

# PERFORMANCE CONTRACTING

## for School Districts

Understanding measurement and verification and the roles of the various participants

**S**chool districts often have some mistaken notions about performance contracting and what constitutes reasonable expectations of the process. That is understandable. While performance contracting has been around for more than 20 years, school districts still try to treat it like design/bid (plans and spec) work.

In reality, performance contracting *is* design/build contracting, which most public agencies are unfamiliar with. For that reason, and because it is retrofit, it cannot be competitively bid. Being a turnkey, design/build process means the vendor or contractor exercises a great deal of control over the process of implementing the project. Further, the vendor or performance contractor does most of the work, including investigation and design, has most of the information, and most often is responsible for measuring and verifying the performance of the work.

As a practical matter, try thinking of measurement and verification in the reverse: Verification is

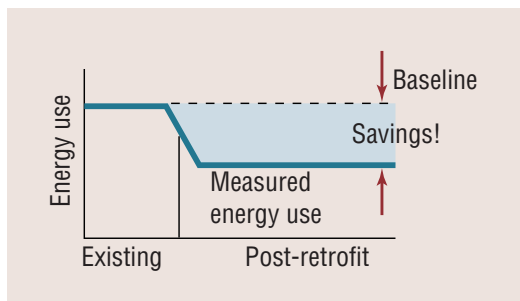
perhaps more important than measurement and should be done first.

In verification, the retrofit work is physically examined to confirm that the project can produce savings. For example, on a variable-air-volume retrofit, it should be confirmed that the digital control system is monitoring the duct static pressure; that the static pressure changes over time, indicating that the distribution box dampers are performing their control function; and that the digital controls are slowing the fan speed as static pressure rises to reduce fan power consumption.

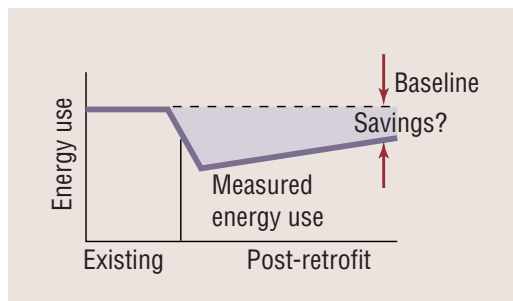
The second part of the process—measurement—accounts for the energy savings (or cost avoidance) produced by the retrofit project. Measurement can be simple and infrequent or complex and continuous, depending on the work.

A simplistic notion of the measurement and verification process is that, assuming all things

By **JAMES P. WALTZ, PE**  
Energy Resource Associates Inc.  
Livermore, Calif.



**FIGURE 1.** If all things are equal and no interfering changes occur, post-retrofit energy use will remain constant, resulting in savings that are easy to see.



**FIGURE 2.** If all things are not equal or interfering changes occur, post-retrofit energy use may rise, potentially making savings unclear.

A member of HPAC Engineering's Editorial Advisory Board, James P. Waltz, PE, is president of Energy Resource Associates Inc., an energy-management consulting firm specializing in the electrical, mechanical, and control systems of existing buildings. He is a member of the Department of Energy's technical committee on the measurement and verification protocol. He can be contacted at [jpwaltz@eraenergy.com](mailto:jpwaltz@eraenergy.com).

are equal and that no interfering changes have occurred, what occurred in the past, such as stable energy use, will continue post-retrofit (Figure 1). Also, it assumes that the retrofit will result in reduced energy use and that the difference between the assumed-to-continue baseline and measured post-retrofit energy use is savings. Conversely, as Figure 2 illustrates, if all things are not equal or if interfering changes occur, such as the 3-percent annual increase in electrical energy use typical of hospitals, post-retrofit energy use may rise until it meets the supposedly stable baseline, potentially eliminating apparent savings.

#### PROBLEMS WITH MEASUREMENT AND VERIFICATION

Two fundamental problems are associated with the measurement and verification tasks in a performance contract. The first is that *savings cannot be measured*. Savings are the stream or flow of energy that no longer is flowing. While you can put a clamp-on meter around a wire carrying current and measure the current and power flow, clamping a meter to a wire that does not have current flowing is useless—there is nothing to measure. Thus, you cannot measure savings.

To paraphrase Kelly Kissock, PhD, of the University of Dayton at the Department of Energy's Cool \$ense Forum in September 1997, the statistical methods used in measurement and verification are frequently invalid or are of questionable validity. Kissock, an expert on statistical methods, explained that the underlying problem is that virtually all statistical methods are based on the assumption that the subject of the statistics represents a random population. While this might be true of people, buildings, their method of construction, their occupancy and use, and even their lighting fixtures are not random—they are unique to the individual building. Therefore, the use of statistical methods for measurement and verification rests on a weak, if not invalid, foundation.

The second problem is that interfering factors and/or attitudes are manifest, including:

- Bad baseline information, such as a small campus of buildings served by a

single electric meter, one of which is outlying, but was not reported to the performance contractor.

