTLY experiencing excessive turnover of managerial and corporate personnel.
- Strikes or other labor-related work stoppages are NOT considered an ongoing concern for management.
- Your company is NOT the current subject of a merger or acquisition attempt.
- Your company is NOT in receivership, Chapter 7, or Chapter 11 status.

Replication Capacity:

- Your company operates more than one manufacturing facility.
- Your manufacturing processes and products are mostly similar across all plants.
- Your facilities are designed and operated per one standard; standards do not significantly vary by facility for asset selection, procedures, and management styles.
- Staff from different plants (or divisions) regularly collaborate to share their common issues and solutions.
- Maintenance management is set up to serve multiple sites; individual sites adhere to centralized maintenance planning and procedures.
- Your corporation currently uses (or is it willing to use) contract vendors for ongoing energy management.

Energy Champion: (NOTE: ALL of these conditions must be met to have a true "energy champion")

- Your lead energy person has thorough knowledge of technology and staff capabilities at the facility level.
- Your lead energy person can prepare financial analyses to support engineering proposals and convincingly present these to top managers.
- Your lead energy person applies more than 50% of his/her time to energy issues.

- _ Your lead energy person can give direction or at least influence decision-making by general managers.
- _ Your lead energy person understands utility tariff structures and administers relations with utility providers.

Leadership Intensity:

- _ Your organization actively maintains disciplines of excellence such as Six Sigma, ISO 9000, or Total Quality Management.
- _ Process technologies, procedures, or staff expertise are a selling point in marketing your products.
- _ Current and future environmental impacts from manufacturing operations are a concern to your top management.
- _ A corporate officer consistently reviews cost and quality performance data for all facilities.
- _ To most of your corporate leaders, "energy efficiency" is perceived as an "opportunity" as opposed to a "hassle."
- _ Staff compensation, raises, and rewards are impacted by their stewardship of energy, raw materials, and other inputs.
- _ Production metrics are integral to performance evaluations for facility managers and staff.
- _ Your facilities subject to public scrutiny or "good citizenship" expectations.

Pride Intensity:

- _ All or most plants are consistently high performers with respect to health and safety compliance.
- _ Most plant-floor staff as well trained for their jobs.
- _ Staff turnover is NOT considered to be a problem.
- _ Your typical plant worker philosophy can be described as: "Do what's right," instead of "Do what's easy."
- _ You describe your plant equipment as "well maintained" as opposed to "poorly maintained."
- _ To most of your facility staff, "energy efficiency" means "opportunity" as opposed to "hassle."
- _ Key facility personnel maintain professional certifications.
- _ Your organization prescribes and enforces technical training for facility personnel.

Fiscal Protocol Intensity:

- _ Asset purchases are judged primarily by life-cycle costs (acquisition plus life-time operating, maintenance, etc.), instead of first costs (cost of acquisition).
- _ Your organization uses (or is willing to use) leases and other off-balance sheet methods to finance major acquisitions.
- _ Your organization's investing strategy seeks large payback as opposed to fast payback.
- _ Most of your facilities take utility tariffs into account when planning their operating times.
- _ Facilities invest in plant improvements (as opposed to simply fixing what's broken).
- _ Energy-related capital project proposals assigned a hurdle rate equal to or lower than other project proposals.
- _ Any energy savings returned the facilities that successfully implement capital improvements.
- _ Your facility managers understand utility tariffs and their role in determining energy expenses.

Energy Market Capability:

- Your company is willing to make an on-going effort to use energy marketing services to obtain lowest-cost energy commodities and risk-hedging securities.

Engineering Protocol Intensity:

- Your facilities maintain a scheduled maintenance routine for powerhouses, motor drives, pumps, compressed air, and similar utilities.
- Your facilities maintain a protocol for responding to anomalies in operating performance data.
- Your chief engineers are comfortable with using software to analyze engineering issues.
- Plant managers develop (or help to develop) project proposals for capital budgeting purposes.
- Your facilities maintain procedures for safety, health, and/or waste management.
- Most or all of your facilities maintain an action plan for improving process efficiencies.
- Your organization maintains a database or archive that documents engineering problems and solutions.
- Your facilities track the volume of factor inputs required per unit of production.
- Your facilities monitor scrap or error rates.
- Your annual budgets include factor inputs and production targets as well as dollar figures.
- Production, inputs, and cost performance data are created and utilized at the facility level.
- Your engineering problems and emergencies are generally unpredictable and unique as opposed to predictable and recurring.
- Company-wide production stats are made available to all facility staff by publication, discussion, or graphic display.