Guaranteed Energy Savings Manual for Pennsylvania's Government Organizations

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COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF GENERAL SERVICES
HARRISBURG

DISCLAIMER

This manual has been prepared for the Commonwealth of Pennsylvania to serve as a "how-to" guide for Pennsylvania's public agencies that are interested in implementing guaranteed energy savings agreements (GESAs) that will reduce energy consumption and costs in their facilities.

The Pennsylvania Legislature enacted authorizing legislation in 1998, which was amended in 2003, that enables the Commonwealth's state agencies, universities, local governments and school districts to use energy performance contracting to implement large capital-improvement energy projects and reap the associated long-term energy-saving benefits (see 73 P. S. §§ 1646.1- 1646.7).

The intent of this manual is to assist public agencies in investigating the use of guaranteed energy savings agreements to accomplish the goals of Pennsylvania's law.

Notice

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Access/download the manual from the web site:
DGS GESA Website
(you may have to right-click on the link and then click open hyperlink)

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PART 1: INTRODUCTION

What are Guaranteed Energy Savings Agreements?

Across the country, guaranteed energy savings agreements (GESAs) are offered by Energy Service Companies (ESCOs) as a practical way for public sector entities to obtain and finance energy-saving projects for their facilities. GESAs can provide the resources to finance and acquire needed capital equipment and improve energy efficiency and comfort in public buildings. The majority of states, including the Commonwealth of Pennsylvania, as well as the federal government, have enacted legislation that authorizes public agencies to use GESAs for implementing energy improvement projects.

Guaranteed energy savings projects are rapidly achieving widespread use by governmental agencies because they offer a means for overcoming constrained capital budgets, aging and inefficient buildings and equipment, and limited maintenance staff resources. In Pennsylvania, one of the most attractive and distinguishing features of GESAs is the guaranteed energy cost savings that pays for all associated project costs over the life of the contract. This provides an opportunity for agencies[1] to free up scarce budget resources for other needed services and activities.

By allowing the energy cost savings to cover all project and financing costs, GESAs provide agencies with the ability to purchase these comprehensive energy improvements (e.g., lighting, heating, air conditioning, and system controls, etc.) and services from qualified ESCOs. Agencies in Pennsylvania are authorized to use GESAs as provided for in *73 P. S. §§ 1646.1 - 1646.7* of the Pennsylvania Statutes, as amended.

For all agencies in Pennsylvania, the length of the contract term for guaranteed energy savings projects cannot exceed 15 years.

[1] For purposes of this report and to assist the reader, all public sector entities (e.g., Commonwealth executive agencies, local governments [counties and cities], schools and universities) will be referred to as “agencies” or “agency" unless otherwise noted.

Pennsylvania Law

Due to the legislative authority given to agencies in 1998, the Commonwealth's executive agencies, school districts, universities, local governmental agencies and school districts have been able to use GESAs to implement large capital-investment energy projects and reap the long-term energy-saving benefits. In 2004, the law was amended to extend the contract term from 10 to 15 years, allow non-energy improvements to be implemented as long as there is an economic benefit or compliance justification and the costs do not exceed 15% of the value of the GESA which will be paid for from savings. The amended law also requires that agencies review all proposed capital improvement projects for the potential applicability of GESAs.

The Pennsylvania GESA statute, codified at 73 P. S. §§ 1646.1 - 1646.7, is included in Appendix A at the end of this manual. Figure 1-1, which can be found on the following pages, describes the key provisions of Pennsylvania's guaranteed energy savings law.

In December 2004, Governor Edward Rendell issued *Executive Order 2004-12* which established the Department of General Services (DGS) as the centralized coordinating agency for the Commonwealth's energy management and conservation efforts for facilities of the executive agencies. It also identified a number of energy management initiatives and practices, including GESA projects, to be coordinated by DGS. A copy of *Executive Order 2004-12* is located in Appendix A-4.

Overview of the Commonwealth's GESA Program 2001-2008

- 18 Qualified ESCOs
- 11 Participating Agencies
  - Department of General Services
  - Department of Corrections
  - Labor and Industry
  - State System of Higher Education
  - Department of Public Works
  - Department of Transportation
  - Pennsylvania State Police
  - Department of Agriculture
  - Pennsylvania Historical and Museum Commission
  - Pennsylvania Higher Education Association
  - Department of Military and Veterans Affairs
- 45 Projects underway
- 30 Projects under contract (10-15 yrs. contract terms)
- Guaranteed Savings: $353 Million
- Project Investment: $303 Million
- Net Savings: $ 50 Million

FIGURE 1-1

Key Provisions of Pennsylvania's
Guaranteed Energy Performance Contracting Law

Type of Provision	Description of Provision
Title of Act	Guaranteed Energy Savings Act
Applicability	• Any officer, employee, authority, board, bureau, commission, department, agency or institution of a government agency • Any Commonwealth agency • State-aided institution • County, city, district, municipal corporation, municipality, municipal authority, political subdivision, school district, educational institution, borough, incorporated town, township, poor district, county institution district, other incorporated district or other public instrumentality which has the authority to contract for the construction, reconstruction, alteration or repair of any public building or other public work or public improvement, including, but not limited to, highway work
Definitions	• Allowable costs - Equipment and project costs that the governmental unit reasonably believes will be incurred during the term of the guaranteed energy savings contract; and are documented by industry engineering standards • Energy conservation measure - Program or facility alteration designed to reduce energy consumption or operating cost (See ECM's below) • Guaranteed energy savings contract - Contract for the evaluation and recommendation of energy conservation measures and for implementation of one or more such measures • Governmental unit - See Applicability above • Industry engineering standards - Industry engineering standards may include: life cycle costing, R.S. Means-estimated method developed by the R.S. Means Company, historical data, manufacturer's data, American Standard Heating Refrigeration Air-Conditioning Engineers (ASHRAE) standards • Qualified provider - Person or business which is responsible and capable of evaluating, recommending, designing, implementing and installing energy conservation measures as determined by the governmental unit

Type of Provision	Description of Provision
Energy Conservation Measures (ECMs)	• Insulation of the building structure or systems within the building • Storm windows or doors, caulking or weather stripping, multiglazed windows or doors, heat-absorbing or heat-reflective glazed and coated window or door systems, additional glazing, reductions in glass area or other window and door system modifications that reduce energy consumption • Automated or computerized energy control systems • Heating, ventilating or air conditioning system modifications or replacements • Replacement or modification of lighting fixtures to increase the energy efficiency of the lighting system without increasing the overall illumination of a facility, unless an increase in illumination is necessary to conform to applicable State or local building codes for the lighting system after the proposed modifications are made. • Energy recovery systems. • Systems that produce steam or forms of energy such as heat as well as electricity for use within a building or complex of buildings. • Energy conservation measures that provide operating cost reductions based on life cycle cost analysis. • A training program or facility alteration that reduces energy consumption or reduces operating costs, including allowable costs, based on future reductions in labor costs or costs for contracted services. • A facility alteration which includes expenditures that are required to properly implement other energy conservation measures. • A program to reduce energy costs through rate adjustments, load shifting to reduce peak demand, and/or use of alternative energy suppliers, such as, but not limited to (i) changes to more favorable rate schedules; (ii) negotiation of lower rates, same supplier or new suppliers, where applicable; and (iii) auditing of energy service billing and meters. • The installation of energy information and control systems that monitor consumption, redirect systems to optimal energy sources and manage energy-using equipment • Indoor air quality improvements • Daylighting systems. • Renewable and/or on-site distributed power generation systems.
Procurement	Request for Proposals (competitive sealed bids)
Selection of ESCO	Must select from the three most qualified ESCOs whose proposal is determined to be most advantageous to the Commonwealth. A list of qualified ESCO's is available from the Department of General Services
Term	Up to 15 years

Type of Provision	Description of Provision
Contract Provisions	Must provide that savings in any year are guaranteed to the extent necessary to make payments under the contract Must contain a written guarantee that savings meet or exceed cost of project Can include improvements not causally connected to an ECM if: • the total value of improvement does not exceed 15% of the total of the contract and • the improvement is necessary to conform to a law, a rule or an ordinance or an analysis of the contract demonstrates that there is an economic advantage to implementing the improvement and such advantage can be documented using industry engineering standards May provide for other expenditures for a facility alteration to properly implement ECMs as long as installation is supervised by guaranteed energy savings contract supervisor Must include provision that allows termination of contract if in any fiscal year during the term of the contract if the governmental unit does not receive sufficient funds in its annual appropriations to make payments
Savings Guarantee	Must be guaranteed by performance contractor Must be contained in the contract Sufficient bond for faithful performance is required o Commonwealth agencies are to obtain bonds in accordance with section 533 o Other governmental units obtain bonds in accordance with P.L. 869, No. 385 (Public Works Contractors' Bond Law of 1967)
Financing	May use funds for operating utilities or capital expenditures* Purchase or installment payment or lease purchase * (A facility alteration which includes capital expenditures that are required to properly implement other energy conservation measures may be included as part of a guaranteed energy savings contract as long as savings cover the costs.)
Required Approvals for Commonwealth Executive Agencies	Approval by Department of General Services Review by Bureau of Facilities Management and Bureau of Minority and Woman Business Opportunities Review of EOI and selection of three ESCOs to receive RFP by executive panel (comprised of department deputy secretaries) Approval of ESCO selection by Deputy Secretary for Property Management Review and approval by Agency Comptroller for fiscal responsibility

ESCO Standard Services

ESCOs provide comprehensive technical services as a part of a guaranteed energy savings project. In addition to analyzing facility energy use and designing comprehensive projects, they provide ongoing equipment maintenance, project monitoring and savings measurement and verification services that ensure persistent and reliable project performance. In essence, the ESCO becomes a partner with the agency to improve, efficiently manage and maintain a facility's energy consumption throughout the term of the contract.

ESCOs design projects to use state-of-the-art technologies. They also provide extensive training for facility operations personnel and provide or arrange for project financing. The cost of these services will be repaid over the contract term from the energy cost savings. In the event that the actual savings fall short of the guarantee, the ESCO is contractually liable to reimburse the agency for the shortfall.

Standard services offered by ESCOs under an energy performance contract include:

- An investment-grade technical energy audit that analyzes current building conditions, establishes base-year energy consumption, recommends energy conservation measures (ECMs) and calculates associated energy cost savings
- A sound technical project, which includes capital equipment and ongoing energy services
- Project engineering and design
- Tax-exempt project financing guidance and options
- Construction bonding to comply with statutory and agency requirements
- Equipment acquisition
- Complete project installation and construction management
- Guaranteed savings for the life of the contract
- Project commissioning
- Savings measurement and verification
- Project monitoring services
- On-going equipment service and maintenance (if needed)
- Extensive training for building operators and facility personnel

Project Site Selection

There are a number of technical factors to consider when selecting a suitable project site for a GESA. In general, the facility should have high annual energy use, coupled with sufficient energy saving opportunities to generate the necessary cash flow to amortize all project costs over the contract term and attract ESCOs' interest. Some ESCOs are willing to implement projects for smaller facilities, but generally make those decisions on a case-by-case basis.

Good candidate facilities for GESAs will possess most of the following characteristics:

- Excessive annual utility costs with clear savings opportunities
- In general, at least $50,000 in annual utility and operational savings[2]
- Stable facility use and occupancy
- Consistent energy-use patterns over several years
- Access to several years of utility records
- A structurally-sound facility with no extensive building renovations planned, nor recently completed

Often, it makes economic sense to combine several facilities into a single project offering. Multiple building projects with excessive energy costs are usually very attractive to ESCOs and allow the agency to finance and obtain a greater number of energy improvements through a single procurement.

A simple rule of thumb to consider when selecting candidate project sites:

> *The larger the annual energy costs and potential for savings, the greater the opportunity for both parties to benefit from energy performance contracting.*

[2] ESCOs may consider smaller projects on a case-by-case basis.

Features of Energy Savings Guarantees

Since expected energy cost savings must pay for all project costs over the term of the contract, ESCOs have a strong financial incentive to design optimal-performing projects. In addition, payment of ongoing ESCO service fees (e.g., maintenance services, project monitoring, savings measurement and verification, etc.) must also be paid from the facility savings. Therefore, if savings are not achieved, the ESCO does not get paid.

At a minimum, any savings guarantee should meet the annual debt service payments (e.g., tax-exempt lease, bonds, bank loan, etc.) and any ongoing ESCO service fees for project monitoring. Typically, these savings guarantees are structured to be 85-90 percent or more of the predicted savings.

Savings guarantees are generally expressed in both dollars and fuel units. The dollar value attributed to fuel units should be the prevailing utility rate for that particular fuel at the time of contract execution. It is standard practice for ESCOs to establish the prevailing unit utility rate as a "floor rate" from which the dollar value of savings will not fall. This "floor rate" protects the ESCO from future projected savings devaluation should utility rates drop during the contract term. This structure assumes that if utility rates fall, the facility will immediately benefit from an overall reduction in utility costs. It is important for the agency to establish reasonable utility escalation rates for each year of the contract to more accurately value future savings.

However the savings guarantee is structured, it is critical that both parties agree to and thoroughly understand the terms of the guarantee and how it will be applied throughout the contract term.

Benefits of Energy Performance Contracts

In addition to the savings guarantee, there are a number of other benefits for public agencies to use GESAs to implement capital energy projects:

- Preserves limited budget dollars for other agency services, programs and activities
- Allows agencies to implement comprehensive capital energy projects and avoid a "piecemeal" approach to bidding on and managing separate project components (see Figure 1-2 for a comparison of conventional bid and spec vs. EPC procurement)
- Finances capital energy improvements from utility savings
- Reduces frequency of repairs and maintenance costs for inadequate, aging or obsolete equipment
- Provides operating personnel with technical training
- Decreases indoor air quality (IAQ) problems
- Creates a more comfortable work environment and increases employee productivity
- Improves facility personnel's awareness of effective and efficient building operations
- Enhances the local economy with the ESCOs' use of local subcontractors
- Creates an incentive for ESCOs to develop efficient projects since compensation is linked to project savings
- Improves the environment and conserves scarce energy resources

FIGURE 1-2

Comparison of Conventional Bid and Specification
vs. GESA Procurement

Conventional Bid & Spec Procurement	Guaranteed Energy Savings: Competitive Negotiations for Professional Services
• Requires several years to secure sufficient funds to implement comprehensive energy projects	• All funds needed for a comprehensive energy project are readily available
• Piecemeal approach to bidding and managing separate project components results in high staff costs	• Lower staff costs and quicker completion of a comprehensive project
• Multiple contracts with multiple vendors can result in conflicting project requirements	• Single contract with single point accountability for project performance
• No guaranteed energy savings	• ESCO guaranteed long-term energy savings
• Comfort and operating standards usually are not offered by equipment vendors	• Energy performance contracts typically contain explicit comfort and operating standards
• Incremental project implementation misses savings design opportunities	• Comprehensive project implementation maximizes savings design opportunities
• Energy projects must compete for limited budget resources with other improvement projects	• Energy projects are funded with utility bill savings
• No direct incentive for building staff to reduce energy costs	• ESCO payments are tied to achieving energy cost savings over the contract term
• Limited staff expertise and resources may put project performance at risk	• ESCO provides ongoing technical expertise to insure project performance
• Under-funded operations and maintenance typically result in wasted energy	• GESA projects generate energy cost savings to finance the operation and maintenance required to sustain long-term project performance

Project Financing

In general, it is more economical for public agencies to secure their own project financing and to require the ESCO to provide the financial guarantee that covers the annual debt service from the project energy cost savings. The tax-exempt status granted to a public agency enables it to access lower-cost financing than that typically available to an ESCO. Tax-exempt lease financing generally offers more favorable financing terms that can expand the potential scope of work and reduce the overall cost of the project. It is important to understand that the utility savings streams generated by these projects create the available funds to repay project financings. Therefore it is important that utility budgets be preserved at baseline levels for the duration of the contract.

Project Financing Considerations

There are a number of factors to consider when assessing financing options for guaranteed energy savings projects:

- Size of project investment
- Length of financing term
- Source of funds (e.g., bonds, tax-exempt lease, commercial lease, ESCO corporate funds or line of credit, etc.)
- Interest rate
- Flexibility of escrow account structure
- Flexibility of financing instrument to fund project "soft costs" (e.g., design, engineering, construction management, etc.)
- Creditworthiness of the agency and ESCO
- Length of construction period
- Construction financing options/interest rate
- Equipment ownership
- Buy-out schedule
- Required security interest/project collateral
- Project bonding requirements
- Risk premium charges for ESCO financing (if applicable)
- Preferred project repayment schedule (e.g., monthly, quarterly, annually)
- Ability to time the debt repayment schedule to coincide with the guarantee period

Available Sources of Project Financing

One of the primary benefits of a guaranteed energy savings project is the ESCOs' savings guarantee. This guarantee makes the ESCO financially liable for any project performance savings shortfall. If the guaranteed level of savings does not materialize, the ESCO is contractually bound to reimburse the agency for the difference between the actual savings and the guaranteed savings. This feature reduces the agency's financial risk.

There are a variety of sources available to public agencies for financing GESA projects. Since public agencies are tax-exempt, it makes economic sense to use some method of tax-exempt financing. Most ESCOs offer to assist with project financing arrangements since many ESCOs have established relationships with financial institutions willing to provide financing. While the repayment obligation resides with the agency, the ESCO should provide a guarantee that the agency's annual financial obligation will be met during the contract duration, regardless of the financing method chosen.

The primary sources of project financing available to public agencies include:

General Obligation (G.O.) Bonds

These are typically the least expensive source of funds available for agencies with the authority to issue general obligation bonds. The bonds are attractive to the financial market because they are backed by the full-faith and credit of the issuer. This means that the issuer pledges its authority to tax, raise, and collect sufficient funds to satisfy the bond obligations. There have been a number of instances where energy projects have been financed as a part of a larger G.O. bond issue that included other capital projects. In those cases, the project costs were paid outright and the energy performance contract was structured to provide a guarantee that corresponds to the bond retirement schedule agreed to by both parties.

While general obligation bonds offer the lowest interest rates, there are statutory debt restrictions that limit their availability. Approval to issue the bonds must be obtained by the state legislature or by public referendum. This can impose project implementation delays. Also, the financing of capital energy projects must compete with the financing of other essential government services and capital project needs.

Revenue Bonds

Revenue bonds are another option for energy project financing. They carry attractive interest rates, although the rates are slightly higher than G.O. bonds. Also, revenue bonds are not backed by the full faith and credit of the issuing agency and are, therefore, considered a method of "off-budget" financing. In addition, revenue bonds require the identification and availability of a dedicated revenue source to retire the bond debt. While guaranteed savings would appear to fulfill that requirement, energy savings are not considered actual revenue by the financial markets. Appropriated payments dedicated specifically to revenue bond retirement would have to be secured to fulfill the revenue obligation. Approval by the state legislature or public referendum often is required prior to issuing revenue bonds; however, there is rarely a statutory limitation on the use of such bonds for public use. Similar to G.O. bonds, the performance contract would guarantee the retirement of the revenue bonds on a schedule agreed to by both parties.

Tax-exempt Lease Purchase

The use of tax-exempt lease financing is the most common method used by public agencies to finance guaranteed energy savings projects. The interest rates associated with tax-exempt lease financing are significantly lower than commercial lease-purchase interest rates because the interest payments are considered to be tax-exempt income to the investor. A tax-exempt lease typically does not require public approval or constitute a long-term debt obligation for the agency. This type of financing also allows the agency to retain the equipment title with an equipment security interest held by the investors. The ESCO industry and financial institutions typically accept lease payments subject to annual appropriations with a standard non-appropriations provision included in the lease agreement. The ready access to tax-exempt lease financing makes this method the most attractive and commonly used method of financing guaranteed energy savings projects by public agencies. It is important to note that executive agencies of the Commonwealth are required to use the *Installment Purchase Agreement and Payment Schedule*, which is located in Appendix F-1.

Bank Financing

A conventional installment-payment loan obtained from a local bank or financial institution also can be used to finance a guaranteed energy savings project. Depending upon the agency's relationship with the bank, interest rates and contract terms could be negotiated to make this an attractive and economical means of project financing. Under an installment payment loan, the bank retains title to the equipment for the loan term. At the conclusion of the loan term, the title is turned over to the agency subject to the agreed-upon terms. This type of financing is considered a long-term debt obligation and is credited against the agency's outstanding debt limitation.

ESCO Financing (Commercial Leases, Internal Corporate Funds or Credit Lines)

ESCO financing is generally the most expensive financing available for guaranteed energy savings projects - particularly for tax-exempt public agencies. Since ESCOs do not have direct access to tax-exempt financing sources, they must use commercial sources or their own internal funds or credit lines. Commercial credit lines carry higher interest rates. Also, using an ESCO’s internal corporate fund is subject to required rates of return for corporate shareholders. Additional financial risk premiums may be charged to the project in exchange for the ESCO bearing all the financial risks associated with project repayment. The high cost of ESCO financing can impose limitations on the technical scope of the project and may place restrictive conditions on the terms of the GESA.

