Investment Grade Energy Audits... Fact? Or Fiction?

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Performance contracting is all the rage for facility managers in the late 1990's. Everybody talks about "energy audits" and "investment grade audits," but what's the difference, and what is an audit, really? This article provides a down-to-earth discussion of the need for and benefits to be derived from doing investment grade audits. It also provides a detailed description of what an investment grade audit should be—as based on the author's two decades of experience in the performance contracting field and from his nationwide seminar on performance contracting.

Depending upon who you talk to in the performance contracting industry the concept of the "investment grade audit" is either waved aside as a foolishly expensive techno-babble academic exercise—or a critical element in developing a successful project. While it can in fact be either one (mostly depending upon who's doing the audit), what you will read in the following is a rather strong statement of the case in favor of the investment grade audit, in one "flavor" or another. In fact it is not just a statement in favor of investment grade audits, but a statement in favor of doing performance contracting in such a way that the door is opened to investment grade audits and makes them an integral part of the process, rather than an almost "accidental" part of the process.

A PROBLEM EXISTS

One of the problems with the performance contracting industry (or "energy services" as it was known in the early 1980's when we helped to formulate the industry), is that it has always been sort of a "rogue" business—not falling into any existing category of business, sort of hard to understand, and therefore inclined towards freelancing and not following any particular standards, nor really even having it's own "standard of care" as such things are referred to in legal circles. Some have claimed that as the industry has matured the "hit and run" ESCo's "are no longer with us." Unfortunately nothing could be farther from the truth.

The dichotomy that exists in this industry is that on one hand the business proposition is compellingly simple, but on the other hand the actual implementation is devilishly tricky.

First of all we have to deal with the technical and organizational problems associated with determining actual existing field conditions, figuring out, designing and building a complex retrofit project (like doing a heart transplant on a marathon runner... during a marathon), and then keeping it working when the end users may actually be in resistance (to lighting controls, building automation, etc.).

After scaling these hurdles, we then have to deal with the fact (as mentioned in the Spring 1998 E&EM article "Measurement & Verification Option") that ***savings cannot actually be measured.*** That is to say, cost avoidance can be accounted for, but the actual stream of savings is a use of energy that *no longer exists* and it is therefore physically impossible to slap a clamp-on ammeter around it to measure it.

Combine this with the owner's greed occasionally getting in the way (á la Alameda County v. Western Energy Management, et al) and actually encouraging unethical Energy Service Company (ESCo) behavior, and you have significant potential for calamity—especially when the unwary owner and the unscrupulous ESCo collide, but also when other well-intended parties pursue performance contracting in relative ignorance. Given the rush of Energy Service Providers (ESP's—as opposed to ESCo's) to add energy service offerings to their commodity portfolio, this is inevitable, and already occurring.

THE "SALESMAN'S" POINT OF VIEW

I do not present this point of view spuriously. It is real, in many cases fairly held, and it continues to recur as turnover in sales staff takes place every few years. It is, however, largely wrong.

This point of view (perhaps unfairly named) holds that the whole business of performance contracting is simply one of marketing—specifically product packaging and sales. The salesman's point of view is that there is a need in the marketplace and that the smart company (and salesman) simply provides what it is that the customer thinks they need.

In this case the project is just a somewhat unique assembly of widgets (lighting, digital controls, some chillers, perhaps a few rooftop units, etc.), engineering is a commodity at best (in fact it really is only needed to identify the parts needed, not to really do any analysis or design), that energy audits and studies use things like impossible-to-understand-or-prove computer simulations, that it is really the owner's ultimate responsibility to make everything work and that the "guarantee" is only there because the competition offers it as well.

Combine this with levels of sales performance bonuses that are generally unprecedented in the HVAC industry, and you have very little motivation for taking the performance contracting process seriously.

And the truth is, given buildings of low complexity, a large inventory of facilities over which to spread risk, a little bias on the salesman's part towards ethical behavior, a company with some actual, practical energy retrofit acumen, and you can actually produce workable projects.

But "accidents" don't equal good policy and good procedure—as, for example, a couple of ESCo's learned in the recent past.