- Failures of new or existing equipment, of which the performance contractor (or owner) may not be aware, that result in a change of building operations and an increase (or decrease) in energy use.
- Changes in use and occupancy and the documentation of these changes.
- Additions to, or demolitions of, occupied space.
- Sabotage (yes, it happens).
- Assigning the tasks of measurement and verification to a person who may not have been present during the planning and implementation phases of the project and who lacks the authority to react to or correct problems that may be discovered in the performance of the project. The person may feel that his job is in jeopardy if negative results are discovered.
- An aversion by the school district or the energy-service company to hearing that the project is not performing. It is not uncommon for only one correct answer to be sought and all others ignored, dismissed, or not detected by the methods used. Often, those who are likely to deliver a bad project, such as unscrupulous or inexperienced performance contractors, are unlikely to engage in remediation if project-performance problems are detected.

Although measurement and verification occur at the end of a performance contract, planning for these tasks must begin at the beginning of the project to ensure success and eliminate interfering factors and attitudes.

#### IF THE PROJECT FAILS

A small shortfall in savings—10 to 30 percent—generally means the project can be fixed. In the event of a small shortfall, take the following steps:

- Compare the engineer's projection of savings by end use (e.g., air distribution, cooling, lighting) with the documented savings.
- Assuming options A and B under the International Performance Measurement and Verification Protocol have been used for verifying measurements, compare the measurement and verification documentation with the original

savings projection. If the non-performing portion of the project cannot be identified this way, use the verification portion of the documentation in the field to examine the various retrofit measures to determine which no longer are performing as expected.

- Fix the retrofit measure by repairing failed control components or installing additional devices.
- Negotiate an adjustment to the baseline to account for changes in building occupancy or use.
- Make up the difference in the missing savings to the school district.

In cases in which the savings shortfall exceeds 30-percent less than that guaranteed, perform an audit of the entire job. Ask yourself:

- Was a baseline established?
  - In reviewing the energy audit and its documentation, was an investment-grade energy audit performed? Energy Resource Associates uses a seven-page standard to define the steps in an investment-grade energy audit.
  - Are the individual energy-conservation measures proposed reasonable? Could they work?
  - Are the savings projections for each energy-conservation measure reasonable? At times, salespeople incorporate into a project measures that an engineer would reject.
  - Is the guarantee reasonable?
  - Are the energy-conservation-measure designs correct?
  - Does a physical examination of the energy-conservation measures indicate that they were properly installed? For example, adding an outdoor economizer to a building without providing for building-pressurization relief may result in the economizer being overridden and disabled.
  - Were the energy-conservation measures properly commissioned?
  - Have the energy-conservation measures been maintained?
  - Is the measurement and verification plan sensible? Is the right information being gathered and properly processed?
- Remediation where there is a large shortfall can take one of two courses, depending on whether the flaws are fatal or non-fatal. Fatal flaws will involve financial restitution, possibly long-term, to the school district. If the flaws are

non-fatal, the project may be recoverable and may include modifying energy-conservation measures to add controls or additional equipment, recommissioning the energy-conservation measures, redesigning the measurement and verification approach, or renegotiating the entire deal with the school district.

#### EDUCATE SCHOOL CLIENTS

Three facets of performance contracting must be communicated to school-district clients if they are to understand the value of measurement and verification and their role in performance contracting. They are:

- Energy-service companies combine

investigation, planning, design, construction, and follow-on maintenance and monitoring services in a single package. They identify energy and operational problems in facilities and find creative, cost-effective solutions, delivering true value. Therefore, performance contracting, in essence, is a professional service, and, as such, schools should select an energy-service company on its qualifications, rather than on its financial projections and sales presentation. Advise them to consider two questions about every performance contractor under consideration: Do they have the skills to solve your problems? Will they still be here once the dust has settled?

- Performance contracting is not a “no brainer,” as it often is portrayed, but a rather tricky business. The energy-service company gathers and maintains most of the information on the facilities, leaving the owner (the school district) uninformed and potentially vulnerable. Because many school districts view themselves as not having any money, they may not fund front-end activities such as planning or preliminary audits, be unwilling to compensate the energy-service company for the audit when the retrofit project is declined, and fail to seek expert help. This is a mistake.

- The financial aspects of projects can be creatively managed so the school district does not have to pay. One way to fund an owner's needs is to put project funds into an escrow account for the owner's use.

Advise school-district clients who are considering hiring a performance contractor to consider these recommended “rules”:

- Only hire a performance contractor on its qualifications. Performance contracting is a professional service, not a commodity.

- Insist on the use of detailed criteria for how *each part* of the project is to be implemented and documented.

- Manage the entire process, and do not become an absentee owner.

- Stick to the basics, and use common sense. Remember, there is no free lunch!

When these rules are followed, we have never seen a project fail.