PART 2: PROCUREMENT PROCESS

Overview

The Pennsylvania Department of General Services (DGS) has established a pool of qualified ESCOs based on the results of an Application for Qualification (AFQ) process that was first conducted in 2000, and more recently in 2006. Currently, there are 17 qualified firms in the DGS pool and it is DGS' policy to conduct the AFQ process every three years. For the purposes of this manual, all of the procurement and contracting documents contained in the appendices have been developed by DGS to reflect the specific policies and requirements for executive agencies of the Commonwealth. These documents may be used as templates and customized for use by local government agencies and school districts.

Pennsylvania's public agencies are required to use a *Request for Proposal* (RFP) when procuring energy performance contracts. An RFP is used to solicit and invite written submissions of proposals from ESCOs that are capable of implementing GESA projects. (The sample RFP developed by DGS to be used by executive agencies of the Commonwealth is included in Appendix B-1.) The following is a general description of the competitive procurement process to be used by public agencies as required by Pennsylvania's GESA statute.

- Agency Issues RFP: Agencies will need to comply with local procurement policies with regard to advertising requirements. Agencies may directly notify the ESCOs from the DGS pre-qualified pool. A list of the ESCOs with contact information can be found on the DGS website at: http://www.portal.state.pa.us/portal/server.pt?open=512&objID=1300&&PageID=269159&level=4&css=L4&mode=2 (cut and paste this link into your browser to access the DGS website). Agencies may also obtain a list of ESCOs from the National Association of Energy Service Companies (NAESCO) website at: www.naesco.org

- Agency Receives ESCOs' Written Proposals: The ESCOs' written responses to the RFP is the first step in this process. The ESCOs' written proposals should include information on their corporate background and technical qualifications, past projects, client references and their proposed approaches to the agency's project. This information will be used to investigate, evaluate, score and rank the ESCOs' proposals. Client references are checked concurrently with the review and ranking of RFP responses. The combined written proposal and client reference scores may be used to shortlist the highest-ranking firms that will be invited to participate in the oral interviews. Executive agencies of the Commonwealth also score ESCOs' commitments to minority and women-owned businesses.

- Agency Conducts Oral Interviews of Shortlisted ESCOs: Oral interviews provide a valuable means of obtaining additional information from the shortlisted ESCOs. These interviews allow the agency to review each ESCO's project approach and give the ESCOs an opportunity to more fully respond to direct questions from the evaluation team.

- ESCO Selection: Final selection is the last step in the procurement process. Selection of the best-qualified ESCO should be based on the cumulative scores of the written proposals, client references, oral interviews and consensus of the evaluation team. The highest ranked ESCO is then recommended for selection.

> *…the RFP must clearly state that achieved energy cost savings must pay for all project costs for the duration of the contract.*

After receiving the necessary administrative approvals for project commencement, the investment grade technical energy audit agreement, which authorizes the ESCO to conduct a complete technical and economic analysis of the project site(s), is executed. This investment-grade energy audit results in a report which details the ESCO's final list of energy improvements

for installation, a complete description of services it will provide, complete contract terms and conditions, a project timetable and all energy cost savings projections associated with the project.

It is important for the agency to rigorously review and verify the results of the energy audit conducted by the ESCO. Whether technical consultants or in-house technical personnel verify the audit results, all components of the proposed and final technical scopes of the project should be thoroughly reviewed prior to the execution of the Guaranteed Energy Services Agreement (GESA). The Information gathered during the audit process is the basis for the negotiation of the final scope of work and ESCO services, and for final contractual terms and conditions. It should be clearly understood that the agency is responsible for the cost of the energy audit if they are unable or choose not to proceed with the final EPC contract. If the agency decides to proceed with the project, the cost of the audit will be rolled into the project financing and amortized over the project term. Each ESCO's cost for conducting the audit should be disclosed in its written response to the RFP.

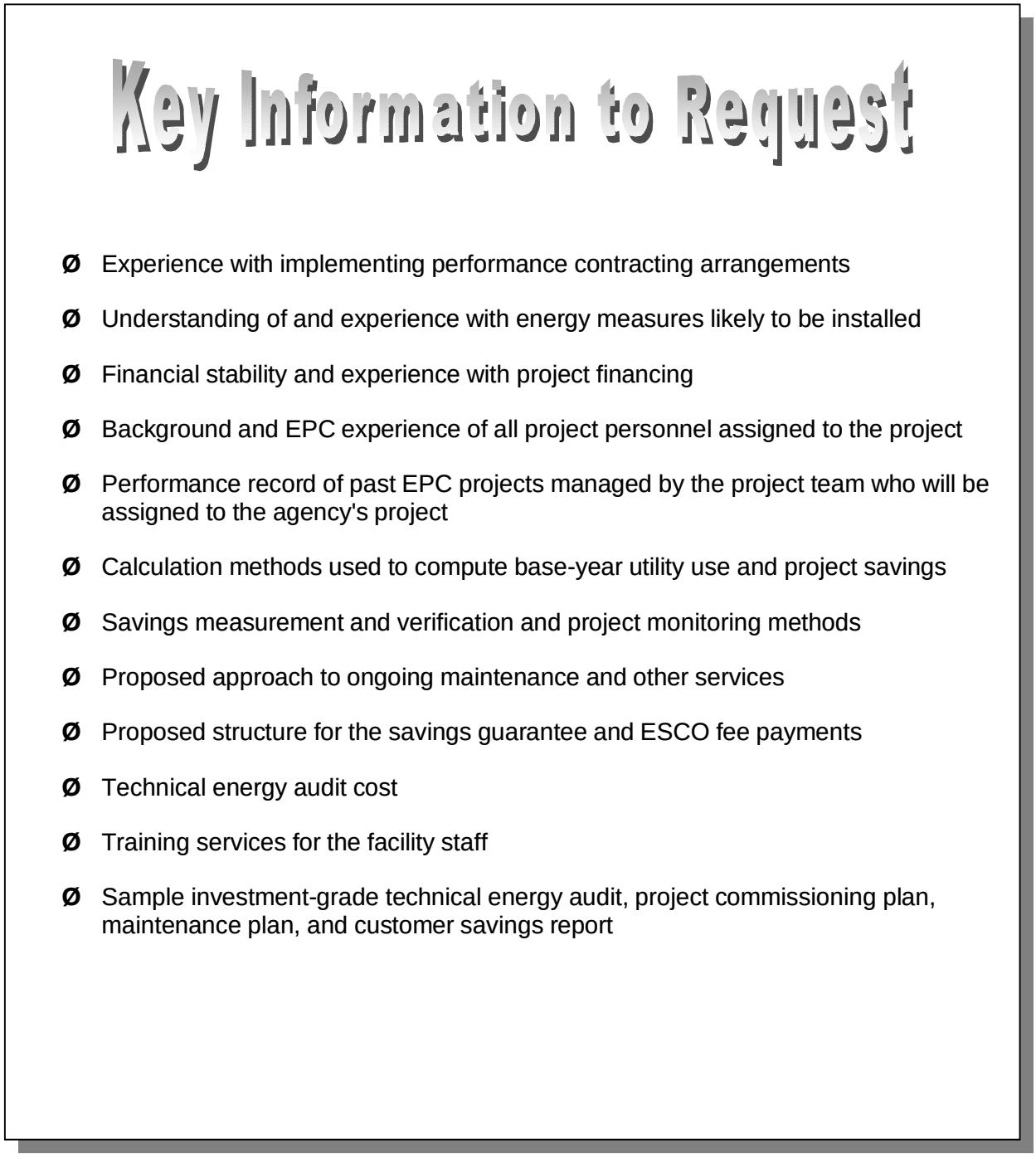
For executive agencies of the Commonwealth, DGS has developed specific policies and procedures for guaranteed energy savings projects which are contained in Part IV, Chapters 11 and 12 of DGS' Procurement Handbook and located in Appendices A-2 and A-3, respectively.

Preparing the Request for Proposals (RFP)

The RFP should clearly define the scope of services desired, delineate the steps in the procurement process including the projected project schedule, establish the evaluation criteria, detail the key contract terms and conditions and specify the corporate and technical and cost information to be submitted by the ESCOs in their responses. In addition, the RFP should clearly state that achieved energy cost savings must be sufficient to cover all project costs for the duration of the contract term. This requirement establishes the economic bottom-line and financial performance requirements of the guaranteed energy savings project.

The type of information that should be requested from ESCOs in response to the RFP can be found in Figure 2-1 on the following page.

FIGURE 2-1



The RFP needs to have sufficient technical and economic (utility consumption and costs) information about the project to attract ESCOs' interest in implementing a project in the issuing agency's facility(ies). The primary purpose of the RFP is to give form and substance to the project and to create the ground rules by which competing ESCOs will have to comply.

As mentioned previously, the *Request for Proposals* (RFP) document developed by DGS is located in Appendix B-1 and contains the essential components common to guaranteed energy savings projects in Pennsylvania. This RFP is designed to be flexible and can be easily customized to accommodate specific project needs and agency requirements. Project-specific procedures and information on site visits, project schedule, evaluation criteria and any special contractual terms and conditions need to be included in the final RFP.

Site Visits

Most ESCOs will want to tour the facility(s) and interview facility staff prior to submitting any written responses. These site visits should be scheduled after the RFP is issued but before responses are due. The facility(ies) should be available for individually-scheduled tours during a specified period of time. It is recommended that each responding ESCO be scheduled to tour the site(s) separately.

Project Schedule

A project schedule should be developed that identifies specific procurement dates and activities. Figure 2-2 is a representative sample project schedule that is contained in the *Request for Proposal* (Appendix B-1). The project schedule helps ESCOs understand the procurement schedule of the facility(ies) and serves as a guideline for keeping the project on-track.

FIGURE 2-2

Sample Project Schedule

Activity	Timeframe
Issue RFP	Weeks 1
Site Visit	Weeks 2-6
RFP Responses Due	Week 7
Written Proposals/Client References Reviewed/Evaluated	Weeks 7-10
Oral Interviews/Presentations	Week 12
Anticipated Agency Approval Date	Week 14
Investment Grade Technical Energy Audit Agreement Executed	Week 19
ESCO Conducts Energy Audit	Weeks 20-28
Audit Report Submitted	Week 30
Contract Negotiations Finalized	Weeks 30-32
Anticipated Date for Contract Approval and Execution	Week 33

Evaluation Criteria

It is important to specify the evaluation criteria to be used for ranking competing ESCOs. The DGS RFP located in Appendix B-1, contains a detailed list of recommended evaluation criteria. These criteria are grouped into the following four major categories:

1) Experience
2) Approach to Project Management
3) Technical Capabilities & Expertise
4) Financial Strength

These categories are useful in aggregating evaluation data for the presentation of evaluation rankings.

Project Terms and Conditions

The Project Terms and Conditions, contained in Attachment C of the *Sample RFP*, describe the minimum terms and conditions that will be accepted by the agency for the guaranteed energy savings project and cover the key technical and contractual elements that should be included in the GESA. These terms and conditions can be easily customized to incorporate all the project-specific technical and legal requirements and any agency policies with which the ESCO will have to comply.

Technical Facility Profile

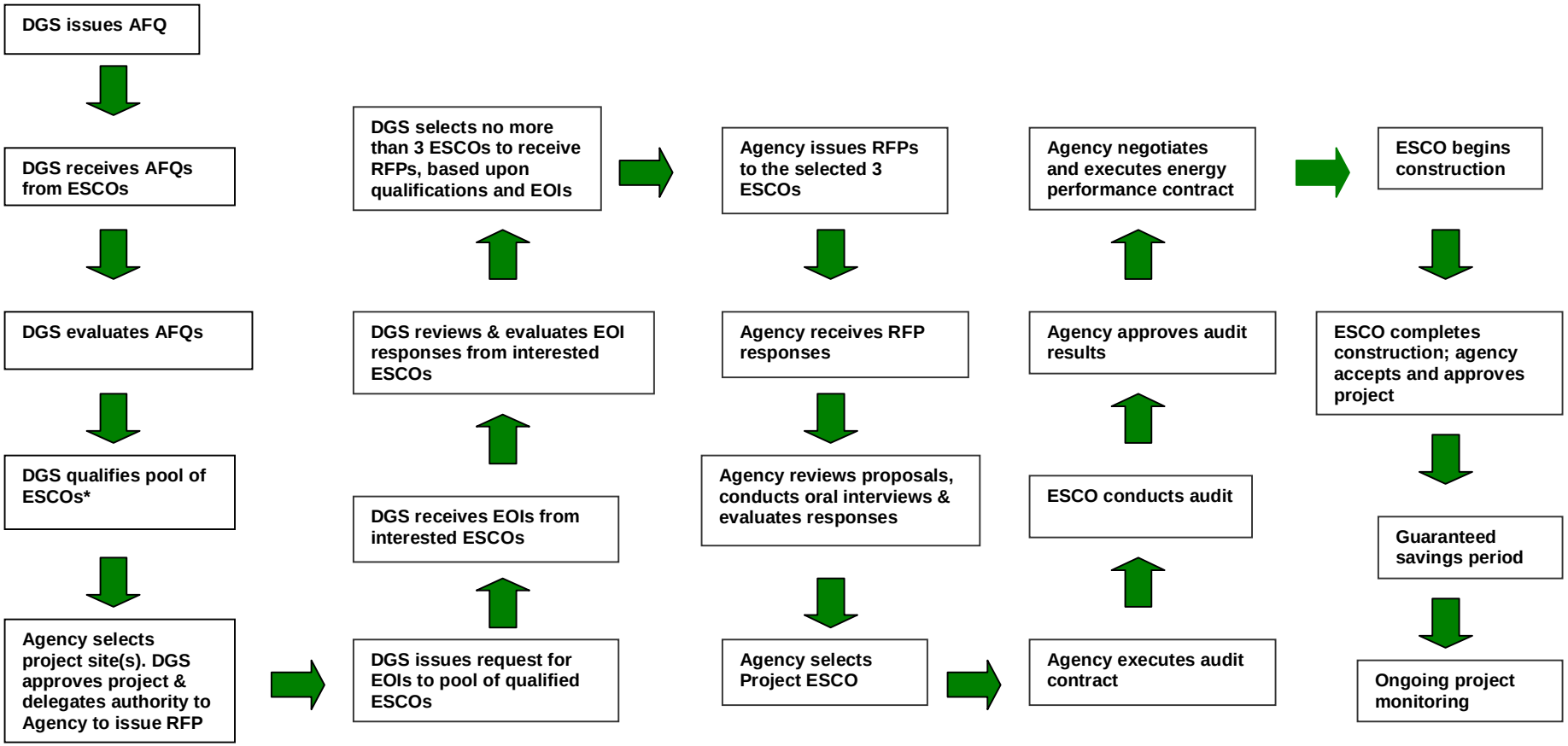
A technical description of the project facility(ies) needs to be prepared to accompany the RFP when it is issued. ESCOs will need enough technical details about the facility to adequately assess the opportunity to develop and implement a successful project. At a minimum, a brief description of the premises and all major energy-using equipment should be provided. Several years of past utility consumption data, preferably by fuel unit and cost, also should be included. Instructions for preparing this technical facility profile are located in Appendix B-2.

Figures 2-3, 2-4 and 2-5, on the following pages, outline the procedural steps for developing and implementing GESA projects for executive agencies of the Commonwealth (both large and small GESA projects) and other public agencies, such as school districts and local governments.

TERMS
DGS – Department of General Services
AFQ – Application for Qualifications
ESCO – Energy Service Company
EOI – Expression of Interest
RFP – Request for Proposals

FIGURE 2-3

COMMONWEALTH OF PENNSYLVANIA
LARGE GUARANTEED ENERGY SAVINGS PROJECTS
(Annual Utilities > $300,000)
ENERGY PERFORMANCE CONTRACTING
PROJECT PROCUREMENT AND IMPLEMENTATION FOR EXECUTIVE AGENCIES
(AFQ PROCESS TO MONITORING)

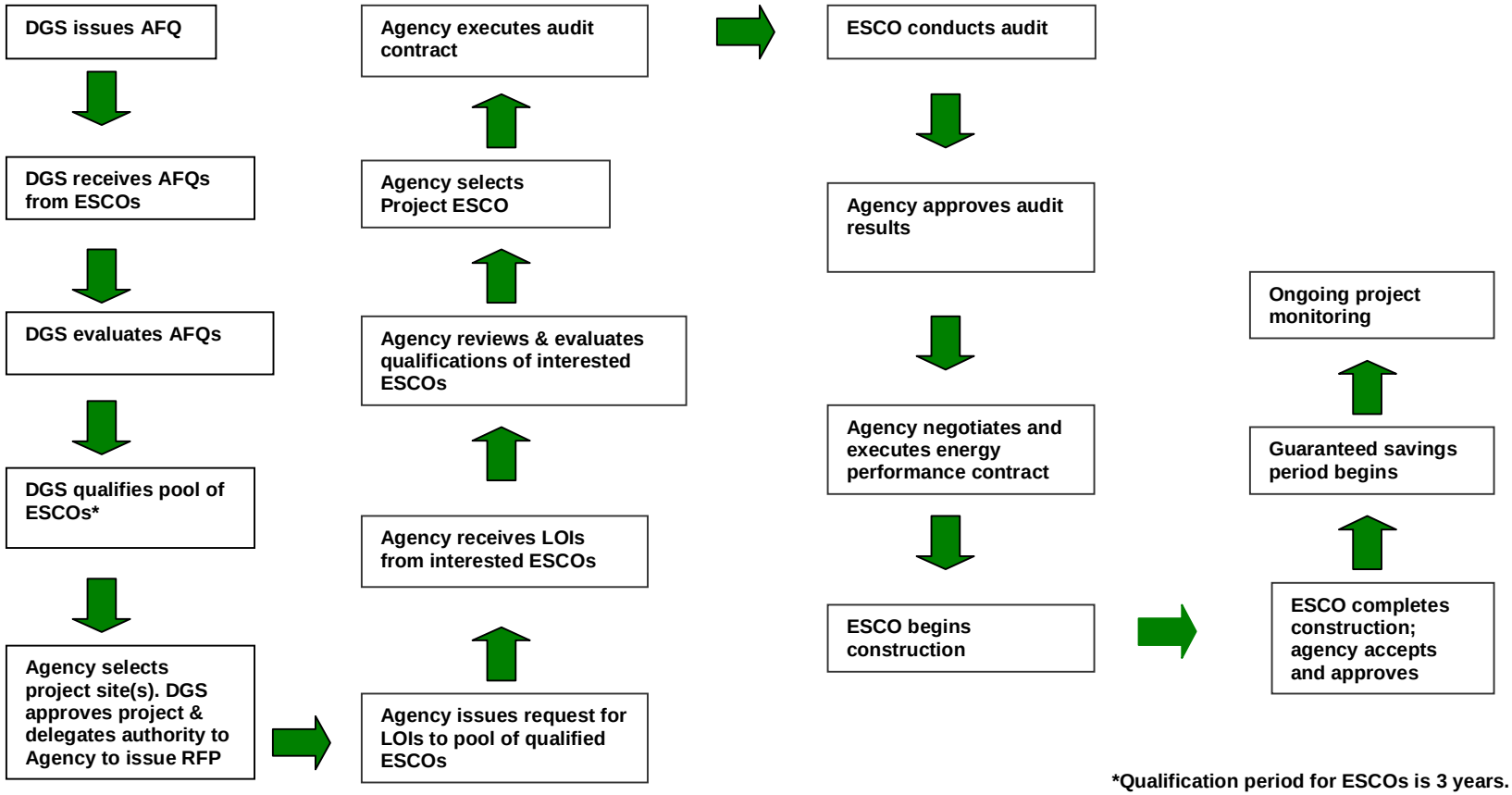


***Qualification period for ESCOs is 3 years.**

TERMS
DGS – Department of General Services
AFQ – Application for Qualifications
ESCO – Energy Service Company
LOI – Letter of Interest
RFP – Request for Proposals