The first of these was competing for the large project that John Schulze wrote of in his Summer 1998 E&EM article "What Do Customers Want Besides Lower Energy Costs?" During the interviews at the ESCo's office, this one ESCo responded to an inquiry regarding their engineering resources by rattling off five consulting firms' names in a single breath. What this told us, and the owner, was that this ESCo viewed engineering as a pure commodity (the firms they named ranged in capability from not-good-enough-to-build-a-dog-house to the best in the business—frightening indeed!), and that they had so many names meant that they did not have a solid working relationship with any of these firms.

This, among other reasons, got them "cut from the squad." Curiously, we later learned that the performance contracting manager (and interview leader) for this company had "learned" the business working for a competitor best known for their marketing rather than execution skills.

The second of these is another Fortune-500 that had signed an audit agreement with a medium sized school district. This one page agreement provided for the ESCo to prepare a "detailed energy audit" (yes, those three words were the entire specification for the audit) for a fee of $75,000. Upon completion of their work, they presented the owner with a 39-page audit report.

This was very disconcerting to the owner, who requested that more detailed information be provided. After a few more submissions by the ESCo (a total of four, one original and three supplements), we were finally brought in to assist the owner.

Amazingly, after four submissions, there was still not a single energy savings calculation in the audit report(s)! When questioned on this later, the ESCo replied, "Well, we don't give our customers detailed information, because they trust us."

Based upon our recommendations, the owner insisted that the ESCo fill in the details (in spite of the fact that they trusted their ESCo) and eventually closed the deal on a $3,000,000 performance contract. The ESCo in this case has still not figured out the folly of their strategy or that it cost them almost a year's delay in the project (this lack of "corporate memory" is one of the bad side effects of rapid turnover in this relatively volatile industry).

A BETTER POINT OF VIEW

A truly better point of view is one which serves the (long term) best interests of *all* the parties involved. As developed from our two decades of experience in the field, as presented in our nationwide seminar on performance contracting and as embodied in the performance contracting program we prepared for the State of California (and for our clients like the San Francisco Unified School District) we sponsor an open-book, process-oriented, qualification-based, pay-as-you-go approach to performance contracting. This approach, which opens the door for the use of investment grade audits, is as follows:

- The owner prepares a preliminary assessment of conservation potential to gauge the opportunity and likelihood of success of a performance contract.

- ESCo's are considered and selected on the basis of their qualifications—in return for which they agree to an open book process and pre-agreed margins and definitions of project costs.

- The ESCo is paid for doing the investment grade audit and must meet a fairly stringent criteria for the audit, including full disclosure of all the audit information, including cost estimates and sub/vendor quotes—and making a commitment to a (reasonable) minimum level of savings, else they do not get paid (see further comment on this below).

- The Owner participates in developing the audit and selecting the final package of retrofit measures to be implemented under the program.

- The parties enter into an Energy Services Agreement (ESA) which is a third-party document that both parties examine at the very beginning of the process, and is finalized following completion of the audit.

- The project is designed, documented, installed and commissioned according to fairly stringent criteria in the ESA.

- Ongoing measurement and verification is conducted for only a fairly short "guarantee demonstration period" (nominally 14 months) following completion of the installation so as to *keep M&V costs to a minimum* and to *focus the concentration of both parties on making sure everything works*—rather than waiting for a year or more to even check the results (which is *very* often the case).

This approach solves virtually all the ills we have discovered in the process of creating a Fortune-500 performance contracting business unit and doing lots of expert testimony and remediation in this field. Moreover, it solves the problem of the investment grade audit—that it all too often isn't done.

WHY INVESTMENT GRADE AUDITS ARE IMPORTANT

The foundation of every performance contract or energy services project is the technical problems in a facility which cause it to perform poorly and waste energy. It is identifying the problems, or *opportunities*, developing technically and organizationally workable fixes, and putting those fixes in place that makes the whole process work.

Treating the audit like a commodity, then, is like getting your quadruple bypass diagnosis from your physician's receptionist. No matter how good he is, the receptionist's opinion is of little value. No indeed, when considering major surgery, nothing short of a Mayo Clinic physical is what most of us would insist upon. Then why do anything less for your building when considering major surgery for it?

Besides laying the foundation for the entire project, the investment grade audit does some other good things for the project as well. These benefits, by the way, *benefit the ESCo* as well as the building owner, and include:

- The investment-grade audit dramatically increases the retrofit team's familiarity and knowledge of the facility—which will help the savings analysis, cost estimating, design and installation.

