

Commonwealth of Massachusetts
Office of Consumer Affairs and Business Regulation

Division of Energy Resources

ENERGY MANAGEMENT SERVICES MANUAL:

*PROVIDING ENERGY SAVINGS THROUGH
ENERGY PERFORMANCE CONTRACTING*



Mitt Romney
Governor

Kerry Healey
Lieutenant Governor

Beth Lindstrom
Director, Office of Consumer
Affairs and Business Regulation

David L. O'Connor
Commissioner, Division of Energy

TABLE

Introduction	1
I: FUNDAMENTAL CONCEPTS OF ENERGY MANAGEMENT SERVICES	3
Sources of Financing	4
Suitable Projects	4
Project Size	5
Multiple Measures	5
Stable Building Use	5
II: THIRD-PARTY FINANCING OVERVIEW	6
Cost-Benefit Methods	6
Simple Payback	7
Internal Rate of Return	7
Net Present Value	7
Summary	8
III: ADVANTAGES AND DISADVANTAGES	9
Benefits	9
Drawbacks	10
Cream Skimming	11
Risk Sharing and Assurances	11
IV: OVERVIEW OF THE DECISION PROCESS	13
V: UNDERSTANDING HOW BUILDINGS USE ENERGY	15
Energy Efficiency and Indoor Air Quality	16
VI: REQUEST FOR RESPONSE DRAFTING GUIDELINES	18
Improving the RFR Process	18
VII: ENERGY AUDIT	20
VIII: SAVINGS CALCULATION OPTIONS	21
Basic Steps	21
Savings Calculations and Verification Methodology	22
Whole-Building Approach	22
Individual Measure Approach	24
International Performance Measurement & Verification Protocol Options	26
Renewable Energy Projects	27
IX: ELEMENTS OF THE ENERGY MANAGEMENT SERVICES CONTRACT	28
Types of Contracts	28
Key Elements	28
X: COMMISSIONING AND MONITORING	31
Commissioning	31
Monitoring	31
Electric Energy	32
Electrical Demand	32
Chilled & Hot Water	32
Indoor Environmental Quality	32
XI: FREQUENTLY ASKED QUESTIONS	33
GLOSSARY	37
REFERENCE	40
APPENDIX A: CERTIFICATE OF COMPLIANCE CHECKLIST	43

APPENDIX B: M.G.L. C.25A §11C. SUMMARY	46
APPENDIX C: STATUTE: C.25A, §11C	49
APPENDIX D: 225 C.M.R. 10.00. SUMMARY	52
APPENDIX E: REGULATIONS: 225 C.M.R.10.00	55
APPENDIX F: PRELIMINARY SITE ASSISSMENT	63
APPENDIX G: FACILITY DATA	67

Figure 1: Cost Savings over the Term of a Project	1
Figure 2: Decision Process	14
Figure 3: Whole Building Approach	23
Figure 4: Individual Measure Approach	25
Table 1: Calculating Net Present Value	8
Table 2: Fuel Consumption and Cost Data	15
Table 3: Energy Efficiency Measures and Potential Adjustments	16

LIST OF ABBREVIATIONS

DOER	Division of Energy Resources
DHCD	Department of Housing and Community Development
DCAM	Division of Capital Asset Management
ECM	Energy Conservation Measure
EMS	Energy Management Services (A specific type of Energy Performance Contract under Massachusetts's law)
EPC	Energy Performance Contract
ESCO	Energy Services Company
IEQ/IAQ	Indoor Environmental Quality/Indoor Air Quality
IPMVP	International Performance Measurement & Verification Protocol
NPV	Net Present Value
RFR	Request for Response (Request for Performance)

Acknowledgements

The Division of Energy Resources' prepared this guide under the direction of Eileen McHugh. Readers may obtain specific information concerning the report from the Division at (617) 727-4732

DOER would like to thank the U.S. Department of Energy for its assistance with these documents

Disclaimer

This document is for informational purposes only. The information contained within is general and subject to change. It is intended to serve as an introduction to elements pertaining to energy management services (energy performance contracting) and should not be used as a substitute for a thorough analysis of facts and the law. The document is not intended to provide legal or technical advice.

The Commonwealth of Massachusetts and DOER make no warranties, expressed or implied, and assume no legal liability or responsibility for the accuracy, completeness, or usefulness of any information provided within this document. The views and opinions expressed herein do not necessarily state or reflect those of the Commonwealth of Massachusetts, any agency thereof, or any of the organizations and individuals that have offered comments as this document was being drafted.