FIGURE 2-4

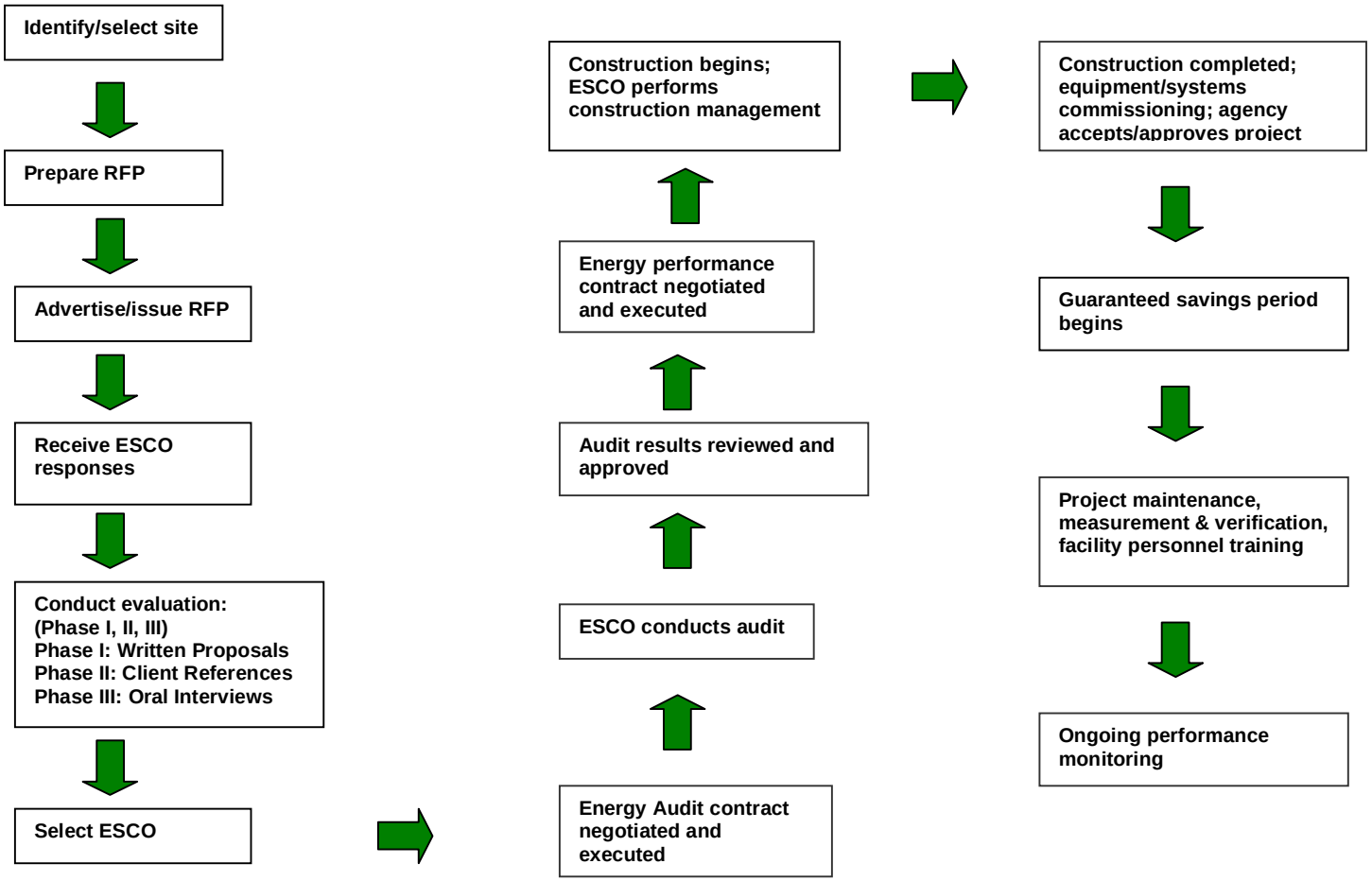
COMMONWEALTH OF PENNSYLVANIA
SMALL GUARANTEED ENERGY SAVINGS PROJECTS
(Annual Utilities < $300,000)
ENERGY PERFORMANCE CONTRACTING
PROJECT PROCUREMENT AND IMPLEMENTATION
(AFQ PROCESS TO MONITORING)



***Qualification period for ESCOs is 3 years.**

FIGURE 2-5

COMMONWEALTH OF PENNSYLVANIA
GUARANTEED ENERGY SAVINGS PERFORMANCE CONTRACTING
PROJECT IMPLEMENTATION FOR SCHOOL DISTRICTS AND LOCAL GOVERNMENTS



PART 3: EVALUATION PROCESS

Evaluation Team Identification

It is important to identify members of the evaluation team early in the procurement process in order to receive their input during the development of the RFP scope and to keep them informed of the project's progress. The evaluation team members also need to be made aware of the evaluation timetable so that they can schedule sufficient time to review written submissions, check client references and participate in oral interviews. An evaluation team can involve any number of agency personnel, including, but not limited to:

- Facility/Operating Engineers
- Maintenance Staff
- Purchasing Agent
- Energy Manager/Designated Project Manager
- Administrative/Financial Manager
- Legal Counsel
- Technical Advisors/Consultants

However the team is assembled, it is important to include individuals involved with daily facility operations during the entire procurement and evaluation process. It is also recommended that a liaison to staff (i.e., faculty member, building manager, medical staff, etc.) be included to keep other staff members apprised of the project status.

The role of this evaluation team will be to review and evaluate the submissions of competing ESCOs in order to select the most qualified company to implement the guaranteed energy savings project. It is likely that evaluation team members will have varying degrees of expertise and interests with regard to the project. Selecting diverse team members with technical, financial and management expertise allows them to share evaluation tasks (e.g., client reference checking, reviews of sample energy audits and financial statements, etc.), as

well as offers them the opportunity to address a wider variety of concerns and issues. It is recommended that specific evaluation criteria be assigned to individuals with matching expertise and that a minimum of two evaluators rank each criterion. Figure 3-6, *Tips for a Successful Evaluation*, is located on page 36.

Evaluation Project Schedule

The evaluation of ESCOs written submissions, client references, and oral interviews is typically conducted over a period of six to eight weeks. The process can take up to three months, which includes obtaining all the necessary agency approval for the selection of the best and most qualified ESCO. The length of time needed depends on the following:

- The technical complexity of the project
- The number of ESCO responses received
- The agency's required approval processes

It is very important to include a project schedule in the RFP that outlines the anticipated amount of time to be spent on each phase of the evaluation process. When establishing the evaluation schedule, consideration should be given to the time required for compiling evaluation data and generating ESCO rankings. (See Figure 3-7, *Sample Evaluation Schedule*.)

The evaluation methodology described in this manual is a three-phase process and includes:

- Phase 1 - Review of Written Submissions
- Phase 2 - Client Reference Checks
- Phase 3 - Oral Interviews

This evaluation methodology recommends using the combined scores from Phases 1 and 2 to shortlist the highest ranked ESCOs to participate in oral interviews.

Sample evaluation ranking forms for each phase of the evaluation process can be found in Appendix C-1. Each evaluation ranking form contains specific evaluation criteria and a range of point values from zero (0) to five (5), with zero having the lowest value and five the highest.

It is recommended that the evaluation criteria be weighted to reflect its relative importance to the overall project goals. For example, the most important criteria could be weighted using a factor of three (e.g., a five-point score would be valued at 15 points, a four-point score valued at 12 points, etc.). Less important criteria would be weighted by a factor of two (e.g., a five-point score would be valued at 10).

For all three phases of the evaluation process, the evaluation criteria has been aggregated and organized into the following four categories:

- Past Experience
- Project Management Approach
- Technical Capabilities & Expertise
- Financial Strength

These categories are useful for comparing the rankings of ESCOs in each category and in the presentation of evaluation data.

One important design feature of the evaluation methodology -- if specific criteria are not assigned to individual evaluation team members -- is the “Unable to Rank” category. The evaluator and/or client reference contact person should always choose this category if they have insufficient personal knowledge or experience to fairly rank a specific criterion. Checking "Unable to Rank" has no point value and therefore no impact (negative or positive) on the ESCO’s overall score. This has been included to avoid unfairly penalizing or rewarding an ESCO for the evaluator’s and/or client reference contact’s lack of expertise or knowledge. On the other hand, a "Not Acceptable" ranking should be given when a response provided by the ESCO is insufficient, non-responsive or of poor quality. A "Not Acceptable" ranking does have a negative impact on point scoring.

It is extremely important to instruct the evaluation team members on the difference between the "Not Acceptable" and "Unable to Rank" categories. The distinction between these two categories must be emphasized and then used consistently in all phases of the evaluation process.

Figures 3-1 through 3-5 are sample bar charts that graphically illustrate how the cumulative scores from each phase of the evaluation could be presented and the rankings visually compared.

Evaluation Procedures

Phase 1: Written Submissions

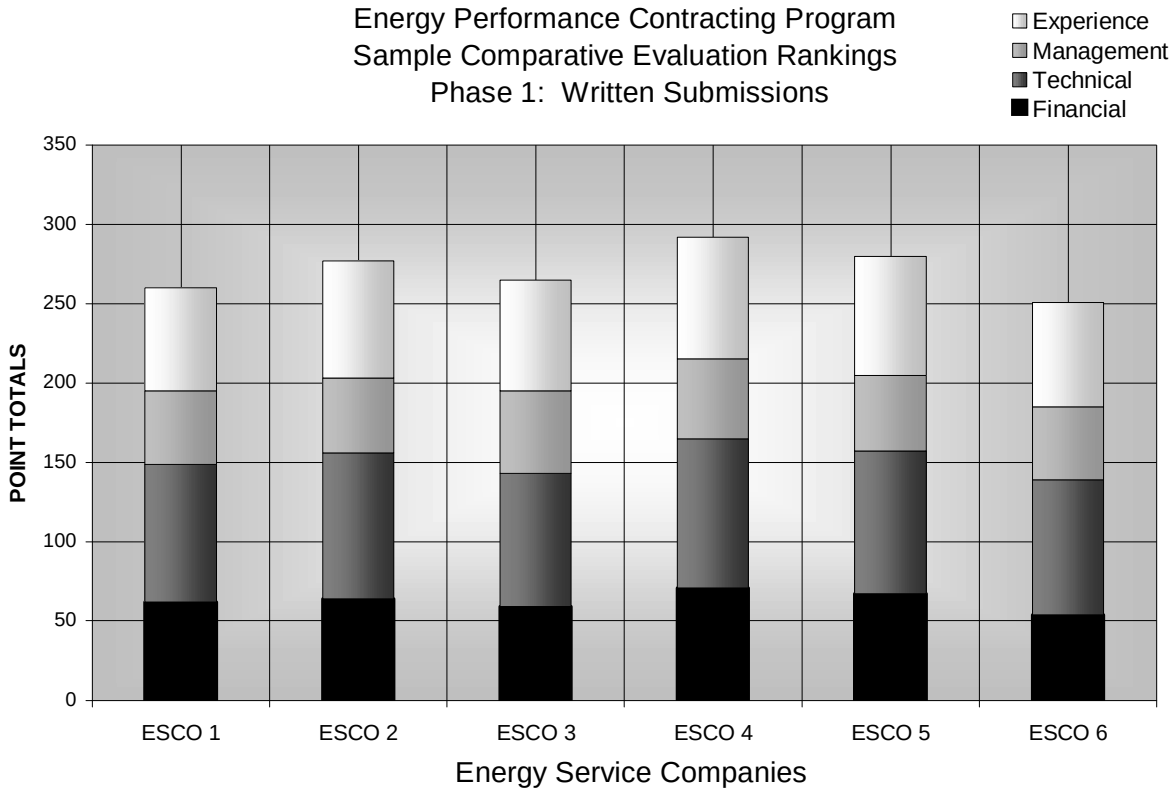
The review written responses submitted by competing ESCOs is the first phase of the evaluation. The written submissions provide the basic information for review and investigation throughout the selection process.

It is recommended that the evaluation team members read all written submissions before the team members begin their rankings. This initial reading familiarizes the evaluators with the content and how the information is presented and organized, and further gives the evaluators a sense of the variations in qualifications between competing ESCOs.

It is important to note that this is a comparative evaluation methodology. Team members will be ranking the competing field of ESCOs in comparison to each other, not to an abstract standard or ideal. A simple way to conduct these evaluations is with a side-by-side comparison of the written submissions. To assist evaluators in their comparative review, each criterion on the *Sample Form for Phase 1 Evaluation: Written Qualifications* located in Appendix C-1, may be indexed to identify where the relevant information is located.

Figure 3-1 is a sample bar chart that illustrates evaluation rankings from Phase 1 - Written Submissions from a field of six competing ESCOs.

FIGURE 3-1

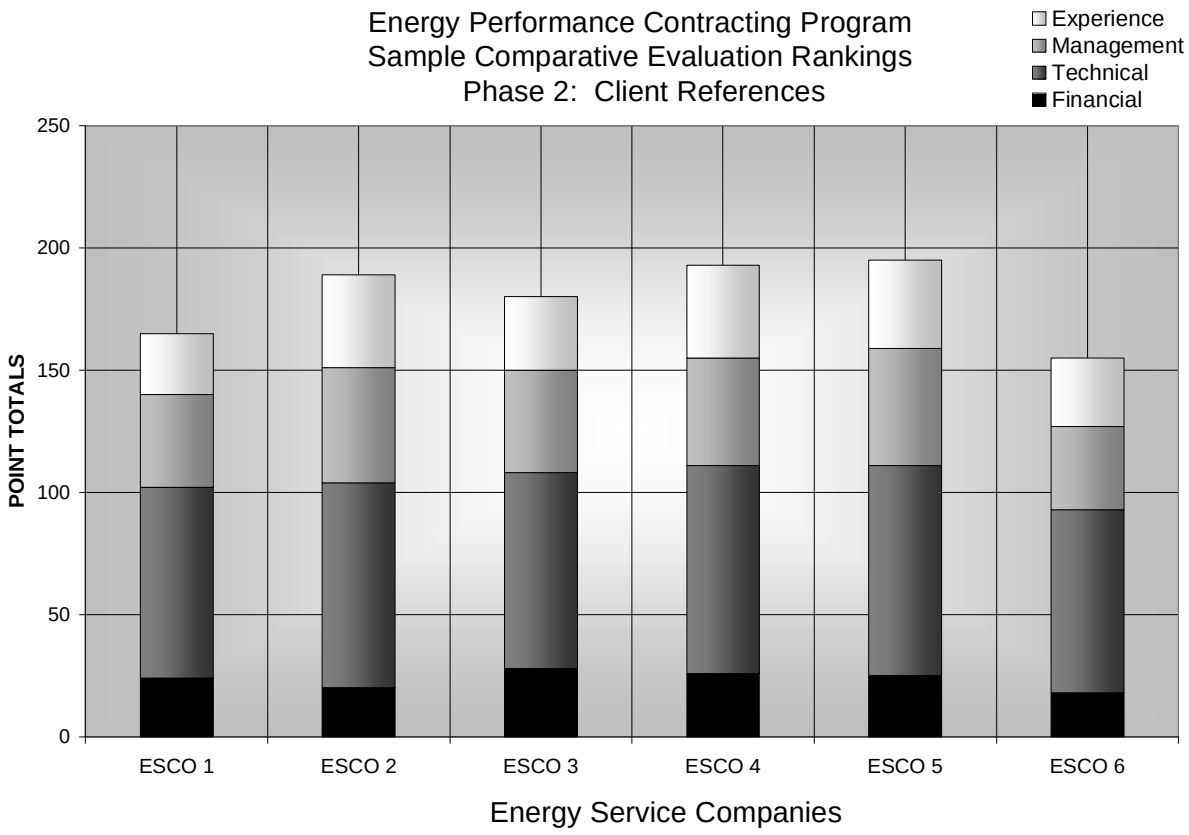

Energy Performance Contracting Program
Sample Comparative Evaluation Rankings
Phase 1: Written Submissions
Experience
Management
Technical
Financial
POINT TOTALS
350
300
250
200
150
100
50
0
ESCO 1
ESCO 2
ESCO 3
ESCO 4
ESCO 5
ESCO 6
Energy Service Companies

Phase 2: Client References

It is recommended that the evaluation of client references provided by the ESCO be conducted concurrently with the evaluation of written submissions. At least three telephone reference checks for each responding ESCO are recommended. Each phone call typically takes 10 to 15 minutes. Every reference should be asked the same set of prepared interview questions listed on the *Sample Form for Phase 2 Evaluation: Client Reference Checks* located in Appendix C-1. It is important to request that the responding reference rank the ESCO in accordance with the point values indicated on the form. This approach alleviates an evaluator's subjective interpretation of the reference's response.

Since each ESCO will provide a number of client references, the task of checking references can be distributed among the evaluation team members. This phase of the evaluation process is critical since client references provide specific information about the ESCO's past performance and their overall satisfaction with the project. Figure 3-2 illustrates the Phase 2 - Client References evaluation rankings from a field of six competing ESCOs.

FIGURE 3-2

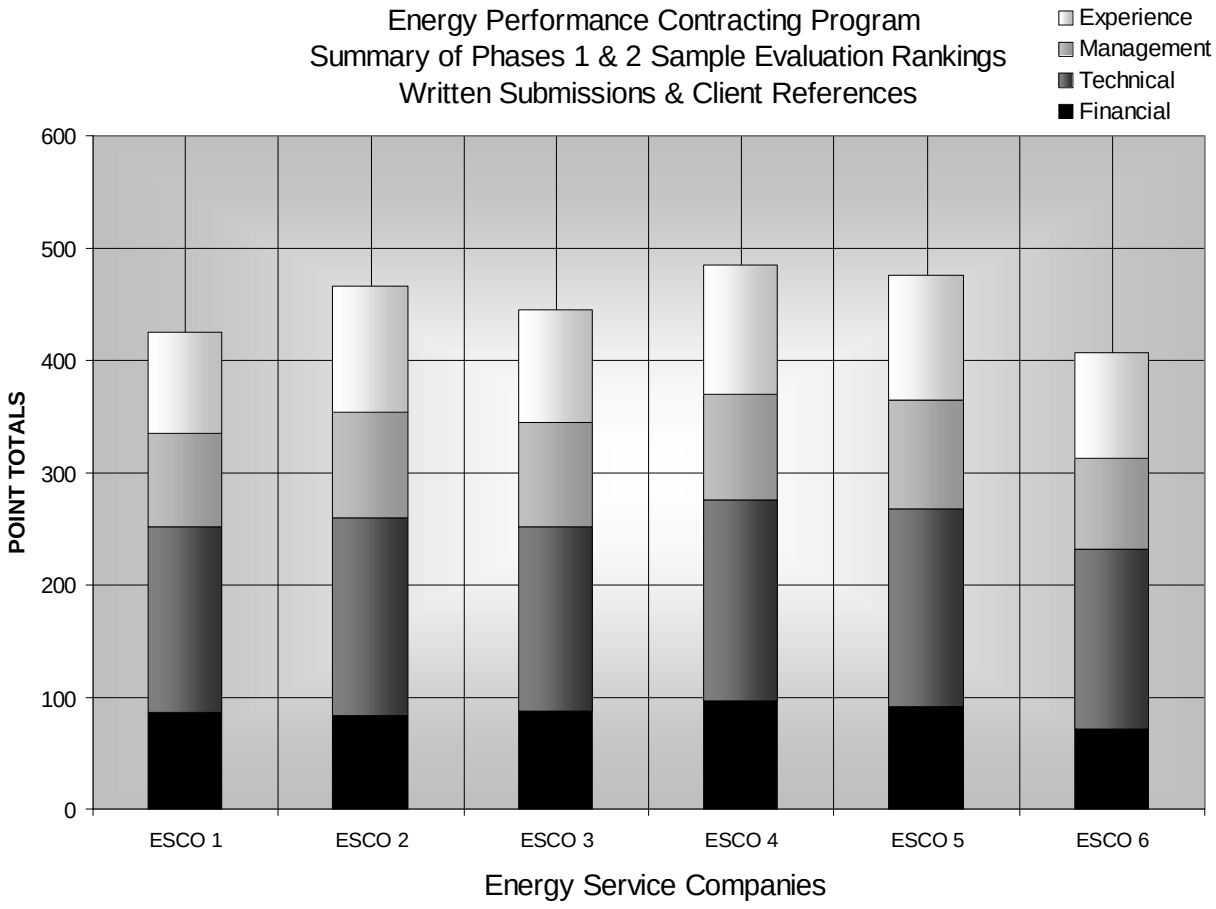


ESCO Shortlist

Once the tabulated results of Phases 1 and 2 are combined, the cumulative scores may be used to shortlist the highest ranking firms (three is recommended, if necessary). These firms then will be invited to participate in oral interviews. A *Sample Letter of Invitation to Oral Interviews* is located in Appendix C.

Figure 3-3 represents cumulative scores from Phases 1 and 2 for each of the six competing ESCOs. Based on these rankings, ESCOs 2, 4, and 5 will be shortlisted for participation in Phase 3 - Oral Interviews.