- It increases the documentation shared by the parties, which will help to resolve change orders and other potential disputes later in the process.

- It puts the numbers "on the table" so that the owner sees exactly what the costs are and serves to co-opt the owner into the process—which helps to avoid buyer's remorse down the road (but also prevent the unscrupulous ESCo from employing "value pricing," i.e., exorbitant mark-ups (good for all you "straight-up" ESCo's!!).

- It provides a set of construction documents that allows the more effective management of subs, commissioning, construction coordination, commissioning, etc.

- It provides a solid base of data for establishing the baseline which will be used during measurement & verification.

In our experience, we have never found a single ethical ESCo who wouldn't "kill" for the chance to open his books in return for being part of a qualifications-based-selection and negotiated contract process. Only those who have admitted to us that their policy is "rape, pillage and burn" have found this approach unworkable. But, hey, too bad.

THE INVESTMENT GRADE AUDIT DEFINED

So what is this thing we're referring to as an "investment grade audit"? Well, it's a lot of things, but mostly it is a process of investigation and creation and documentation. Our criteria runs quite a few pages in the contract documents we prepare for our clients, but basically it includes the following:

- *Energy Accounting.* Before anyone even steps into the buildings, the very first step should be the gathering of all the energy data for the facilities and analyzing it to develop energy use and cost indices. This data can be used to triage multiple facilities (such as school districts) into three groups of facilities (big/bad energy "hogs," big and moderately bad/small but seriously bad, and the "don't waste your time") so that effort on the audit and on the retrofit program can be directed accordingly. We saw one Fortune-500 company some years ago spend as much money on 40,000 Btu/sf/yr elementary schools as they did on 100,000 Btu/sf/yr schools for lack of understanding of this step (while project team members all got to find new jobs later, by the way).

- *Field surveys.* We identify two basic types. The first of these is the "observation" survey during which the auditors look at what is going on in the building—and why. This survey is intended to identify problems (but not yet quantify them). The second type is the "data gathering" survey, in which name plate data, instantaneous measurement or time-series data is gathered for quantification of the energy used and the potential for savings. Following the field survey, the ESCo is required to issue a preliminary report and make a go/no-go recommendation. If the ESCo's commitment to a minimum level of savings that can be financed in a self-funded project cannot be met, this is the time for them to pull out and cut their losses (far superior to having a bunch of ESCo's doing B.S.

audits on speculation and "ginning up" savings figures out of the "ether" during a request-for-proposal process).

- *Energy balance/computer modeling.* As we have explored in numerous papers (and in our new Fairmont Press book), computerized simulation does not have to be costly, especially if modest approaches (such as spreadsheet models) are used. While some avoid building simulation due to their perception of its cost, whether it is used or not, at some point an accounting of all the sources and use of energy must be done. (Sound familiar to you MBA's out there?) The purpose of the energy balance is to prevent double counting of savings and to keep all the estimates of savings bounded by the energy attributed to the end use process being retrofitted. Don't laugh, one Fortune-500 we know of guaranteed $150,000 per year in gas savings on a building that only used $50,000 worth of gas to begin with!

- *Energy Conservation Measure (ECM) development.* Each ECM under consideration should have developed for it an outline scope of work, preliminary sizing calculations, preliminary equipment selection, sketches (for complicated ECM's), detailed cost estimates, and both a statement of the principles of how the ECM will save energy and how that energy savings will be estimated (e.g., "air handlers run at night when it is cool and the space served needs cooling—we will add outside air economizers for "free" cooling and simulate on DOE-2 by adding economizers to the retrofitted air handling systems").

- *Detailed savings calculations.* Someone at some point has to sit down and say what they think the savings from a given retrofit is going to be. This needs to be documented, by type of energy saved, by piece of equipment being modified, as a percent of the equipment/end use being modified (numbers greater than 100 not allowed) and the M&V approach planned for the retrofit (yes, M&V starts at the beginning, not the end of the project).

- *Audit report.* All the data gathered above and all of the analysis needs to be bundled up in the final report. This report should be presented to the owner in draft form, the ECM "package" discussed and negotiated and the report finalized.