The Internet website addresses provided in this document were accurate as of the date of publication. However, website addresses are subject to change by the website administrator. Therefore, some website addresses may become invalid over time.

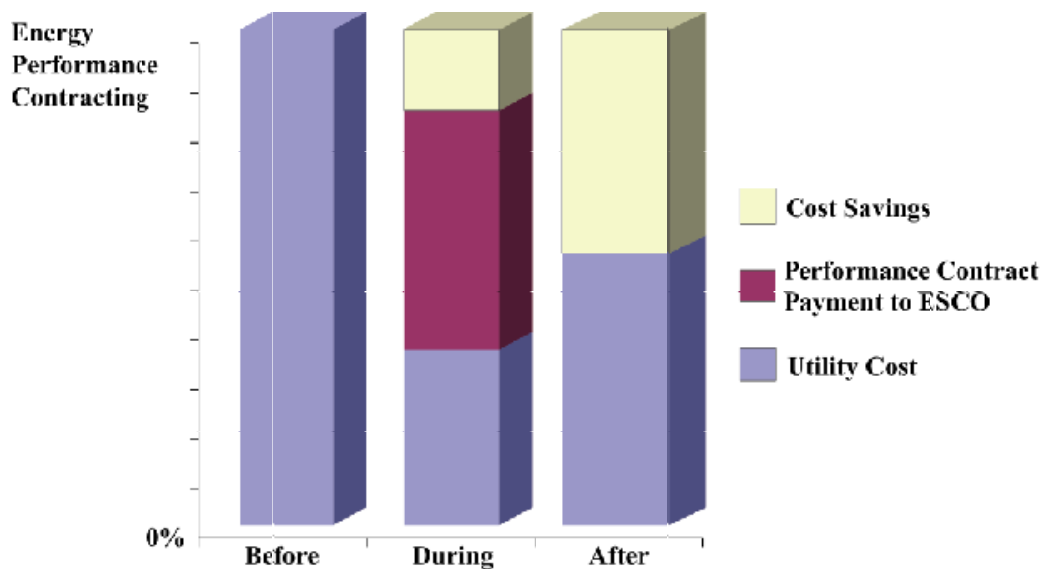
INTRODUCTION

The Massachusetts Division of Energy Resources prepared this document to help Municipalities understand how to improve the energy efficiency of buildings through **Energy Management Services (EMS)**. *This document is not intended as an all-inclusive guide but instead as a reference to highlight existing material and guides, and to convey the Commonwealth's enabling law (M.G.L. c.25A, §11C) and regulation (225 C.M.R. 10.00) for EMS.* Please refer to Appendix A for a list of references to documents, guides and tools. Most, if not all, are available on-line.

In Massachusetts, Public Agencies may contract with an Energy Services Company (ESCO) for the provision of Energy Management Services if the primary purpose for doing so is to reduce energy or water consumption. Under M.G.L. c.25A §11C, Public Agencies seeking to improve the energy efficiency of a facility may contract with an ESCO to design, purchase, install, operate and maintain its energy systems. Public Agencies seeking to contract with ESCOs for the purpose of reducing *operational and maintenance costs* **may not** use M.G.L. c.25A §11C or 225 C.M.R. 10.00.

M.G.L. c.25A §11C authorizes procurement for energy and utility conservation services, and cogeneration, known as energy management services, with three significant differences from other state procurements (under M.G.L. c.30B and M.G.L. c.149). First, it allows a design-build process that provides continuity in the conceptualization, engineering & design, construction, and monitoring. ***Second, once a contract is awarded it allows the project to proceed from design to closeout without further public bidding.*** Third, it is paid for by utility savings that are guaranteed by the Contractor; there is no public funding. In other words, an ESCO makes capital improvements to the premises and, in return, receives a portion of cost savings attributed to the ESCO's performance on energy expenditures. The following chart illustrates costs and savings to a facility under an Energy Management Services arrangement.

Figure 1: Cost Savings over the Term of a Project



Source: *Guide to Energy Performance Contracting*, Hawaii
Department of Business, Economic Development, & Tourism

Public Agencies may purchase a variety of building equipment and services under an EMS. Commonly implemented improvements include energy efficient lighting, air-conditioning systems, energy management control systems, motor replacements, and variable-speed drives for pumps and fans. Generally, an ESCO includes any improvement expected to recover its own cost in energy savings over the term of the agreement. This means that longer payback items, such as adding ceiling insulation or replacing windows, usually do not qualify unless they are bundled¹ with quick payback items such as energy efficient lighting.