FIGURE 3-3



Phase 3: Oral Interviews

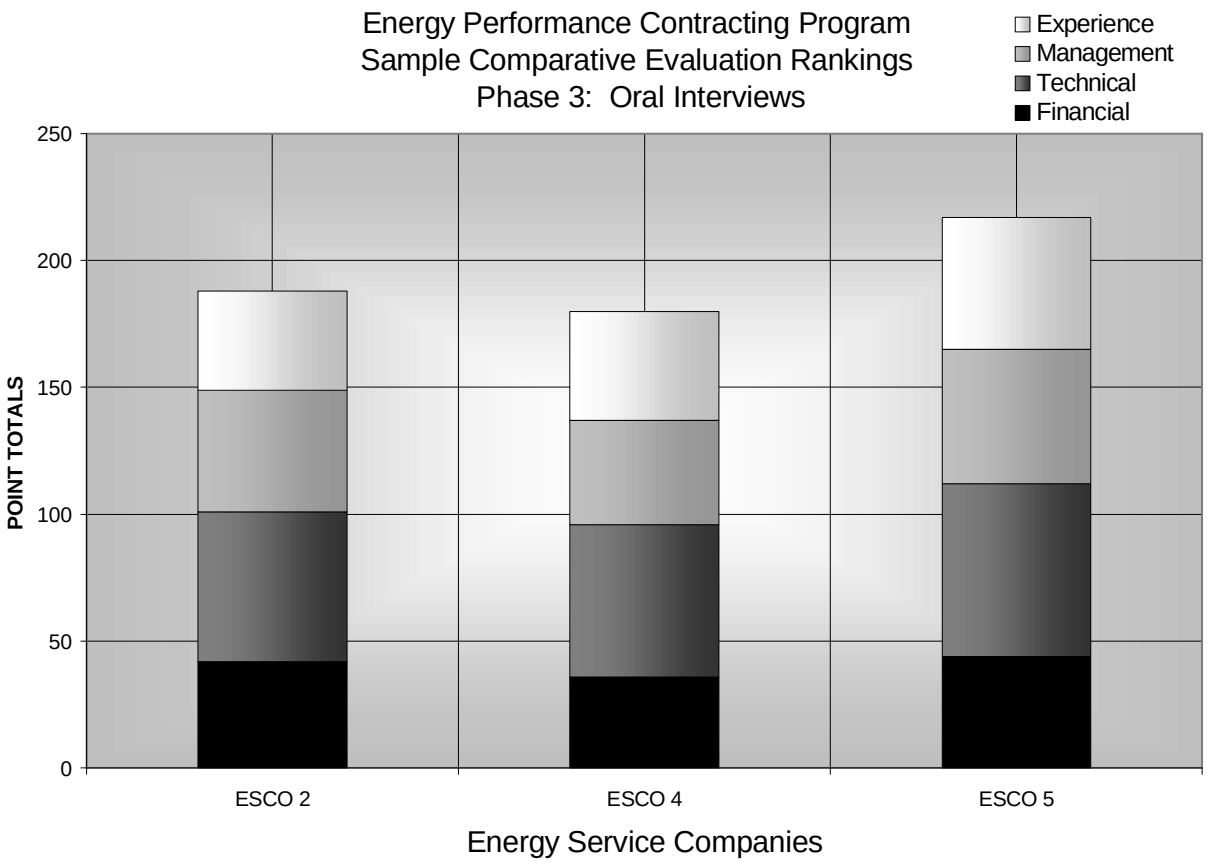
Each oral interview can range from one and a half hours to three hours in length. The interviews should be structured to allow for no more than a 20-minute formal presentation by each ESCO. The ESCOs should be told in advance of the presentation time schedule. The remaining time should be used for direct questions by the evaluation team.

It is recommended that two sets of questions be prepared in advance of the interviews. One set of questions should be asked of all ESCOs on a variety of topics. The second set of questions should be based on the specific information contained in each ESCO's submission or on other information gathered from client references. It is recommended that one team member be designated as the question facilitator. However, the format should be open enough so that all members of the evaluation team have the opportunity to ask questions as they arise.

It is suggested that each ESCO be ranked immediately following their oral interview. At the conclusion of all oral interviews, evaluators may re-rank the companies and discuss their impressions with other team members. A *Sample Form for Phase 3 Evaluation: Oral Interviews* is located in Appendix C-1.

Figure 3-4 illustrates the evaluation results of Phase 3 - Oral Interviews from the three shortlisted ESCOs.

FIGURE 3-4


Energy Performance Contracting Program
Sample Comparative Evaluation Rankings
Phase 3: Oral Interviews
Experience
Management
Technical
Financial
250
200
150
100
50
0
POINT TOTALS
ESCO 2
ESCO 4
ESCO 5
Energy Service Companies

ESCO Selection

Ranking data collected from Phase 3 should be tabulated and added to the cumulative scores from Phases 1 and 2, resulting in the final ranking for each ESCO. At this point, a final evaluation team meeting is recommended in order to gain consensus for the final ESCO selection. Figure 3-5 illustrates final rankings from Phases 1, 2, and 3 of the evaluation process.

FIGURE 3-5

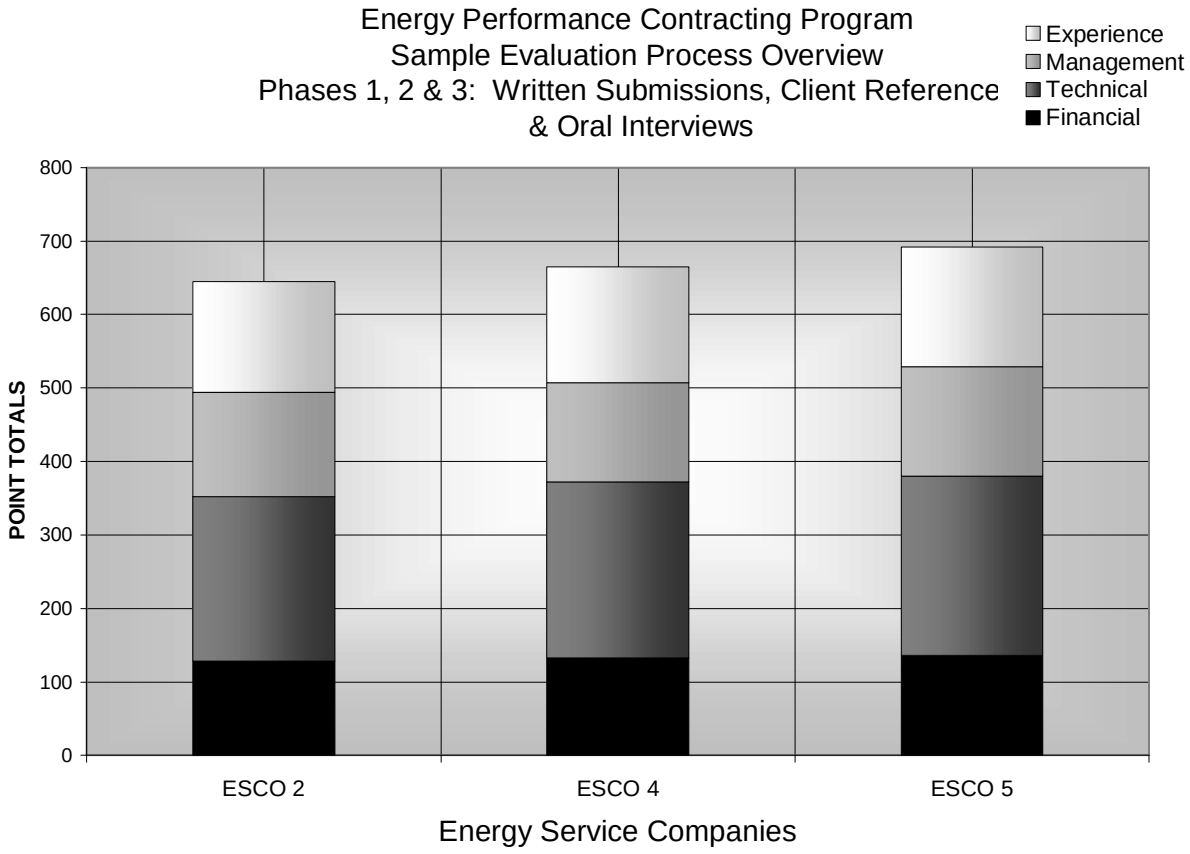


FIGURE 3-6

Tips for a Successful Evaluation

The following tips have been compiled to assist agencies in conducting a successful evaluation of ESCOs who respond to the RFP.

- Ø Assemble a diverse evaluation team who will bring a broad-base of technical, financial, and management expertise to the process
- Ø Weigh each criterion in accordance with its importance to the project (e.g., a weighted value of three for the most important criteria and a weighted value of two or one for less important criteria)
- Ø Briefly review all written submissions before ranking any submissions
- Ø Conduct a side-by-side comparison of written submissions
- Ø Check the "Unable to Rank" category if there is any uneasiness in evaluating any of the criteria
- Ø Check the "Unacceptable" category if the ESCO does not provide sufficient information or the information is of poor quality
- Ø Conduct a minimum of three client reference telephone checks for each ESCO
- Ø Ask client references to indicate a specific ranking in response to each criterion
- Ø Shortlist the highest ranking firms for participation in oral interviews, if applicable
- Ø Prepare two (2) sets of interview questions in advance of the oral interviews (general and the ESCO's proposed approach to the specific project)
- Ø Designate one evaluation team member to facilitate questioning
- Ø Limit formal ESCO presentations at the oral interviews to no more than 20 minutes
- Ø Gain consensus of the evaluation team in the final ESCO selection

FIGURE 3-7

Sample Evaluation Schedule

Activity	Timeframe
Receive Written Responses to RFP	Week 1
Evaluate Written Responses (Phase 1)	Weeks 2-4
Conduct Client Reference Checks (Phase 2)	Weeks 2-4
Tabulate Phases 1 and 2 Rankings	Week 5
Shortlist to the Highest Ranked ESCOs	Weeks 5-6
Invite Shortlisted ESCOs to Oral Interviews	Weeks 5-6
Conduct and Evaluate Oral Interviews (Phase 3)	Weeks 6-7
Tabulate Phase 3 Rankings and Add to Rankings from Phases 1 and 2	Weeks 7-8
Select Highest Ranked ESCO to Proceed with Project	Week 8

PART 4: INVESTMENT GRADE ENERGY AUDIT & ENERGY SERVICES AGREEMENT

Audit Process

After the agency has approved selection of an ESCO, negotiation of the technical energy audit agreement begins. Once signed by both parties, this agreement authorizes the ESCO to conduct an audit. Under an EPC arrangement, the negotiated cost of the audit will be rolled into the project financing and repaid from the project savings. If the agency decides not to proceed with the project after the audit is completed, the agency is obligated to pay the ESCO for the audit.

Since the audit results contain most of the information that will be incorporated into the final contract, the agency should conduct a rigorous technical review of the audit information before negotiating the final contract.

Appendix D-1 includes a *Sample Investment Grade Energy Audit Contract*.

What are Investment Grade Audits?

An investment grade audit is the technical and economic foundation of a successful guaranteed energy savings project. The audit needs to provide sufficient technical detail so that a technically competent reviewer can effectively assess the ESCO's proposed project. The audit results must also establish and define a representative annual consumption baseline for all utilities and fuel types (e.g., gas, water, electric, etc.) to allow a realistic analysis of potential energy and cost savings.

At a minimum, an investment grade audit should include:

- For each proposed measure: cost, annual cost savings, annual maintenance cost impacts, simple payback, expected life and environmental impacts.

- A full analysis and definition of base year consumption for each fuel and utility type.

- A full description of the analysis methods, calculations, data inputs, and all technical and economic assumptions.

It is important that the ESCO conduct a thorough and comprehensive technical and economic facility analysis since this analysis serves as the basis for the project design and performance. The cost of an investment grade audit generally varies between 6 and 12 cents per square foot, but costs could be higher or lower depending on the complexity of existing equipment and the effort required for collecting accurate data. There are economies of scale, however, which can reduce audit costs per square foot in large facilities. For example, using representative sampling can eliminate the need for inspecting many similar pieces of equipment.

The time required to complete an investment grade audit varies by the facility size and complexity and data availability. Typically, the time to conduct an audit ranges from two to six months.

Challenges of Investment Grade Audits

There are a number of challenges when completing a quality audit:

- Missing or inaccurate utility consumption or cost data
- Inaccurate building operation and equipment load data
- Inaccurate estimates of utility savings
- Incomplete cost estimates for implementing the proposed measures
- Undocumented estimates of operation and maintenance savings
- Inaccurate accounting for interactive effects between energy saving measures
- Inadequate analysis of all feasible energy saving measures
- Limited field measurement to verify equipment operating parameters

Overview of the Final Guaranteed Energy Savings Agreement (GESA)

The final guaranteed energy savings agreement (GESA) serves as the blueprint for how the project will operate over the contract term. The GESA should clearly define each party's roles and responsibilities and should explicitly state how the project is expected and guaranteed to perform. The relationship between the agency and the ESCO - including who will do what, when, at what cost, and under what conditions - needs careful review. Due to the long-term nature of this relationship, the contract should be specific yet flexible enough to accommodate both current and future facility needs.

The main body of the contract frames the basic legal provisions and protections to which each party will conform. It specifies governing laws, contingent liabilities, conditions of default and remedies, regulatory requirements (e.g., insurance, labor and wage rates, minority/women business goals, code compliance, etc.) and indemnification provisions. The contract can be customized to accommodate additional terms and conditions as necessary.

The *Guaranteed Energy Savings Agreement* developed by DGS for agencies of the Commonwealth is located in Appendix E-1. The Commonwealth's GESA addresses the usual legal provisions and protections covered in a guaranteed energy savings project and can be customized to reflect the policies and requirements of other local jurisdictions in Pennsylvania. Since individual projects and circumstances vary, local agencies and school districts should consult appropriate legal counsel about individual ESCO projects and work closely with them to incorporate any special contract terms and conditions into the GESA.

Contract Schedules

Contract schedules are referred to throughout the main body of the GESA. These schedules contain specific details of the project negotiated between the agency and an ESCO. The schedules listed below are offered only as illustrative examples of the types of contract schedules that could be negotiated into the final contract:

- Schedule A: Equipment to be Installed by ESCO
  This schedule should specify newly installed equipment, including name of manufacturer, equipment quantity and location. The schedule also should describe, if

applicable, any existing equipment modifications. New equipment warranties often are kept in a separate warranty schedule.

- Schedule B: Description of the Premises; Pre-Existing Equipment Inventory
  This schedule contains basic information about the condition of the premises at the time of contract execution. Such information would include facility square footage, construction type, use, occupancy, hours of operation and any special facility conditions that may exist. A pre-installation equipment inventory helps to identify which equipment was in place and how it was configured at the time of contract execution. This schedule is important to accurately establish the energy base year and may be a useful reference in later years of the contract.

- Schedule C: Energy Savings Guarantee
  This schedule fully describes all provisions and conditions of the savings guarantee provided by the ESCO. The guarantee should define the units of energy and dollars to be saved for the contract duration. Reference to the annual reconciliation of achieved vs. guaranteed savings should be included (Please see specific language in Section 4.2 of DGS' *Guaranteed Energy Savings Agreement* regarding annual reconciliation located in Appendix E-1).

- Schedule D: Compensation to ESCO
  This schedule should cover the amount and frequency of payments that will be made to the ESCO for maintenance, monitoring, or other services negotiated as part of the contract. Schedule C also should contain information about how the compensation is calculated and if an annual inflation index will be used to escalate fees over the duration of the contract term. An hourly fee structure should be included to cover ESCO costs for any services provided beyond the scope agreed to at the time of contract execution.

- Schedule E: Baseline Energy Consumption
  The baseline utility consumption is the yardstick by which project savings will be measured. The methodology and all supporting documentation used to calculate the base year, including unit consumption and current utility rates for each fuel type, should be located in this schedule. This schedule also may include base year documentation regarding other cost savings such as commodity savings (e.g., bulbs, ballasts, filters,

chemicals, etc.) and cost savings associated with the elimination of outside maintenance contracts.

- Schedule F: Savings Measurement & Calculation Formulae; Methodology to Adjust Baseline

  This schedule contains a description of the savings measurement, monitoring and calculation and modeling procedures used to verify and compute the savings performance of the installed equipment. The calculation formula will include a method to compare the energy that would have been consumed if the GESA had not been implemented (referred to as the "base year"), with the amount of energy actually used over a specified time (monthly, quarterly, etc.). All methods of measuring savings (engineered calculations, metering, equipment run times, pre- and post-installation measurements, etc.) should be explicitly described for all equipment installed. The technical review and approval process for baseline adjustments also should be fully described in this schedule. Periodically, the baseline may be adjusted to account for changes in conditions that impact savings (e.g., weather, billing days, occupancy, etc.).

- Schedule G: Construction and Installation Schedule

  Timetables and milestones for project construction and equipment installation should be contained in this schedule. If so desired, documentation of required insurance, subcontractor lists and any minority and women-owned business goals or requirements. MBE/WBE required subcontracts could be included in this schedule or broken out into separate schedules.

  NOTE: It is important that the construction/installation phase of the project be treated in compliance with individual agency requirements and the appropriate governing statutes. Since construction is just one component of the overall project, a separate construction contract may be desirable and, in some cases, necessary. The construction contract would then be referred to within the body of the contract and attached as an exhibit, appendix or other type of attachment; or the appropriate construction language could be included in the body of the final contract. This decision should be made on a case-by-case basis. *Sample Construction Process Provisions* are contained in Appendix E-2.

- Schedule H: Systems Start-Up and Commissioning of ECMs; Operating Parameters of Installed Equipment

  This schedule should specify the performance testing procedures that will be used to start up and commission the installed equipment and total system. It also should provide for agency notification before all commissioning procedures. Schedule H should contain a provision for documenting the agency's commissioning attendance and for approval signatures that the commissioning tests followed the procedures specified and met or exceeded the expected results. Detailed specifications for these commissioning procedures should be developed during the project design phase. In addition, operating schedules for installed equipment should be specified in this schedule.

- Schedule I: Standards of Comfort

  Schedule I contains explicit standards of comfort and levels of service for heating, cooling, lighting levels, hot water temperatures, humidity levels and/or any special conditions for occupied and unoccupied areas of the facility.

- Schedule J: ESCO's Maintenance Responsibilities

  A complete description of the ESCO's specific operation and maintenance responsibilities, along with a timeline for these activities, should be included in this schedule.

- Schedule K: Agency's Maintenance Responsibilities

  This schedule describes the agency's operation and maintenance responsibilities that have been agreed to by both parties. In some instances, the schedule will contain no more than a description or checklist of routine operation and maintenance currently being performed on facility equipment. In other cases, facility staff may provide routine maintenance on newly-installed equipment, with the ESCO providing some specialized services on the same equipment.

- Schedule L: Facility Maintenance Checklist

  This checklist assists the ESCO in tracking the agency's compliance with maintenance procedures performed by facility staff. The checklist typically specifies a simple list of tasks and a corresponding schedule for performing prescribed procedures. When facility staff completes the checklist, they forward it to the ESCO on a pre-established schedule

(monthly, quarterly, etc). This checklist is a useful tool for both the agency and the ESCO to verify that the required maintenance activities are being performed at the scheduled intervals.

- Schedule M: Company Training Responsibilities
  A description of the ESCO's facility staff training program should be contained in this schedule. The schedule also should include the duration and frequency of the training sessions, plus provisions for on-going training, commitments to train newly-hired facility personnel and future training for equipment or software upgrades. Any fees associated with the agency's training requests beyond what is specified in the contract should be provided in this schedule.

- **Schedule N: Financing Agreement**
  An amortization and payment schedule from the lease financing agreement should be included in this section. A separate financing agreement will be executed with a third party lender. (Agencies of the Commonwealth must use DGS' *Installment Purchase Agreement and Payment Schedule*, a copy of which is located in Appendix F-1.)

- Schedule O: Final Project Cost and Final Project Cash Flow Analysis
  This schedule should contain a spreadsheet depiction of the expected financial performance of the project throughout the entire contract term. The documentation should clearly identify all financial components of the project, including interest rates, current fuel prices, any escalation rates, guaranteed savings figures, ESCO compensation figures, cash-flow projections and projected Net Present Value of any cumulative positive cash flow benefits to the agency. Savings projections should be delineated by utility/fuel type and should identify ongoing annual service fees provided over the contract term. Project cost breakdowns should identify both hard costs (labor costs, subcontractor costs, cost of materials and equipment, and miscellaneous costs like permits, bonds taxes, insurance, mark-ups, overhead and profit, etc.). A suggested presentation format for this information can be found in the *Sample Investment Grade Energy Audit Contract* located in Appendix D-1.

Other Contract Schedules

The following schedules can be included as either separate schedules, exhibits or combined with the above schedules:

- Current And Known Future Capital Projects at the Premises
  Information about the implementation of current or planned facility capital projects not included under this agreement should be contained in this schedule. This information could prove useful in later contract years by assisting in avoiding disputes over long-term savings performance, overall facility energy consumption, and associated energy costs.