AVOID "STUDY KINGS"

Our standards for doing this work also include criteria for the engineer performing the audit as well. Generally we are looking for engineers other than traditional consultants who do new construction primarily, as it is rare that they have retrofit expertise. Similarly, we avoid what we call the "study kings," i.e., those firms that have traditionally specialized in audit work for "low buck" government agencies and have little expertise in designing and commissioning actual projects.

We generally look for design-build experience, control system experience and building simulation experience in selecting consultants for our clients. Building owners are cautioned here as many of the folks out there in the performance contracting business are unable to discriminate between competent energy engineers and the rest—which actually (and unfortunately) reinforces the "salesman's" point of view discussed above.

Now, all of this describes a pretty rigorous process, and if you're doing a 1,000,000 square foot high rise in the center of town, this is definitely the way to go. However, and as we have alluded to, if you're working with an elementary school district, a much "lighter" approach would make sense. We would still call this an investment-grade audit, though the level of site investigation and the rigor of the energy balance/building simulation would be significantly relaxed. The documentation would be commensurately lighter as well, though we would still expect it to be fully comprehensive in nature.

As a rule of thumb, we expect to spend 5 to 15¢ per square foot, or 3 to 5% of the annual energy bill in doing investment grade audits. Generally this represents a value in a range of 3 to 5% of the overall value of the project. This is another area where intimate involvement between the owner's and the ESCo's organization is important, as the allocation of the engineering resources to the various facilities should really be a collaborative endeavor.

FINALLY...

To some, this rigorous form of energy audit is new. Well, some energy engineers, your author included, have been doing instrumented surveys and investment grade audits since the late 1970's. At that time

we could not imagine asking our employers to "roll the dice" on anything but a rigorously-performed audit. In fact we found it both curious and frustrating that only government agencies and other institutions felt that "ordinary" audits, lacking in rigor, were acceptable. We could only conclude that accountability apparently had a lot to do with the judgment of what was acceptable.

Perhaps this also explains why the vernacular 20 years ago used by real energy engineers when referring to rigorous audits was "engineering feasibility studies"—to avoid the stigma of the term "audit."

To close, we believe that it is important to observe that not a single project that has followed our process has ever come to naught. While some have bemoaned the "high cost" of investment grade audits, we can think of no better (or cheaper) "insurance" for success than doing the homework, and doing it right.

ABOUT THE AUTHOR

James P. Waltz, president of Energy Resource Associates, Inc., is a pioneer in the field of energy management. Prior to the Arab oil embargo of 1973, Mr. Waltz made a personal commitment to energy management as the focal point of his engineering career. Since that time, he has served as energy management program manager for the Air Force Logistics Command and the University of California's Lawrence Livermore National Laboratory. In addition he has worked as an energy management engineer for consulting and contracting firms. In 1981 he founded Energy Resource Associates for the purpose of helping to shape the then-emerging energy services industry—and did so through a multi-year assignment to create a successful energy services business unit for a Fortune 500 temperature controls manufacturer.

Specializing in the mechanical, electrical and control systems of existing buildings, Mr. Waltz's firm has accomplished a wide variety of facilities projects, recently including a corporate-wide energy management program review for a major hospital chain, design of a replacement chilled water plant for a northern California hospital, on-site recommissioning of the entire building automation system for another large northern California hospital and audit and expert testimony relating to a failed energy services contract for a large southern California hospital.

Mr. Waltz's firm has been selected by the State of California as the

State's sole performance contracting consultant and provides performance contracting owner's representative services for such clients as San Francisco Unified School District.

Mr. Waltz's credentials include a bachelor's degree in mechanical engineering, a master's degree in business administration, professional engineering registration in three states, charter member of and certified energy manager of the Association of Energy Engineers (AEE), member of the Association of Energy Services Professionals (AESP), Demand Side Management Society (DSMS) and the American Society of Heating Refrigeration and Air Conditioning Engineers (ASHRAE).

Mr. Waltz serves as a member of the DOE's measurement and verification protocol technical committee, responsible for the recently released International Performance Measurement and Verification Protocol (IPMVP), formerly known as the North American Energy Measurement & Verification Protocol (NEMVP).

Mr. Waltz was named International Energy Engineer of the Year in 1993 by the Association of Energy Engineers (AEE) and teaches a nationwide performance contracting seminar through the AEE. He may be reached at eraenergy.com.