In addition to equipment installation, the ESCO may propose various repair and maintenance services. Often contractors propose repairs to existing systems, such as re-installation of damaged or missing controls or repairs of leaks in chilled water piping, etc. The contractor may assume responsibility for preventive maintenance and repairs to all new equipment installed. The contractor may also offer to take responsibility for maintenance and even operation of existing equipment. For example, the contractor may offer to provide remote monitoring and adjustment of temperature setpoints with a computerized temperature control system.²

In Massachusetts, three agencies oversee Energy Management Services: 1) the Department of Housing and Community Development (DHCD) presides over Housing Authorities, 2) the Division of Capital Asset Management (DCAM) presides over state government buildings, and 3) the Division of Energy Resources (DOER) presides over other public buildings (cities, towns, counties, and schools). Each agency provides similar boilerplate documents.

Contact information on Energy Management Services at public housing:

Department: Department of Housing and Community Development (DHCD)
Mailing Address: One Congress Street, Boston, MA 02114
Phone: 617-727-7765
Fax: 617-727-7127

Contact information on Energy Management Services at cities, towns, counties, and public schools:

Department: Division of Energy Resources
Mailing Address: 70 Franklin Street, 7th Floor, Boston, MA 02110-1313
Phone: 617-727-4732 x 205
Fax: 617-727-0030
Email: www.doer.energy@state.ma.us

Contact information on Energy Management Services at state and public agency facilities:

Department: Division of Capital Asset Management
Mailing Address: One Ashburton Place, Boston, MA 02108
Contact: John DiModica
Phone: 617-727-4050
Fax: 617-727-5363

¹ See glossary

² Guide to Energy Performance Contracting, July 1998, Hawaii Department of Business, Economic Development, & Tourism: Energy, Resources, & Technology Division

I: FUNDAMENTAL CONCEPTS OF ENERGY MANAGEMENT SERVICES

Energy Management Services (EMS) is an arrangement structured so that the cost of implementing the Energy Conservation Measures (ECM) is recovered from savings created by the performance of those measures. Equipment purchased and installed using EMS may include any equipment or system upgrade designed to conserve energy or water. This includes improvements to existing equipment. What distinguishes these contracts is the provision of a guarantee on energy savings from the installed retrofit measures. This type of contracts usually offer a range of associated design, installation, and maintenance services. The contract period can range from 5 to 10 years (up to 20 years for cogeneration projects) and usually requires a certain minimum level of capital investment before a contract is considered.

Under an EMS contract, the ESCO provides a service package that typically includes the design, engineering, financing, installation, and maintenance of retrofit measures to improve energy efficiency. The scope of the improvements can range from work that affects a single part of a building's energy-using infrastructure (such as lighting) to a complete package of improvements for multiple buildings and facilities.

Moreover, an EMS contract defines the method for establishing the baseline costs, the cost savings, and the distribution of the savings to the parties involved. The contract also specifies the method for determining savings and addresses contingencies such as utility rate changes and variations in the use and occupancy of a building. While several excellent guides exist for selecting and negotiating energy performance contracts, they are no substitute for the assistance of experienced legal counsel when deliberating a large or complicated contract.³

To determine energy or demand savings, compare measured energy use or demand before and after implementation of an energy savings program. In general:

$$\text{Energy Savings} = \text{Baseyear Energy Use} - \text{Post-Retrofit Energy Use} \pm \text{Adjustments}^4$$

To determine if an EMS contract is right for you, you will want to gather a variety of information. Using a preliminary feasibility survey helps evaluate the viability of using a performance based contract. Begin by determining various building aspects, such as: energy consumption, use and occupancy, recent energy improvement updates, space conditions, equipment inventory, and any planned remodeling. Collect historical energy data to calculate energy use, cost, and cost per square foot. This information provides the energy intensity of a building.⁵ An on-site walk-through provides an inventory of energy systems, equipment, and usage. This initial examination combined with historical energy use data aids in determining whether sufficient opportunity for energy savings exists. Gathering basic information is important for energy management, however you will need an in-depth audit later in the contract process. Section V: Understanding Your Building (s) and How it Uses Energy, on page 15, explains various building aspects.