- Pre-Existing Service Contracts
  Information regarding the scope and cost of pre-existing equipment service contracts may be contained in this schedule. This gives both the agency and the ESCO information about how and when existing equipment service should occur. If the ESCO is credited with maintenance savings or if the ESCO is taking over existing service contracts, the scope and cost of these contracts will be useful for tracking the ESCO's performance.

- Alternative Dispute Resolution (ADR)
  This schedule describes methods for resolving disputes or claims relating to construction or the ESA, wherein the parties agree to exercise good faith efforts (e.g., mediation, dispute resolution board) and to only use litigation as a last resort. This schedule is included as an alternative to costly binding arbitration and litigation and it is recommended that the agency's purchasing officer or legal counsel be consulted to determine if ADR may be used. *Sample Alternative Dispute Resolution* language is located in Appendix E-3.

- Insurance and Bonds
  This schedule should contain evidence of each type of insurance policy and bond required by the agency to be obtained by the ESCO during all project phases.

- Equipment Warranties
  This schedule should contain all of the manufacturers' equipment warranties, specifications, and procedures for invoking warranty provisions.

- Facility Changes Checklist
  A facility changes checklist may be provided by the ESCO to assist the agency in notifying it when energy use changes occur (e.g., occupancy, new equipment acquisition, hours of use, etc.). This checklist is generally submitted to the ESCO on a monthly or quarterly basis.

Managing EPC Projects to Avoid Disputes

It should be a mutual goal of the agency and the ESCO to voluntarily resolve any performance problems that may arise. Because of cost and time delays, it is not advisable to delegate a technical dispute to attorneys or other "non-technical" individuals. However, it is important to fully disclose all pertinent information and not allow frustration to result in the parties losing focus on the project value and their real and mutual interests.

Energy performance contracting projects require a cooperative effort between the agency and ESCO to achieve energy and cost saving goals, effective equipment maintenance and building comfort. Maintaining high quality performance results over a 15-year contract period requires effective communication, a mutual understanding and the fulfillment of contract responsibilities by both the agency and the ESCO.

The voluntary resolution of performance problems is facilitated when both parties are committed to seeking resolution based on good faith. Pertinent facts should be fully disclosed early in the resolution process, with the agency and the ESCO devoting sufficient time and resources to the proper evaluation of viable options. The agency and the ESCO must realistically evaluate the potential risk and cost of seeking legally binding involuntary resolution. Litigation and formal arbitration are usually very expensive and involve lengthy procedures by judges or arbitrators who often have inadequate expertise to understand complex technical issues. Alternative dispute resolution (ADR) that requires the use of mediation should be included as a standard contract provision to minimize the high cost of resolving performance problems.

To ensure a successful relationship and reduce the potential for conflict, the following should be considered:

- Document and Explain Adjustments Made to the Base Year Projections
  Mutual duties need to be explicitly defined in the contract. Any contractual conditions that affect the savings guarantee must be realistic and technically sound. It is important to document and explain any adjustments made to the base year projections. If unsound technical data are used for project analysis and planning, there will be problems with the project performance.

- Document Equipment Technical Performance Requirements
  Adequate staff training and accurate documentation of equipment technical performance requirements are a must for a successful project. Continuous monitoring and regular performance reviews provide important feedback to keep the project on track. Also, coordination of energy performance contracts with other construction projects helps to minimize conflicts between project goals.

- Put All Project Changes IN WRITING
  It is important to keep thorough and precise written records of approvals for all changes to the project. Individual memories are often unreliable and staff turnover is unavoidable. The resolution of problems, through prompt and effective action by both the agency and the ESCO, is essential to avoiding disputes. Sound technical solutions, transparent to both parties, should satisfy the legitimate interests of both the agency and the ESCO. It is advisable to have a process in place to confirm, by mutual sign-off, that performance problems are solved.

- Create Explicit Definitions of Technical and Economic Data and Performance Measurement Methods
  Since vague definitions of technical and economic data and methods of performance measurement invite misunderstanding and differing perceptions, it is important that clear definitions be provided. Definitions and contract standards should be fair, economically viable, technically sound, transparent and mutually approved. All technical calculations should be double-checked for data input and math errors and fully documented to explain any base year adjustments.

- Encourage Open and Timely Communication
  Regular, open and timely communication between the ESCO and the agency staff charged with performance responsibilities is crucial to a project success, especially during project commissioning. Each party needs to fully describe project performance concerns and objectively evaluate the merits of available options in order to fairly and efficiently resolve performance problems.

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PART 5: PROJECT COMMISSIONING

Project Commissioning Overview

Project commissioning is a systematic performance testing and quality control process designed to verify that newly installed equipment and systems operate according to the intended design and the agency's needs. Commissioning typically begins during the project design phase and continues for at least one year after construction is complete. It requires thorough documentation of system design, construction quality, functional performance tests and operation and maintenance requirements.

The training of facility operators and staff is a key component of building commissioning since staff will be responsible for some equipment maintenance. If the ESCO has sufficient commissioning expertise, it is recommended to have the ESCO perform project commissioning since it is the most familiar with the technical details of the project. Over time, continuous commissioning is the best way to determine whether controls and equipment function properly.

Why Do Commissioning

Field studies show that building energy-systems rarely function to their full potential. Poorly designed systems, improper equipment selection, inferior equipment installation, insufficient maintenance and improper system operation all reduce energy cost savings.

Typical problems in non-commissioned energy projects include:

- Serious air flow problems
- Poor documentation of project installation and operational requirements
- Underutilized energy management systems for optimum comfort and efficiency
- Incorrect lighting and equipment schedules
- Incorrect cooling and heating sequences

- Improperly installed or missing equipment
- Incorrect calibration of controls and sensors
- Lack of building operator training
- Short cycling of HVAC equipment
- Malfunctioning economizers

The value of commissioning has become more important in recent years because of the following:

- There is more diversity in the number of building specialized systems that need to be integrated.
- Building systems, especially building controls, are much more complex.
- HVAC systems are being designed with less excess capacity.
- Building and safety codes are becoming more stringent.
- There is wider recognition of the economic value of health and productivity benefits from properly operating buildings.
- Rising building operation costs make efficient operation more valuable.

GESA Project Commissioning Benefits

Depending on the complexity of the project, commissioning costs can range from five ($.05) to ten ($.10) cents per square foot. An investment in commissioning usually pays for itself in one to three years. Commissioning can reduce future equipment repair costs, downtime, and replacement costs by 15 percent or more. Detecting equipment performance problems while under warranty can reduce agency costs by getting equipment manufacturers and ESCOs to remedy any problems.

Benefits of commissioning include:

- Increased building staff knowledge and improved equipment operation
  Project commissioning provides the agency the knowledge to optimize equipment, systems and control efficiencies. Optimization improves coordination between building systems and, therefore, improves overall building performance. Improved systems control extends equipment life and improves operation efficiency by avoiding frequent equipment cycling.

- Better planning and coordination for smoother equipment start-up
  During project construction, commissioning provides better planning, coordination and communication between the agency and ESCO. This results in shorter punch lists and fewer callbacks. Commissioning also provides faster and smoother equipment start-up due to systematic equipment and control testing procedures.

- Better up-front performance accountability
  Since problem prevention is less expensive than problem correction, commissioning provides front-end performance accountability and quality control. This can provide quick feedback to design professionals on the dynamic performance of their design. Proper commissioning can also reduce liability risks from equipment failure.

- Improved building control and performance
  Perhaps the most valuable benefit from commissioning comes from better building control and the assurance of improvements to thermal comfort and indoor air quality. This helps reduce occupant complaints and employee absenteeism, increase staff retention and saves the agency money. While difficult to quantify, the health and productivity benefits of a comfortable building are likely worth more than five times the energy and operating cost savings.

Examples of Projects that Require Commissioning

- Boilers, Furnaces and Chillers
  Check for proper sizing, controls, efficiency criteria, and performance testing

- Energy Management Systems
  Conduct functional performance tests on control capabilities, review sensor locations and calibration and thoroughly train system operators

- Air and Water Distribution Systems
  Check fan and pump motor sizing, system alignment and control, air filtration, and seasonal changeover procedures, and test and balance air and water delivery systems

- Lighting Control Systems
  Conduct functional performance tests, control maintenance, and control calibration

How Commissioning Works

During project design, the agency needs to identify the facility's commissioning requirements. Effective commissioning requires the use of consistent performance criteria to guide the decision process from design through agency acceptance. The ESCO should review the design documents with the agency and, if applicable, incorporate the commissioning requirements into the bid specifications. From these requirements, the scope of the commissioning plan can be developed. The plan should include a commissioning schedule, all documentation requirements and specific team member responsibilities. Commissioning activities need to be an integral part of the construction schedule.

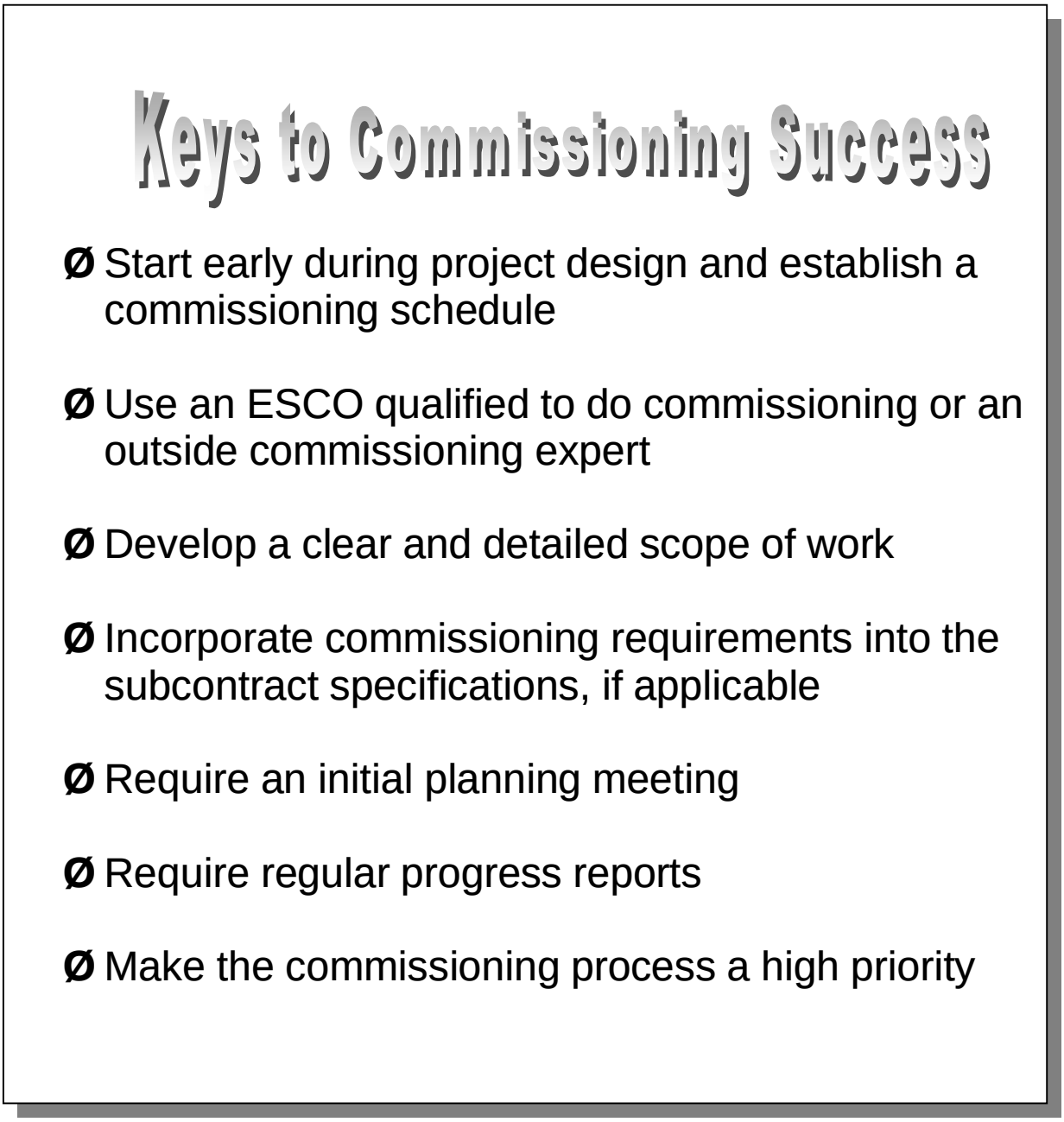
Generally, pre-functional equipment checklists are used to evaluate proper equipment installation. Separate functional performance tests are used to verify proper equipment operation. Based on the results of functional performance tests, equipment is either accepted by the agency or performance deficiencies are corrected and then retested.

The ESCO should prepare a commissioning report that documents the commissioning process and a training manual for system operation and maintenance for submission to the agency.

Model commissioning documents and specifications are available via the Internet from the Building Commissioning Association at http://www.bcxa.org/index.htm

Figure 5-1 highlights some of the key strategies for successful project commissioning.

FIGURE 5-1


Keys to Commissioning Success
Ø Start early during project design and establish a commissioning schedule
Ø Use an ESCO qualified to do commissioning or an outside commissioning expert
Ø Develop a clear and detailed scope of work
Ø Incorporate commissioning requirements into the subcontract specifications, if applicable
Ø Require an initial planning meeting
Ø Require regular progress reports
Ø Make the commissioning process a high priority

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PART 6: SAVINGS MEASUREMENT & VERIFICATION & PROJECT MONITORING

Savings Measurement & Verification Overview

Since energy and operating savings are calculated by comparing consumption and costs both before and after the installation of energy efficiency equipment, it is critical to accurately estimate the building energy use prior to execution of a GESA. This estimate can include the base-year utility consumption and costs for the facility or a specific energy-using system (e.g., lighting system, HVAC).

The base year provides the foundation for the technical and economic analysis of savings from the new energy equipment and is used to measure the value of future energy savings. Due diligence by both the agency and the ESCO is required to develop an accurate base year.

The defined base year can be affected by a variety of factors, each of which should be carefully analyzed. These factors include:

- Changes in building equipment, schedule, occupancy, or controls
- Changes in operation or maintenance procedures
- Unusually mild or severe weather
- Changes in utility costs
- Existing service levels for lighting, ventilation, temperature, and humidity
- Equipment sizes, loads, and operating conditions

Significant changes could occur in the building or energy-using systems after project installation and may require a base year adjustment to correct for the impact on savings performance. In such instances, a mutually agreed to and properly corrected base year would need to be used for calculating project savings.

Some challenges to calculating accurate base year estimates include:

- Failure to account in the data analysis for periods during which equipment was broken or malfunctioning
- Number of burned out lights
- Baseline consumption data reflect atypical schedule or operating conditions
- Inaccurate or missing consumption data due to utility metering, billing, or data entry errors
- Run hours of equipment ≠ operating hours of building
- Run hours of equipment ≠ facility staff estimates
- Thermal loads may not be simply proportional to weather due to occupant load
- Actual annual equipment loads ≠ full load rating nameplate (e.g., average motor operates at 60% of full load rating)
- Actual equipment loads are unknown
- Inaccurate data provided to the ESCO by facility staff

Why Measure and Verify Savings?

In large buildings, equipment monitoring provides better control of energy consumption. Regular equipment monitoring maximizes the persistence of cost savings over the contract term by improving equipment reliability and optimizing system performance. Monitoring consumption also provides data to correct base year calculations and can provide useful load profiling for negotiating with energy suppliers.

Periodic savings reports provide valuable data for cost accounting and budget forecasting. Verification of the value of achieved savings provides project performance accountability for the savings guarantee.

Benefits of Measurement & Verification

When properly applied, measurement and verification can:

- Accurately estimate energy savings for a project
- Verify that the savings guarantee has been met
- Allocate performance risks to the appropriate parties
- Reduce project performance uncertainties to reasonable levels
- Document emissions reductions from energy savings
- Quantify improvements in indoor environmental quality
- Identify additional savings over the term of the contract
- Document the value of the investment to the agency
- Give the ESCO a feedback mechanism on the quality of engineering
- Maximize persistence of utility consumption and cost savings
- Reduce operations and maintenance costs (e.g., automatic dial-up alarms)
- Reduce utility and equipment performance data collection and analysis costs (e.g., utility rate analysis and load profiling)
- Provide benchmarking data for cost reductions in similar buildings
- Improve equipment reliability and optimize system performance (e.g., load management)
- Provide valuable management information for building cost accounting and budget forecasting
- Provide timely project performance feedback and accountability
- Provide the data required for savings or baseline adjustments

Methods of Measurement & Verification

The *International Performance Measurement and Verification Protocol* (IPMVP) was developed by the U.S. Department of Energy in cooperation with many nationally recognized technical advisors. This protocol establishes measurement and verification (M&V) technical guidelines. These guidelines must be customized before they can be applied to any guaranteed energy savings project. An electronic copy of the IPMVP can be downloaded online from http://www.evo-world.org/.

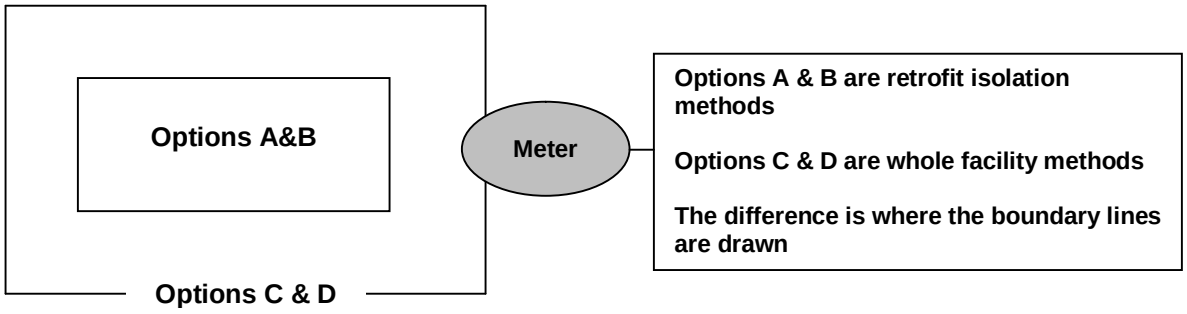
M&V approaches are divided into two general types: retrofit isolation and whole facility. Retrofit isolation methods look only at the affected equipment or system, independent of the rest of the facility. Whole facility methods consider only the total energy use while ignoring specific equipment performance.

- Options A and B - retrofit isolation methods
- Option C - whole facility method
- Option D - can be used as either, but is usually applied as a whole facility method

The differences in these approaches are shown in Figure 6-1.

FIGURE 6-1

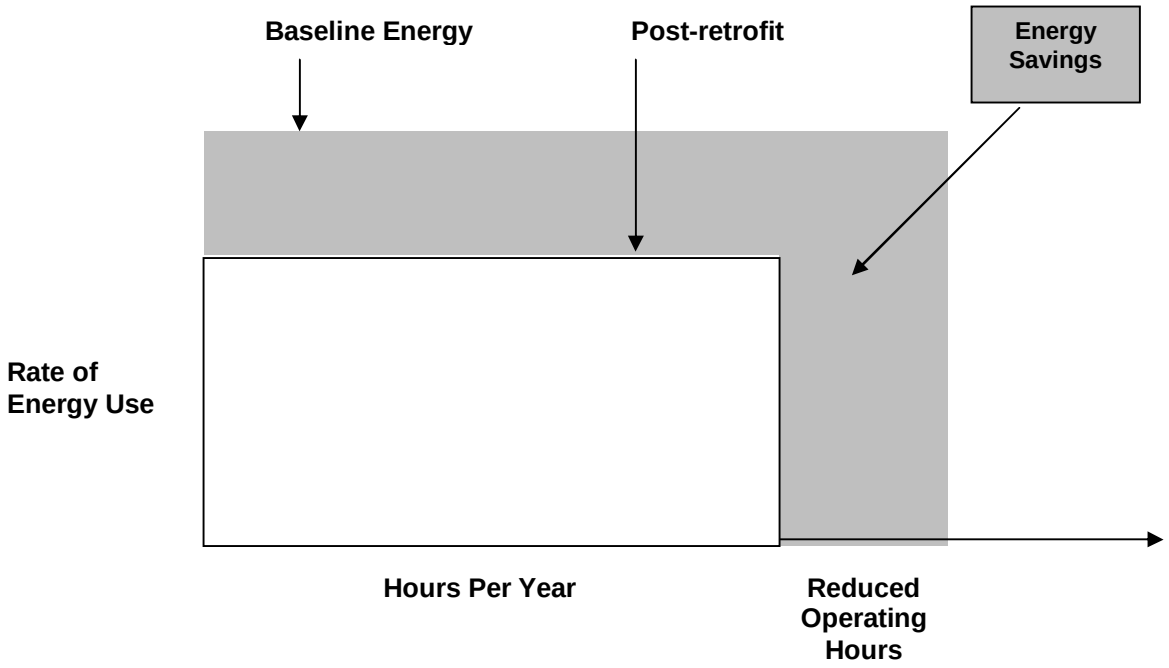
Retrofit Isolation Vs. Whole-Facility M&V Methods



Within each method, there are two fundamental factors that drive energy savings: performance and usage. Performance describes how much or how little energy is used to accomplish a specific task; usage describes the operating hours that a piece of equipment runs. Lighting provides a simple example: performance would be the Watts required to provide a specific amount of light; usage would be the operating hours per year. A chiller is a more complex system: performance is defined as kW/ton, which varies with load; usage is defined by cooling load profile and ton-hours. In all cases, both performance and usage factors need to be known to determine savings, as shown in Figure 6-2.

FIGURE 6-2

Energy Savings Depend On Performance And Usage



IPMVP Options

IPMVP identifies four main M&V options for EPC projects:

- Option A is designed for projects using spot measurements of pre- and post-energy use together with agreed-to operating hours for estimating savings. Periodic equipment inspections also may be required to verify equipment condition.

  Option A costs from one to five percent of construction costs and provides an accuracy of +/- 20 percent.

- Option B requires continuous or repeated measurement of pre- and post-energy use for specific equipment or a sampling of equipment. Sub-metering is typical of this approach.

  Option B costs from three to 10 percent of construction costs with an accuracy of +/- 10 to 20 percent.

- Option C makes use of the main building meters to measure savings from all project efficiency measures. This approach involves continuous analysis of metered data.

  Option C, with monthly data, costs from one to three percent of construction costs and provides an accuracy of +/- 20 percent.

- Option D uses a calibrated computer simulation of pre- and post-installation energy use to measure project savings.

  Option D costs between three to 10 percent of construction costs and provides an accuracy of +/- five to 10 percent.

Why Individual End-Use Equipment is Measured

- Isolates affected end-use from total building meter
- Quantifies parameters for engineering calculations and simulation models (e.g., temperatures, run times, control settings)
- Provides equipment operation diagnostic data
- Corrects catalog data estimates, which can vary by application, design, quality of installation and control

Initial vs. Annual Metering

- Metering during the audit is most beneficial because it provides:
  - Accurate data for calculations
  - Understanding of systems and operation
- Initial metering data can assist M&V selection by:
  - Quantifying constant and variable uses or loads
  - Establishing baselines
- Pre- & post-construction measurement options
- Annual dedicated equipment metering is costly

Cost of Metering

- Metering equipment cost is normally reasonable
- Labor cost
  - Reasonable for spot readings
  - High for loggers
    - Programming, installation, data retrieval, analysis

- Travel expenses (several times)

Metering Cautions

- Meters should be properly calibrated to collect accurate data
- Carefully convert measured consumption savings to dollars
  - Use accurate marginal utility rates that include taxes and variable charges
  - Account for electric demand if appropriate (time and duration)
- Balance metering cost with savings and risk
- Equipment replacement
- Utility rate changes

Factors Affecting M&V Accuracy and Costs

Factors that affect the cost and appropriate choice level of M&V include:

- Value of projected savings
- Complexity of efficiency equipment
- Total amount of equipment
- Level of savings certainty
- Risk allocation for achieved savings between agency and ESCO
- Value of other uses for the M&V data (e.g., optimizing operation and maintenance)
- Level of detail and effort associated with verifying baseline and post-installation data collection
- Sample sizes (number of data points) used for metering representative equipment
- Duration and accuracy of metering activities
- Number and complexity of dependent and independent variables which are metered or accounted for in analyses
- Availability of existing data collecting systems (e.g., energy management systems)
- Contract term and internal costs and resources to administer agency M&V tasks
- Confidence and precision levels specified for energy savings analyses

Usually, the parties stipulate M&V operation and maintenance savings by using labor and commodity cost-saving calculations. These savings may include contracted labor costs, scheduled maintenance, unscheduled repairs, parts and materials, internal labor costs and inventory costs.

The IPMVP contains guidelines for verifying operation and maintenance savings. Make sure that the contract clearly defines whether the ESCO will reimburse the agency if operation and maintenance savings are not achieved.

The Difference Between Stipulated and Measured Values

Stipulation

To *stipulate* a parameter is to hold its value constant regardless of what the actual value is during the contract term. A stipulation in an M&V plan is an agreement between the agency and the ESCO to accept a defined value of a specific factor (e.g., operating hours) in determining the baseline and/or post-installation energy consumption used to calculate the guaranteed savings. If related requirements are met (e.g., satisfactory commissioning results were submitted, annual verification of equipment performance is performed and necessary maintenance is being conducted), the guarantee is considered to have been met.

Stipulated values must be based on reliable, traceable and documented sources of information, such as:

- Standard lighting tables from recognized sources
- Manufacturer's specifications
- Building occupancy schedules
- Maintenance logs
- Performance curves published by national organizations
- Weather data from government agencies

Sources of stipulated values must be documented in the M&V plan. Even when stipulated values are used in place of measurements, periodically verifying equipment performance (technically, the *potential to perform*) is still required.

Measurement

Measured factors are quantified by metering or monitoring of individual components, systems or buildings. Measurements can be taken continuously -- for hours, days, weeks or for moments to obtain data "snapshots". Data from these measurements are used to calculate savings using engineering calculations, regression or other analysis algorithms or computer models.

Measurement and Stipulation as Technical Terms

Measurements are used to verify equipment operation and demonstrate that savings can be achieved. Typically, only one or two sets of measurements are made and the results are applied to the project for the contract term. One measurement is made if the parameter (or relationship) in question is not expected to change following installation; two measurements are made before and after installation if that parameter is expected to change following installation.

In place of measurements, some of the values (or relationships) upon which the savings are based may be estimated (e.g., operating hours for a lighting system) and then *stipulated*. Once agreed to by the agency and the ESCO, these stipulated values will be held constant during the contract term.

Deciding Whether to Use Stipulations

Properly used, stipulations can reduce M&V costs and simplify procedures. Improperly used, stipulations can give M&V results an undeserved aura of authority. Deciding whether parameters should be stipulated requires understanding how they will affect savings, judging their affect on reliability and uncertainty of results and balancing agency needs with the costs, risks and goals of the projects.

Evaluation of a few key aspects of the project should drive decisions about whether to use stipulations and how to use them effectively in an M&V plan, including

- Magnitude of the measure's cost savings
- Cost of measurement
- Availability of reliable information
- Project's likelihood of success

- Uncertainty of the stipulated parameter and its contribution to overall project uncertainty
- Responsibilities of the agency and the ESCO

Parameters Commonly Stipulated

Parameters commonly stipulated include lighting operating hours, lighting fixture power and constant-volume fan powers and schedules. Once equipment performance and schedules have been defined, these parameters may be stipulated for the baseline case (and possibly for the post-retrofit case as well). More complex parameters that are sometimes stipulated include chiller performance curves and equipment load frequency distributions (e.g., hours per damper position, hours per motor speed, hours per chiller load). Measurements are often required to confirm performance curves or load frequencies (usually during the baseline audit or commissioning of the newly installed equipment). If these parameters can be reliably and safely estimated, they may be stipulated instead of measured.

Conditions Indicating that Stipulation Is or Is Not Appropriate

Positive Indicators

Using stipulated values in savings estimates is usually appropriate if some or all of the following apply:

- The ECM
  - Has a high probability of delivering expected savings
  - Contributes a small percentage to overall project savings
  - Contributes a small percentage to overall project performance uncertainty

- The agency
  - Is willing to accept some uncertainty
  - Has experience with similar ECMs
  - Can not justify the cost of measurement based on the value of reduced uncertainty
  - Determines that measurement produces no additional value (such as equipment diagnostics)

- Determines that the ESCO has no control over the factor (such as operating hours)

Negative Indicators

Using stipulated values may be inappropriate if one or more of the following conditions apply:

- The agency is not willing to assume some risk
- Parameters are not known with reasonable certainty or are highly dependent on external factors (e.g., variable-speed drives on fans)
- The measure has an uncertain probability of success; for example, it has significant potential for performance variations
- The cost of measurement is more than justified by the increased accuracy and value of performance feedback

Sources of Information for Stipulated Parameters

The stipulated parameters will affect the reported savings over the entire contract term. All stipulations should be based on reliable, documented sources and should be known with a high degree of confidence. While direct measurements from short-term logging or existing Energy Management Control Systems (EMCS) records are the preferred information source, such information may not be available or may be too costly to obtain. Sources of information on which stipulations may be based include the following (in order of preference):

- Engineering analysis
- Models derived from measurements and monitoring
- Manufacturer's data or standard tables
- Manufacturer's curves, such as pump, fan and chiller performance curves
- Industry-accepted performance curves, such as standards published by the American National Standards Institute, American Refrigeration Institute and the American Society of Heating, Refrigeration, and Air-Conditioning Engineers (ASHRAE)
- Typical meteorological year weather data (available from the National Oceanographic and Atmospheric Administration)
- Observations of building and occupant behavior
- Facility operations and maintenance logs

Stipulated parameters should *not* come from the following:

- Undocumented assumptions or “rules of thumb”
- Proprietary “black-box” algorithms or other undocumented software
- Handshake agreements with no supporting documentation
- Guesses at operating parameters
- Equations that do not make mathematical sense or are derived from questionable data

Project Savings Risks

- Equipment quality, efficiency, and installation
- Proper project design
- Equipment quantity
- Proper operation and maintenance
- Building use pattern changes
- Customer-added equipment
- Equipment replacement
- Utility rate changes

M&V and Project Performance Monitoring Guidelines

Use the following guidelines when conducting M&V and project performance monitoring:

- Describe the efficiency measures and data required for savings calculations.

- Plan how best to collect required data, format data and define any inputs for calculated savings.

- Value utility and fuel savings, using utility bill reconstruction, to reflect the true cost of the new utility consumption.

- Clearly calculate and document operation and maintenance savings.

- Explicitly define in the contract reasonable escalation rates for valuing future savings and service fees.

- Use measurement procedures that produce consistent results no matter which party uses the procedures.
- Use measurement methods that are clearly defined, provide timely data and are cost-effective, technically sound, reasonably accurate and contractually binding.
- Evaluate M&V data promptly and implement corrective actions (if necessary) to optimize project performance.
- Make certain that monitoring reports document calculations and support base year adjustments.
- Train designated staff to interpret data and follow a defined review and approval schedule.
- Provide building operators with timely and focused performance data to allow them to optimize system performance.
- Present consumption and cost savings relative to target savings in both graphic and numeric data formats.
- Provide data sources, time periods, and explanations for any variances from predicted savings performance.
- Collecting baseline date by metering the building before the audit is ideal.
- Integrating the design of any existing or new Energy Management System (EMS) with the monitoring function may be an economical approach.
- Use a standard monitoring report format, with well-defined measurement standards that emphasizes comparisons with performance targets.

- Monitoring provides incentives for optimizing operations and maintenance and documenting system performance results. Everyone is more careful when the results are monitored.

- Continuous and effective monitoring is the key to creating persistent savings.

- Collective relevant data from building operators and occupants is essential to effective monitoring.

- Don't assume metering is accurate unless calibrated properly.

- Detailed demand and energy data may allow building operators to spot operational problems with large energy-intensive equipment (e.g., chillers).

- Maintain a comprehensive file of monitored data.

- Sufficient detail should be presented to permit a third party unfamiliar with the project to understand the data and results.

M&V Plans

M&V plans must specify the following:

- What will be measured, calculated, simulated or estimated and by whom

- When the measurements or calculations will be done

- Descriptions of any measurement devices, calculations, computer models and all assumptions

- How measurement devices are checked for accuracy

- How measured or calculated data will be used to verify savings (these should include sample savings calculations)

- A sample periodic savings report that shows all data and results

M&V Activities

M&V activities fall into the following five areas:

1. M&V Planning: M&V planning should be part of the proposed/audit phase. Define M&V requirements for inclusion in the contract between the agency and the ESCO.

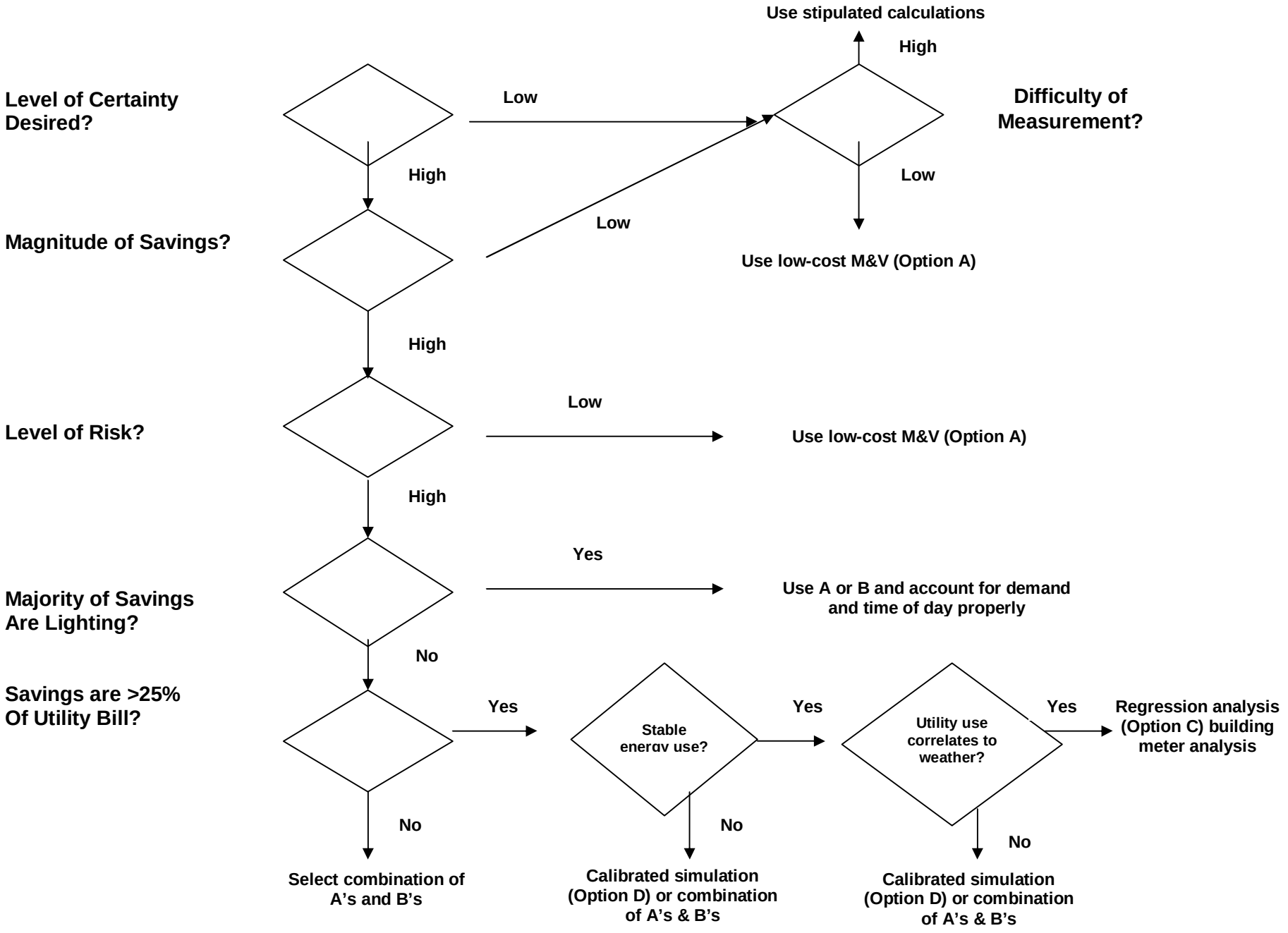
2. Preparing the Site-Specific M&V Plan: As soon as the project has been fully defined and before the contract is signed, prepare a site-specific M&V plan for the project. Define how the M&V data will be used to verify, add or create value from the project.

3. Defining Pre-Installation Baselines: Define the pre-installation baseline, including (a) equipment and systems, (b) baseline energy use (and cost) and/or (c) factors that influence baseline energy use. The baseline can be defined through site surveys; spot, short-term or long-term metering; and/or analysis of billing data. This activity must occur before the contract is signed.

4. Defining Post-Installation Baselines: Define the post-installation conditions, including (a) equipment and systems, (b) post-installation energy use (and cost) and/or (c) factors that influence post-installation energy use. Site surveys; spot, short-term or long-term metering; and/or analysis of billing data can be used for the post-installation assessment.

5. Conducting Annual M&V of Project Performance: Conduct annual M&V activities to (a) verify the operation of the installed equipment/systems, (b) determine current year savings and (c) estimate savings for subsequent years.

M & V DECISION PROCESS



PART 7: PENNSYLVANIA CASE STUDIES

- Building Controls & Services, Inc. (BCS)
  - Ø Greater Johnstown Career & Technology Center
- CLT Efficient Technologies Group
  - Ø Butler County Courthouse and Government Center
  - Ø The City of Erie
- CM3 Building Solutions, Inc.
  - Ø Greater Nanticoke Area School District
  - Ø Scranton School District
- Constellation Energy Projects & Services Group
  - Ø Washington Suburban Sanitary Commission
  - Ø Cumberland County
- Custom Energy Services, LLC - *A ConEdision Solutions Company*
  - Ø The Pennsylvania State University - West Halls Residential Complex
  - Ø Penn State University - Harrisburg
- DMJM Harris
  - Ø York College- Queens – NY
  - Ø Rowland Unified School District - CA
- Johnson Controls, Inc.
  - Ø Northampton County
  - Ø PA Department of Corrections – SCI Cresson

- NORESCO
  - Ø PA Department of Corrections – SCI Camp Hill
  - Ø Westmoreland County
- PEPCO Energy Services
  - Ø Pennsylvania State University – Altoona Campus
- PPL Energy Services
  - Ø Millville Area School District
  - Ø Juniata County School District
- Siemens Building Technologies, Inc.
  - Ø Steel Center Area Vocational Technical School
  - Ø Mack Trucks, Inc.
- TAC Americas, Inc.
  - Ø Hiram G. Andrews Center
  - Ø Capital Area Intermediate Unit # 15

Greater Johnstown Career & Technology Center

Location of Project	**Johnstown, Pennsylvania**
Type of Facility	**Office / School**
Number of Buildings/ Total Square Footage	**271,100 square feet**
Pre-Project Annual Utility Costs	**$227,648 – Electric $355,508 - Total $127,860 – Natural Gas**
Project Dollar Amount (installed project cost)	**$2,127,564**
Primary ECMs Installed	• **Facility Wide Lighting System Upgrade.** • **Replacement of Inefficient Rooftop Multizone Units with New High Efficiency Variable Air Volume Units.**
Date Construction Started/ Date Construction Completed	**Start Date: June 2004 Completion Date: September 2005**
Length of Contract Term	**9/1/2005 to 8/31/2015**
Type of Project Financing (e.g. tax-exempt lease, COPs, local bank, bonds, etc.)	**Greater Johnstown Career & Technology Center used its own funds for this project.**
Dollar Value of Projected Annual Energy Savings	**$116,106**
Dollar Value of Guaranteed Annual Energy Savings Dollar Value of Measured Energy Savings Dollar Value of Stipulated Energy Savings	**$116,106 $125,344 $116,106**
Dollar Value and Type of Annual Operational Cost Savings (if applicable) (e.g., outside maintenance contracts, material savings, etc.)	**$17,500 – Savings of Facility Maintenance Costs**
Method(s) of Savings Measurement and Verification	**Metrix 3.10 – Utility Accounting System**
Name of ESCO **Project Notes**	**Building Controls & Services, Inc. (BCS) 4 Peuquet Parkway Tonawanda, NY 14150 Phone: (716) 693-7220 Website: http://www.bcsco.com**

Butler County Courthouse and Government Center

Location of Project	**Butler, PA**
Type of Facility	**Administrative Offices, Courthouse, Nursing Home**
Number of Buildings/ Total Square Footage	**Three Buildings 301,446 Sq. Ft.**
Pre-Project Annual Utility Costs	**$397,108 (does not include water/sewer)**
Project Dollar Amount (installed project cost)	**$1,276,836**
Primary ECMs Installed	• **Retrofit interior lighting systems** • **Install new chillers** • **Install new boilers** • **Upgrade energy management system** • **Install variable frequency drives** • **Install laundry ozone generation system and high-efficiency kitchen hood exhaust**
Date Construction Started/ Date Construction Completed	**Start Date: August 2004 Completion Date: March 2005**
Length of Contract Term	**Ten Years**
Type of Project Financing (e.g. tax-exempt lease, COPs, local bank, bonds, etc.)	**County Funds, Bond Issue**
Dollar Value of Projected Annual Energy Savings	**$125,719**
Dollar Value of Guaranteed Annual Energy Savings Dollar Value of Measured Energy Savings Dollar Value of Stipulated Energy Savings	**Guaranteed: $125,626** **Measured: $152,377** **Stipulated: $53,223**
Dollar Value and Type of Annual Operational Cost Savings (if applicable) (e.g., outside maintenance contracts, material savings, etc.)	**$53,223**
Method(s) of Savings Measurement and Verification	**IPMVP Option A: Comprehensive Lighting System Retrofit Installation of a Laundry Ozone system at Sunnyview Nursing Home IPMVP Option B: Upgrade & Extend the Energy Management System at the Government Center** **Install Variable Frequency Drives on Air Handling Units at the Government Center - IPMVP Installation of a kitchen hood system at Sunnyview Nursing Home Installation of Two (2) New Chillers IPMVP Option C: Two (2) New Boilers at the Courthouse Building - Option C**
Name of ESCO **Project Notes**	**CLT Efficient Technologies Group 61 Arch Street, Suite 102 Carnegie, PA 15106 412-279-2000 Website: http://www.cltetg.com/**

The City of Erie

Location of Project	**Erie, PA**
Type of Facility	**Administrative Offices, Fire Houses, Parking Garages**
Number of Buildings/ Total Square Footage	**Seventeen Buildings 267,517 Sq. Ft.**
Pre-Project Annual Utility Costs	**$163,105 (does not include gas utilities and traffic signal utilities)**
Project Dollar Amount (installed project cost)	**$2,241,732**
Primary ECMs Installed	• **Upgrade Municipal Building energy management system and terminal boxes** • **Refurbish Municipal Building air handling unit** • **Replace Municipal Building chilled water and condenser water pumps** • **Upgrade interior lighting in 14 buildings** • **Upgrade traffic signal system city-wide**
Date Construction Started/ Date Construction Completed	**Start Date: August 2004 Completion Date: March 2005**
Length of Contract Term	**Ten Years**
Type of Project Financing (e.g. tax-exempt lease, COPs, local bank, bonds, etc.)	**Bond issue**
Dollar Value of Projected Annual Energy Savings	**$271,151**
Dollar Value of Guaranteed Annual Energy Savings Dollar Value of Measured Energy Savings Dollar Value of Stipulated Energy Savings	**Guaranteed: $271,011 Measured: $280,310 Stipulated: $34,865**
Dollar Value and Type of Annual Operational Cost Savings (if applicable) (e.g., outside maintenance contracts, material savings, etc.)	**$34,865**
Method(s) of Savings Measurement and Verification	**IPMVP Option A: Comprehensive Retrofit of Interior Lighting Systems Retrofit of the Traffic Signal Lights Retrofit/Refurbishment of the Existing Terminal Boxes at the Municipal Building Refurbishment of the Air Handling Unit at the Municipal Building - Engineering Calculations Replacement of the Chilled and Condenser Water Pumps at the Municipal Building IPMVP Option B: Installation of a New DDC System at the Municipal Building**
Name of ESCO **Project Notes**	**CLT Efficient Technologies Group 61 Arch Street, Suite 102 Carnegie, PA 15106 Phone: 412-279-2000 Website: http://www.cltetg.com/**

Greater Nanticoke Area School District

Location of Project	**Nanticoke, PA 18634**
Type of Facility	**K-12 School**
Number of Buildings/ Total Square Footage	**5 buildings totaling 420,000 sq. ft.**
Pre-Project Annual Utility Costs	**$525,000**
Project Dollar Amount (installed project cost)	**$1,305,000**
Primary ECMs Installed	• **Lighting Retrofit & Lighting Controls** • **Boiler System Installation, Energy Recovery Systems** • **Roof Top Replacement & Air Conditioning Upgrades** • **Energy Management System/DDC Control**
Date Construction Started/ Date Construction Completed	**Start Date: 3/04 Completion Date:12/04**
Length of Contract Term	**Ten Years**
Type of Project Financing (e.g. tax-exempt lease, COPs, local bank, bonds, etc.)	**Municipal Lease Purchase**
Dollar Value of Projected Annual Energy Savings	**$111,103 per year**
Dollar Value of Guaranteed Annual Energy Savings Dollar Value of Measured Energy Savings Dollar Value of Stipulated Energy Savings	**$111,103 $61,809 $49,294**
Dollar Value and Type of Annual Operational Cost Savings (if applicable) (e.g., outside maintenance contracts, material savings, etc.)	**$31,500 (lighting, condensing units, boiler room, controls)**
Method(s) of Savings Measurement and Verification	**International Performance Measurement and Verification Protocols (IPMVP) are used as part of our M&V plan. Option C**
Name of ESCO **Project Notes**	**CM3 Building Solutions, Inc. 4667C Somerton Road Trevose, PA 19053 Phone: (215) 322-8400 ext 810 http://www.cm3web.com Customer was satisfied with project results and issued an RFP for a second phase installed during 2007/2008. This project is also over $1,000,000**

Scranton School District

Location of Project	**Scranton, PA 18502**
Type of Facility	**K-12 School**
Number of Buildings/ Total Square Footage	**1 3 buildings**
Pre-Project Annual Utility Costs	**$2,700,000**
Project Dollar Amount (installed project cost)	**$7,443,732**
Primary ECMs Installed	• **Lighting Retrofit & Lighting Controls** • **Boiler Installations** • **Central Steam Loop Conversion** • **Window Replacements** • **Mechanical Retrofits** • **Kitchen Replacement**
Date Construction Started/ Date Construction Completed	**Start Date: 5/2006 Completion Date: 8/2007**
Length of Contract Term	**15 Years**
Type of Project Financing (e.g. tax-exempt lease, COPs, local bank, bonds, etc.)	**Bank Loan**
Dollar Value of Projected Annual Energy Savings	**$964,997**
Dollar Value of Guaranteed Annual Energy Savings Dollar Value of Measured Energy Savings Dollar Value of Stipulated Energy Savings	**$964,997 $747,478 $217,519**
Dollar Value and Type of Annual Operational Cost Savings (if applicable) (e.g., outside maintenance contracts, material savings, etc.)	**$34,890 (lighting products, miscellaneous mechanical, kitchen equipment repair)**
Method(s) of Savings Measurement and Verification	**Option C from the International Performance Measurement and Verification Protocols (IPMVP) is used as part of our M&V plan.**
Name of ESCO **Project Notes**	**CM3 Building Solutions, Inc. 4667C Somerton Road Trevose, PA 19053 Phone: (215) 322-8400 ext 810 http://www.cm3web.com/**

Washington Suburban Sanitary Commission

Location of Project	**Laurel, MD**
Type of Facility	**Wastewater Municipal Authority**
Number of Buildings/ Total Square Footage	**WSSC operates and maintains two water reservoirs with a combined capacity of 14 billion gallons; two water filtration plants that produce an average of 167 million gallons of clean water per day; 14 water pumping stations; six wastewater treatment plants; and 43 wastewater pumping stations. The infrastructure includes 10,200 miles of water and sewer mains. With an operating budget of $494 million, WSSC is among the 10 largest water and wastewater utilities in the nation.**
Pre-Project Annual Utility Costs	**$1,737,340**
Project Dollar Amount (installed project cost)	**$11,960,000**
Primary ECMs Installed	• **Wastewater process improvements** • **Air handling units** • **Energy management system** • **Variable speed drives** • **Lighting retrofits** • **Diesel engines**
Date Construction Started/ Date Construction Completed	**Start Date: 3 main projects (2 capital and one energy procurement) with the earliest starting through a study commissioned in 2001. The energy procurement contract has been extended through June 30, 2019.**
Length of Contract Term	**15 years**
Type of Project Financing (e.g. tax-exempt lease, COPs, local bank, bonds, etc.)	**CEPS assisted WSSC in obtaining long-term, low-interest financing through the State of Maryland's Water Quality Revolving Loan Fund Program.**
Dollar Value of Projected Annual Energy Savings	**$737,340**
Dollar Value of Guaranteed Annual Energy Savings Dollar Value of Measured Energy Savings Dollar Value of Stipulated Energy Savings	**Guaranteed: $661,873** **Measured: $661,873**
Dollar Value and Type of Annual Operational Cost Savings (if applicable) (e.g., outside maintenance contracts, material savings, etc.)	**$375,000**
Method(s) of Savings Measurement and Verification	**FEMP M&V guidelines, Options A, B, C and D**
Name of ESCO **Project Notes**	**Constellation Energy Projects & Services Group, Inc. 1300 Virginia Drive Fort Washington, PA 19034 Phone: (215) 874-4462 Website: http://www.ceprojects.com/ Through RFP process conducted on behalf of WSSC, Constellation selected Edison Mission Group to build a 30 MW wind plant in Somerset County, PA, as part of a 10-year power purchase agreement. Beginning in January 2008, WSSC will receive 85% of the wind project's power output, representing an approximate 70,000 MWh of annual wind purchase, which will provide 33% of the overall electrical requirement for WSSC facilities.**

Cumberland County

Location of Project	**Carlisle, PA**
Type of Facility	**County Government (new and old courthouse, old prison buildings, emergency operations center and nursing home)**
Number of Buildings/ Total Square Footage	**10 Buildings 472,829 Sq. Ft.**
Pre-Project Annual Utility Costs	**$874,733**
Project Dollar Amount (installed project cost)	**$1,896,419**
Primary ECMs Installed	• **Energy Management System** • **Water Conservation** • **Chiller Replacement** • **Boiler Replacement** • **Air handler replacement** • **Lighting upgrades/controls** • **Vending machines controls** • **Cooling tower replacements**
Date Construction Started/ Date Construction Completed	**Start Date: April 2005 Completion Date: April 2006**
Length of Contract Term	**10 Years**
Type of Project Financing (e.g. tax-exempt lease, COPs, local bank, bonds, etc.)	**Bond**
Dollar Value of Projected Annual Energy Savings	**$219,558**
Dollar Value of Guaranteed Annual Energy Savings Dollar Value of Measured Energy Savings Dollar Value of Stipulated Energy Savings	**Guaranteed: $219,558** **Measured: $219,558**
Dollar Value and Type of Annual Operational Cost Savings (if applicable) (e.g., outside maintenance contracts, material savings, etc.)	**$51,996**
Method(s) of Savings Measurement and Verification	**Guaranteed Savings IPMVP Types A and B**
Name of ESCO **Project Notes**	**Constellation Energy Projects & Services Group 1300 Virginia Drive Fort Washington, PA 19034 Phone: (215) 874-4462 Website: http://www.ceprojects.com/** **The savings identified through the M&V process and shown in this table total $271,554. This exceeds the guaranteed amount of savings, by $27,350.**

The Pennsylvania State University - West Halls Residential Complex

Location of Project	**University Park, Pennsylvania**
Type of Facility	**University**
Number of Buildings/ Total Square Footage	**7 buildings 488,460 sq. ft.**
Pre-Project Annual Utility Costs	**$1,007,207**
Project Dollar Amount (installed project cost)	**$1,953,457**
Primary ECMs Installed	• **Lighting and lighting controls** • **Controls upgrade** • **Roof insulation** • **Water conservation** • **Steam system improvements** • **Ventilation optimization** • **Retrocommissioning**
Date Construction Started/ Date Construction Completed	**Start Date: May 2006 Completion Date: December 2006**
Length of Contract Term	**10 years**
Type of Project Financing (e.g. tax-exempt lease, COPs, local bank, bonds, etc.)	**The Pennsylvania State University used self-funding financing.**
Dollar Value of Projected Annual Energy Savings	**$253,877**
Dollar Value of Guaranteed Annual Energy Savings Dollar Value of Measured Energy Savings Dollar Value of Stipulated Energy Savings	**Guaranteed: $253,877 Measured: $152,457 Stipulated: $101,420**
Dollar Value and Type of Annual Operational Cost Savings (if applicable) (e.g., outside maintenance contracts, material savings, etc.)	**$0**
Method(s) of Savings Measurement and Verification	**The measurement and verification plan was developed and presented for prior approval along with the construction proposal. Savings are measured. All excess savings are the property of the site. We abide by the philosophy and guidance of the International Performance Measurement and Verification Protocol (IPMVP).**
Name of ESCO **Project Notes**	**Custom Energy Services, LLC, *A ConEdision Solutions Company*** **3 Chartwell Court** **Baltimore, MD 21117** **Phone: (410) 363-0654** **Website: http://www.customenergy.com/** **Challenge: The University's residential complex has 7 buildings which are 60 - 80 years old. Many were beginning to develop problems due to age and chronic heating challenges in the winter months.** **Solution: We performed a detailed audit to see how the buildings were using energy and proposed a complete set of energy saving measures. The energy efficient improvements are completely self-funded by the energy savings they create.**

Penn State University - Harrisburg

Location of Project	**Harrisburg, Pennsylvania**
Type of Facility	**University**
Number of Buildings/ Total Square Footage	**17 buildings 643,274 sq. ft.**
Pre-Project Annual Utility Costs	**$988,308**
Project Dollar Amount (installed project cost)	**$1,715,787**
Primary ECMs Installed	• **Lighting system improvements** • **Water conservation** • **Energy management system optimization and communication network upgrade** • **Variable air volume system modifications** • **Weatherization** • **Retro-commissioning** • **Energy awareness training**
Date Construction Started/ Date Construction Completed	**Start Date: August 2006 Completion Date: April 2007**
Length of Contract Term	**10 years**
Type of Project Financing (e.g. tax-exempt lease, COPs, local bank, bonds, etc.)	**The Pennsylvania State University used self-funding financing for this project.**
Dollar Value of Projected Annual Energy Savings	**$199,743**
Dollar Value of Guaranteed Annual Energy Savings Dollar Value of Measured Energy Savings Dollar Value of Stipulated Energy Savings	**Guaranteed: $191,353 Measured: $ 82,798 Stipulated: $108,555**
Dollar Value and Type of Annual Operational Cost Savings (if applicable) (e.g., outside maintenance contracts, material savings, etc.)	**$0**
Method(s) of Savings Measurement and Verification	**Savings are measured. All excess savings are the property of the site. We abide by the philosophy and guidance of the International Performance Measurement and Verification Protocol (IPMVP).**
Name of ESCO **Project Notes**	**Custom Energy Services, LLC, *A ConEdision Solutions Company*** **3 Chartwell Court Baltimore, MD 21117 Phone: (410) 363-0654 Website: http://www.customenergy.com/** **Challenge: The staff wanted to make changes on the campus to save energy and reduce gas emissions. Much of the plumbing was standard-flow, and the lighting consisted of magnetic ballasts.** **Solution: New lighting and plumbing fixtures, control systems for heating and cooling, weatherization upgrades to windows and doors, and other "green" enhancements were implemented.**

York College - Queens

Location of Project	**Queens, NY**
Type of Facility	**Higher Education**
Number of Buildings/ Total Square Footage	**Three Buildings 840,000 Sq. Ft.**
Pre-Project Annual Utility Costs	**$1 Million**
Project Dollar Amount (installed project cost)	**$6.9 Million**
Primary ECMs Installed	• New replacement chillers • New/replacement boilers • Variable speed drives • New/replacement motors • Energy management system • Piping/steam distribution • Pumps & Priming systems • New/replacement cooling towers
Date Construction Started/ Date Construction Completed	**Start Date: August 2003 Completion Date: June 2004**
Length of Contract Term	**February 2002 – December 2006**
Type of Project Financing (e.g. tax-exempt lease, COPs, local bank, bonds, etc.)	**Dormitory Authority – State of New York Bonds**
Dollar Value of Projected Annual Energy Savings	**$151,890**
Dollar Value of Guaranteed Annual Energy Savings Dollar Value of Measured Energy Savings Dollar Value of Stipulated Energy Savings	**Guaranteed: $106,323 Measured: $ 96,000 Stipulated: $151,890**
Dollar Value and Type of Annual Operational Cost Savings (if applicable) (e.g., outside maintenance contracts, material savings, etc.)	
Method(s) of Savings Measurement and Verification	**International Performance Measurement and Verification Protocol (IPMVP) – Option B, including sub-metered performance testing of all new equipment.**
Name of ESCO Project Notes	**DMJM Harris 260 South Broad St. Suite 1500 Philadelphia, PA 19102 Phone: (215) 966-4884 Website: http://www.dmjmharris.com**

Rowland Unified School District - CA

Location of Project	**Rowland Heights CA**
Type of Facility	**K-12 School District**
Number of Buildings/ Total Square Footage	**24 Buildings 1,359,647 Sq. Ft.**
Pre-Project Annual Utility Costs	**$2,241,855**
Project Dollar Amount (installed project cost)	**$16.2 Million**
Primary ECMs Installed	• New replacement chillers • Lighting Retrofits • Micro turbines • New/replacement motors • Energy management system • Air-cooled Condensers • Economisers (air-sided) • Controls/Occupancy Sensors
Date Construction Started/ Date Construction Completed	**Start Date: 2004 Completion Date: 2007**
Length of Contract Term	**2004 - 2007**
Type of Project Financing (e.g. tax-exempt lease, COPs, local bank, bonds, etc.)	**Rowland Unified School District**
Dollar Value of Projected Annual Energy Savings	**$696,101**
Dollar Value of Guaranteed Annual Energy Savings Dollar Value of Measured Energy Savings Dollar Value of Stipulated Energy Savings	**Guaranteed: $556,881 Measured: $609,069 Stipulated: $696,101**
Dollar Value and Type of Annual Operational Cost Savings (if applicable) (e.g., outside maintenance contracts, material savings, etc.)	
Method(s) of Savings Measurement and Verification	**International Performance Measurement and Verification Protocol (IPMVP) – Option B, including sub-metered performance testing of all new equipment.**
Name of ESCO Project Notes	**DMJM Harris 260 South Broad St. Suite 1500 Philadelphia, PA 19102 Phone: (215) 966-4884 Website: http://www.dmjmharris.com**

Northampton County

Location of Project	**Easton, PA**
Type of Facility	**County Government Complex, Mixed use facilities**
Number of Buildings/ Total Square Footage	**7 Buildings 650,000 Sq. Ft.**
Pre-Project Annual Utility Costs	**$3,000,000**
Project Dollar Amount (installed project cost)	**$6,208,650**
Primary ECMs Installed	• **Central Boiler and chiller plant** • **Lighting upgrades Site Wide** • **Water Conservation Site Wide** • **New Chillers at Nursing Home** • **Laundry Ozone System** • **Building Controls/Energy management system** • **New Rooftop AHU's**
Date Construction Started/ Date Construction Completed	**Start Date: January 2000 Completion Date: March 2001**
Length of Contract Term	**10 years**
Type of Project Financing (e.g. tax-exempt lease, COPs, local bank, bonds, etc.)	**Municipal Bond**
Dollar Value of Projected Annual Energy Savings	**$542,000**
Dollar Value of Guaranteed Annual Energy Savings Dollar Value of Measured Energy Savings Dollar Value of Stipulated Energy Savings	**Guaranteed: $542,000 Measured: $624,440 Stipulated: $ 98,891**
Dollar Value and Type of Annual Operational Cost Savings (if applicable) (e.g., outside maintenance contracts, material savings, etc.)	**$98,891 Maintenance Contracts**
Method(s) of Savings Measurement and Verification	**IPMVP Options A and B**
Name of ESCO Project Notes	**Johnson Controls Inc 195 Limekiln Rd New Cumberland, PA 17070 Phone: (717)-712-181 Website: http://www.johnsoncontrols.com**

PA Department of Corrections - SCI Cresson

Location of Project	**Cresson, PA**
Type of Facility	**State Correctional Facility**
Number of Buildings/ Total Square Footage	**33 Buildings**
Pre-Project Annual Utility Costs	**$3,100,000**
Project Dollar Amount (installed project cost)	**$9,127,170**
Primary ECMs Installed	• **Bio Mass Boiler and Co-Gen plant** • **Steam and Condensate Line repairs** • **Lighting and Water conservation** • **Building envelope and Insulation upgrades** • **New AHU's and HE Motors** • **Steam Trap program** • **Domestic water control upgrades**
Date Construction Started/ Date Construction Completed	**Start Date: September 2006 (Phase 1) Completion Date: February 2008 (Phase 1)**
Length of Contract Term	**15 Years**
Type of Project Financing (e.g. tax-exempt lease, COPs, local bank, bonds, etc.)	**Tax Exempt Lease**
Dollar Value of Projected Annual Energy Savings	**$843,743**
Dollar Value of Guaranteed Annual Energy Savings Dollar Value of Measured Energy Savings Dollar Value of Stipulated Energy Savings	**Guaranteed: $830,371** **Measured: $831,265** **Stipulated: $ 31,267**
Dollar Value and Type of Annual Operational Cost Savings (if applicable) (e.g., outside maintenance contracts, material savings, etc.)	
Method(s) of Savings Measurement and Verification	**IPMVP Option A and B**
Name of ESCO **Project Notes**	**Johnson Controls Inc 195 Limekiln Rd New Cumberland, Pa 17070 (717)-712-1817 Website: http://www.johnsoncontrols.com**

PA Department of Corrections, SCI Camp Hill

Location of Project	**Camp Hill, PA**
Type of Facility	**State Correctional Complex**
Number of Buildings/ Total Square Footage	**29 Buildings 772,000 Sq. Ft.**
Pre-Project Annual Utility Costs	**$1,600,000**
Project Dollar Amount (installed project cost)	**$3,843,315**
Primary ECMs Installed	**The project scope of work included a total of 12 ECMs. The primary ECMs are:** • **Lighting** • **Boiler tune-ups** • **Digital controls** • **Energy management system** • **Water conservation measures** • **Variable frequency drives** • **Condensate improvements** • **Return systems** • **Steam trap repairs**
Date Construction Started/ Date Construction Completed	**Start Date: July 2002 Completion Date: January 2004**
Length of Contract Term	**Ten Years**
Type of Project Financing (e.g. tax-exempt lease, COPs, local bank, bonds, etc.)	**Tax-exempt municipal lease**
Dollar Value of Projected Annual Energy Savings	**$510,996**
Dollar Value of Guaranteed Annual Energy Savings Dollar Value of Measured Energy Savings Dollar Value of Stipulated Energy Savings	**Guaranteed: $510,996** **Measured: Year 1: $548,654 – Year 2: $558,619 – Year 3: $583,915**
Dollar Value and Type of Annual Operational Cost Savings (if applicable) (e.g., outside maintenance contracts, material savings, etc.)	**$99,319 in material savings**
Method(s) of Savings Measurement and Verification	**The IPMVP Option A was used for all of the above-listed ECMs.**
ESCO Name **Project Notes**	**NORESCO 4 Penn Center West Suite 220 Pittsburgh, PA 15276 Phone: (412) 788-4044 Website: http://noresco.com** **After the first year measurement and verification period, the future years' savings are represented as stipulated per contract.**

Westmoreland County

Location of Project	**Greensburg, PA**
Type of Facility	**County Government Administrative and Correctional Facility**
Number of Buildings/ Total Square Footage	**12 Buildings 1,113,712 Sq. Ft.**
Pre-Project Annual Utility Costs	**$2,100,000**
Project Dollar Amount (installed project cost)	**$6,529,233**
Primary ECMs Installed	**The project scope of work included a total of 8 ECMs. The primary ECMS are:** • **Lighting** • **Variable frequency drives** • **Energy management system** • **Boiler plants** • **Water conservation measures** • **I-Con System Plumbing** • **Controls and valves** • **Cooling tower upgrades**
Date Construction Started/ Date Construction Completed	**Start Date: September 2002 Completion Date: March 2004**
Length of Contract Term	**Ten Years**
Type of Project Financing (e.g. tax-exempt lease, COPs, local bank, bonds, etc.)	**General Obligation Bonds**
Dollar Value of Projected Annual Energy Savings	**$717,886**
Dollar Value of Guaranteed Annual Energy Savings Dollar Value of Measured Energy Savings Dollar Value of Stipulated Energy Savings	**Guaranteed: $717,886** **Measured: Year 1: $785,744 – Year 2: $1,017,829 – Year 3: $1,151,349**
Dollar Value and Type of Annual Operational Cost Savings (if applicable) (e.g., outside maintenance contracts, material savings, etc.)	**$43,290 in material savings**
Method(s) of Savings Measurement and Verification	**The IPMVP Option A was used for all of the above-listed ECMs.**
Name of ESCO **Project Notes**	**NORESCO 4 Penn Center West Suite 220 Pittsburgh, PA 15276 Phone: (412) 788-4044 Website: http://noresco.com** **This project underscores NORESCO's ability to effectively develop and implement multi-site projects across a variety of facility types. Dollar savings are based on current utility rates. The project's units of energy savings continue to over-perform the guaranteed values each year.**

Pennsylvania State University – Altoona Campus

Location of Project	**Altoona, PA**
Type of Facility	**Higher Education**
Number of Buildings/ Total Square Footage	**28 Buildings 575,376 Sq. Ft.**
Pre-Project Annual Utility Costs	**$936,995**
Project Dollar Amount (installed project cost)	**$3,485,372**
Primary ECMs Installed	• **Rooftop HVAC Replacements** • **Boilers Replacements** • **Air Handling Unit Replacements** • **Building Automation Controls** • **Lighting Upgrades** • **Building Envelope Improvements** • **Occupancy Sensors** • **Heat Recovery Unit** • **Air Balancing**
Date Construction Started/ Date Construction Completed	**Start Date: July 2007 Completion Date: April 2008**
Length of Contract Term	**Ten Years**
Type of Project Financing (e.g. tax-exempt lease, COPs, local bank, bonds, etc.)	**Self financed by Penn State University**
Dollar Value of Projected Annual Energy Savings	**$360,000**
Dollar Value of Guaranteed Annual Energy Savings Dollar Value of Measured Energy Savings Dollar Value of Stipulated Energy Savings	**Guaranteed: $360,000 Measured: $339,000 Stipulated: $21,000**
Dollar Value and Type of Annual Operational Cost Savings (if applicable) (e.g., outside maintenance contracts, material savings, etc.)	**None**
Method(s) of Savings Measurement and Verification	**IPMVP Options A, B and D**
Name of ESCO Project Notes	**PEPCO Energy Services 1300 North 17th Street Suite 1600 Arlington, VA Phone (703) 253-1750 Website: http://www.pepcoenergy.com PEPCO identified, designed and managed the installation of all energy conservation measures throughout campus.**

Millville Area School District

Location of Project	**Millville, PA**
Type of Facility	**K-12 School District**
Number of Buildings/ Total Square Footage	**2 Buildings 169,223 Sq. Ft.**
Pre-Project Annual Utility Costs	**$195,150**
Project Dollar Amount (installed project cost)	**$2,995,167**
Primary ECMs Installed	• **M1 Water Cooler Timers** • **M2 Vending Machine Controls** • **M3 Demand Control Ventilation** • **M7 HS Heating System Optimization** • **M8 ES Dishwasher/ HS Steamer** • **M10 ES DHW Insulation** • **L1-L5 Lighting - Combined** • **BE1-BE5 HS Roof** • **BE6-BE11 HS Windows and Doors** • **BE12 ES Roof**
Date Construction Started/ Date Construction Completed	**Start Date: May 2005 Completion Date: January 2006**
Length of Contract Term	**15 Years**
Type of Project Financing (e.g. tax-exempt lease, COPs, local bank, bonds, etc.)	**Municipal Lease-Purchase**
Dollar Value of Projected Annual Energy Savings	**$55,950**
Dollar Value of Guaranteed Annual Energy Savings Dollar Value of Measured Energy Savings Dollar Value of Stipulated Energy Savings	**Guaranteed: $44,519 Measured: $44,666**
Dollar Value and Type of Annual Operational Cost Savings (if applicable) (e.g., outside maintenance contracts, material savings, etc.)	**$63,250**
Method(s) of Savings Measurement and Verification	**IPMVP Option A, Lighting Retrofits IPMVP Option B, Mechanicals**
Name of ESCO Project Notes	**PPL Energy Services 4101 North 6th Street Harrisburg, PA 17110 Phone: (717) 232-9743 http://www.pplenergyservices.com/**

Juniata County School District

Location of Project	**Mifflintown, PA**
Type of Facility	**K-12 School District**
Number of Buildings/ Total Square Footage	**3 Buildings 441,529 Sq. Ft.**
Pre-Project Annual Utility Costs	**$557,380**
Project Dollar Amount (installed project cost)	**$2,423,482**
Primary ECMs Installed	• **M1 Water Cooler Timers** • **M2A Vending Machine Controls – East and TJ** • **M2B Vending Machine Controls – Juniata** • **M3.1 Juniata Central Plant Retrofit** • **M4 Juniata DHW Heater Conversion** • **L1 Lighting – Elementary** • **L2 Lighting – East and TJ** • **L3 Lighting – Juniata**
Date Construction Started/ Date Construction Completed	**Start Date: May 2005 Completion Date: September 2005**
Length of Contract Term	**15 years**
Type of Project Financing (e.g. tax-exempt lease, COPs, local bank, bonds, etc.)	**Municipal Lease - Purchase**
Dollar Value of Projected Annual Energy Savings	**$149,950**
Dollar Value of Guaranteed Annual Energy Savings Dollar Value of Measured Energy Savings Dollar Value of Stipulated Energy Savings	**Guaranteed: $119,951 Measured: $141,106**
Dollar Value and Type of Annual Operational Cost Savings (if applicable) (e.g., outside maintenance contracts, material savings, etc.)	**$34,734**
Method(s) of Savings Measurement and Verification	**IPMVP Option A, Lighting Retrofits IPMVP Option B, Mechanical**
Name of ESCO Project Notes	**PPL Energy Services 4101 North 6th Street Harrisburg, PA 17110 Phone: (717) 232-9743 http://www.pplenergyservices.com/**

Steel Center Area Vocational Technical School

Location of Project	**Clairton, PA**
Type of Facility	**Vocational and technical education provider to high school students residing in 11 different school districts in southern Allegheny County..**
Number of Buildings/ Total Square Footage	**(3) Mon Valley, Steel Center and Boiler/Chiller House 264,000 Sq. Ft.**
Pre-Project Annual Utility Costs	**$656,293 (Electric/Gas/Water)**
Project Dollar Amount (installed project cost)	**$1,193,460**
Primary ECMs Installed	**Campus-wide program: optimization of the central steam boiler and chilled water plant, lighting upgrades, facility management system and air distribution system upgrades; air handling system serving the pool at Mon Valley School was upgraded to provide optimal environmental conditions, along with ongoing support program. Implementation of educational partnership through apprenticeship program with two students.**
Date Construction Started/ Date Construction Completed	**05/1998 01/1999**
Length of Contract Term	**10 Years**
Type of Project Financing (e.g. tax-exempt lease, COPs, local bank, bonds, etc.)	**Third Party Financing**
Dollar Value of Projected Annual Energy Savings	**$152,024**
Dollar Value of Guaranteed Annual Energy Savings Dollar Value of Measured Energy Savings Dollar Value of Stipulated Energy Savings	**$152,024 Guaranteed $165,504 Measured Energy Savings in Year 1 Customer agreed to calculated usage savings given in the M & V Report after the retrofit.**
Dollar Value and Type of Annual Operational Cost Savings (if applicable) (e.g., outside maintenance contracts, material savings, etc.)	**Yr. 1 – $87,099 Yr. 2 - $280,755 Baseline Adjustment and Operational Savings (Years 2-10 escalated 3% per year)**
Method(s) of Savings Measurement and Verification	**Pre and Post measurements Continuous periodic measurements**
Name of ESCO Project Notes	**Siemens Building Technologies, Inc. 1450 Union Meeting Rd. Bluebell, PA 19422 Phone: (800) 716-6396 Website: http://www.buildingtechnologies.usa.siemens.com/ Project savings greater than expectations due to continuous advance control strategies implemented by Siemens and continuous energy saving adjustments made by customer.**

Mack Trucks, Inc., Macungie Assembly Operations

Location of Project	**Macungie, PA 18062**
Type of Facility	**Manufacturing facility that assembles on-highway trucks for vocational use. This is a production facility and includes a some office space and some warehouse space.**
Number of Buildings/ Total Square Footage	**(1) Building Approx. 1,000,000 Sq. Ft.**
Pre-Project Annual Utility Costs	**$2,487,525**
Project Dollar Amount (installed project cost)	**$2,734,856**
Primary ECMs Installed	• **Lighting Improvements** • **Building Automation/Energy Management System - Lighting Controls, ventilation fans/pressurization control, Paint booth exhaust fan controls, Office night temperature set back** • **Boiler plant retrofit and other heating system improvements** • **Engine Exhaust (tailpipe) ventilation system** • **Paint Booth Heat Recovery for space heating** • **Compressed air system modifications** • **Energy Supply Procurement Management**
Date Construction Started/ Date Construction Completed	**Start Date: 5/1/2006** **Completion Date: 12/31/2006**
Length of Contract Term	**7 Years**
Type of Project Financing (e.g. tax-exempt lease, COPs, local bank, bonds, etc.)	**Owner's Capital**
Dollar Value of Projected Annual Energy Savings	**Yr. 1 - $ 294,206 (partial year)** **Yr. 2 - $ 604,996 (full year)**
Dollar Value of Guaranteed Annual Energy Savings **Dollar Value of Measured Energy Savings** **Dollar Value of Stipulated Energy Savings**	**Yr. 1 Guaranteed Annual Energy Savings - $ 294,206** **Yr. 1 Measured Energy Savings - $ 197,972** **Yr. 1 Stipulated Energy Savings - $ 19,479** **Guaranteed savings adjusted due to customer's construction schedule delays** **Yr. 2 Guaranteed Annual Energy Savings - $ 564,466** **Yr. 2 Measured Energy Savings - $ 683,333** **Yr. 2 Stipulated Energy Savings - $ 171,491**
Dollar Value and Type of Annual Operational Cost Savings (if applicable) (e.g., outside maintenance contracts, material savings, etc.)	**Yr. 1 - $106,000** **Yr. 2 - $63,448 (Years 2-7 escalated 3% per year)**
Method(s) of Savings Measurement and Verification	**Pre and Post measurements – Lighting Retrofit, Compressor replacement** **Continuous periodic measurements – All EMS related measures, chilled water loop VFD on compressors** **Stipulated – Boiler Plant Retrofit, Engine Exhaust Retrofit, Paint Booth Heat Recovery**
Name of ESCO **Project Notes**	**Siemens Building Technologies, Inc.** **1450 Union Meeting Rd.** **Bluebell, PA 19422** **Phone: (800) 716-6396** **Website: http://www.buildingtechnologies.usa.siemens.com/** **Project savings greater than expected due to advance control strategies implemented by Siemens and continuous energy saving adjustments made by customer. 2nd year savings are greater than 30% compared to pre-contract baseline.**

Hiram G. Andrews Center

Location of Project	**Johnstown, PA 15905**
Type of Facility	**Trade school for handicapped individuals with dormitories.**
Number of Buildings/ Total Square Footage	**1 building 550,000 SF**
Pre-Project Annual Utility Costs	**$472,956 (Average Annual Expenditure 2000 to 2002)**
Project Dollar Amount (installed project cost)	**Phase 1: $8,041,000; Phase 2: $4,815,774; Phase 3: $2,146,376**
Primary ECMs Installed	**Phase 1: Fuel conversion (coal to dual fuel) of Centralized Steam Plant Installation of 400 KW electric turbine Indoor and outdoor lighting upgrades HVAC improvements with limited DDC controls Phase 2: Expansion of DDC controls Expansion of HVAC upgrades and improved ventilation Replacement of windows Water conservation within kitchen area Phase 3: Installation of 500 Ton electric chiller Re-design of Centralized Chiller Plant Installation of CCTV and Security Access system Expansion of DDC controls Expansion of HVAC upgrades**
Date Construction Started/ Date Construction Completed	**Phase 1: Start Date: July 2002; Completion Date: November 2003 Phase 2: Start Date: July 2005; Completion Date: January 2007 Phase 3: Start Date: February 2008; Completion Date: October 2008**
Length of Contract Term	**Phase 1: 10 year term Phase 2: 10 year term Phase 3: 15 year term**
Type of Project Financing (e.g. tax-exempt lease, COPs, local bank, bonds, etc.)	**Each phase was funded through the client's deferred maintenance budget**
Dollar Value of Projected Annual Energy Savings	**Phase 1: $1,336,229 Phase 2: $ 511,753 Phase 3: $ 226,661**
Dollar Value of Guaranteed Annual Energy Savings Dollar Value of Measured Energy Savings Dollar Value of Stipulated Energy Savings	**Phase 1: Guaranteed: $(85,887) Measured: $(85,887) Phase 2: Guaranteed: $106,084 Measured: $106,084 Phase 3: Guaranteed: $192,662 Measured: $192,662 There are no stipulated energy savings for all phases.**
Dollar Value and Type of Annual Operational Cost Savings (if applicable) (e.g., outside maintenance contracts, material savings, etc.)	**Phase 1: $410,683 – miscellaneous O&M, maintenance contracts, and attrition of central plant employees Phase 2: $405,470 – Miscellaneous O&M and avoided maintenance contracts. Phase 3: $0**
Method(s) of Savings Measurement and Verification	**Phase 1: IPMVP Option A and Option B – Pre and Post measurements Phase 2: IPMVP Option A and Option B – Pre and Post measurements Phase 3: IPMVP Option C – Utility Meter**
Name of ESCO Project Notes	**TAC Americas, Inc. 4431 North Front Street, Suite 100 Harrisburg, PA 17110-1709 Phone: (814) 937-7602 Website: http://www.tac.com/us/**

Capital Area Intermediate Unit #15

Location of Project	**Summerdale, PA**
Type of Facility	**Regional Educational and Office Facility for Pennsylvania Department of Education's Region 15**
Number of Buildings/ Total Square Footage	**1 Building 86,000 square feet**
Pre-Project Annual Utility Costs	**$104,422**
Project Dollar Amount (installed project cost)	**$345,076**
Primary ECMs Installed	• **Energy management system** • **Direct digital controls** • **Modulating burners on boilers** • **Lighting retrofit** • **Air Sealing Wall Roof Edges and Soffits**
Date Construction Started/ Date Construction Completed	**Start Date: January 2006 Completion Date: August 2006**
Length of Contract Term	**12 Year Guarantee Term**
Type of Project Financing (e.g. tax-exempt lease, COPs, local bank, bonds, etc.)	**Cash Purchase**
Dollar Value of Projected Annual Energy Savings	**$28,595**
Dollar Value of Guaranteed Annual Energy Savings Dollar Value of Measured Energy Savings Dollar Value of Stipulated Energy Savings	**Guaranteed Annual Energy - $24,306 Measured: $24,306. All energy savings are measured via utility bills. No stipulated energy savings are required with this project.**
Dollar Value and Type of Annual Operational Cost Savings (if applicable) (e.g., outside maintenance contracts, material savings, etc.)	**No Stipulated O&M Savings**
Method(s) of Savings Measurement and Verification	**IPMVP Option C – Utility Meter**
Name of ESCO Project Notes	**TAC Americas, Inc. 4431 North Front Street Suite 100 Harrisburg, PA 17110-1709 Phone: (814) 937-7602 Website: http://www.tac.com/us/**

RESOURCES

State

Pennsylvania Department of General Services
Room 414 North Office Building
Harrisburg, Pennsylvania 17120
717-346-1426
http://www.portal.state.pa.us/portal/server.pt?open=512&objID=1300&&SortOrder=100&level=3&parentid=1298&css=L3&mode=2&cached=true (Cut and paste link into your browser)

Penn State Facilities Engineering Institute (PSFEI)
https://fei.psu.edu/home2/energy/Gesa.aspx

Governor's Green Government Council
http://www.gggc.state.pa.us/gggc/site/default.asp

Pennsylvania Department of Environmental Protection
Office of Energy and Technology Deployment
PO Box 8772
Harrisburg, PA 17105-8772
717-783-0540
http://www.depweb.state.pa.us/energy/cwp/view.asp?a=3&q=482723

Federal

U.S. Department of Energy
http://www.energy.gov/

U.S. Department of Energy: Energy Efficiency and Renewable Energy
http://www.eere.energy.gov/

U.S. Department of Energy: Rebuild America Program
http://www1.eere.energy.gov/buildings/information_resources.html

U.S. Department of Energy: Federal Energy Management Program (FEMP)
http://www1.eere.energy.gov/femp/

U.S. Environmental Protection Agency: Energy Star Program
http://www.energystar.gov/

U.S. Green Building Council
http://www.usgbc.org/

Associations and Organizations

Alliance to Save Energy (ASE)
http://www.ase.org/

American Council for an Energy Efficient Economy (ACEEE)
http://www.aceee.org/

American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE)
http://www.ashrae.org/

Association of Energy Engineers (AEE)
http://www.aeecenter.org/

Efficiency Valuation Organization (EVO)
http://www.evo-world.org/

Energy Services Coalition (ESC)
http://www.energyservicescoalition.org/

International Performance Measurement Verification Protocol (IPMVP)
http://www.evo-world.org/

National Association of State Energy Officials (NASEO)
1414 Prince Street, Suite 200
Alexandria, Virginia 22314
Phone: (703) 299-8800
http://www.naseo.org/

National Association of Energy Service Companies (NAESCO)
1615 M Street NW, Suite 800
Washington, DC 20036
202-822-0950
http://www.naesco.org

Sustainable Buildings Industry Council (SBIC)
http://www.sbicouncil.org/