³ Source: U.S. Department of Energy, Energy Smart Schools Program

⁴ International Performance Measurements & Verification Protocol (IPMVP), October 2000, Office of Energy Efficiency and Renewable Energy, U.S. Department of Energy

⁵ The U.S. Environmental Protection Agency (EPA) offers a free on-line comparison calculator at www.epa.gov. The EPA's Energy Star Program Portfolio Manager will benchmark the selected site.

If sufficient opportunities for energy savings materialize, engage on-site staff and organize a team responsible for the different aspects of the EMS contract. Typically, this includes the following individuals:

- Person with authority to execute a contract/make major decisions
- Facility and maintenance staff
- Technical resource
- Legal resource
- Financial resource
- Procurement resource, and the
- Individual responsible for monitoring the contract

The contribution of each resource changes throughout the term of the contract, with continuing participation by the monitor responsible for assessing outcomes once construction is completed. When the savings period begins, the monitor will need the expertise to verify the ESCO's annual performance reports (actual savings) to determine the outcomes of the project. An outside independent consultant may be used if in-house staff is not sufficiently experienced.

Once opportunities emerge and the project management team is organized, the RFR process begins. This manual includes both a boilerplate RFR and EMS contract to assist in the process. ***These model documents do not replace legal and technical expertise but only provide guidance.***

Sources of Financing

There are various methods to finance an Energy Management Services project, including:

- **Loan**: The Awarding Authority obtains a loan to cover the cost of all conservation and electrical power generation improvements and equipment related to the performance contract.
- **Third Party Lease**: The Awarding Authority enters into a third party lease for conservation and electrical power generation improvements and equipment. Energy savings funds lease payments over the life of the lease.
- **Turnkey Agreement**: The Awarding Authority and the ESCO enter into a turnkey agreement whereby the ESCO owns the conservation and electrical power generation improvements and equipment related to the performance contract and leases it to the Authority

If the ESCO provides the financing, it is termed 'off balance sheet' or 'non-recourse' financing. The ESCO can use its own funds, borrow money, or sign a leasing arrangement. The Awarding Authority has no debt, and its only obligation is to pay the ESCO all or a share of the savings during the contract period. In all cases, the ESCO guarantees that the energy cost savings provide enough cash flow to repay the financing as well as to cover fees and costs.

Suitable Projects

In general, an EMS contracting arrangement is appropriate for projects that can: (a) produce reliable, significant, and long term energy-related cost savings; and (b) capture all economically viable energy system improvements in an organization's entire stock of buildings and facilities. Because EMS contracting offers continuing operations and maintenance services, it provides a valuable opportunity to capture long-term savings that may accrue to an organization.

Energy Management Services contracts are significant for organizations that:

- Lack necessary technical expertise
- Need to free up in-house resources for other priorities
- Lack the time to supervise or manage comprehensive improvements
- Are unwilling or unable to finance the initial costs of those improvements

Determining whether an EMS contract is appropriate for an organization's needs often depends on project size, the number of measures to be installed, and long-term building use.

Project Size

It is important that projects carried out under an EMS contract be of sufficient size for the savings generated to cover both the equipment upgrades itself and the project costs. Aggregating smaller projects together into a single contract and streamlining the bidding and assessment process by using standard practices may minimize costs. Project size is one determinant of whether an EMS contract is the best financing measure for a particular investment. While this type of contract is generally most appropriate for larger buildings or a set of buildings, smaller projects can also benefit from an effectively executed program. Carrying out smaller trial projects to test whether EMS contracting is the best financing option is often a sound procedure when this type of contracting is being considered for a large project that addresses an organization's entire stock of buildings and facilities.

Multiple Measures

Multiple measures can improve all energy-using systems within a building (i.e., lighting, heating and cooling, controls, etc.). EMS contracts often contain measures with short-term paybacks that offset improvements with long-term paybacks. Multiple measures with a composite (combined) economic payback of up to seven years and individual measures with longer paybacks are good candidates when the expected life span of the measure exceeds its cost-recovery period.⁶

Stable Building Use

Building use is another determinant of the efficacy of EMS contracting. Improving buildings using this type of contract is generally more appropriate for buildings that have relatively stable use and occupancy during the contract period. Major changes in building use significantly affect energy consumption and require modifications to the originally agreed-upon baseline and/or savings and performance guarantees negotiated with the contractor.

Building owners considering multi-building projects may want to establish a master financing agreement with a single firm. Bid specifications can detail the extent of the contracting effort. Often, multi-building project financing significantly reduces transaction time and costs for both the building owner and ESCO.⁷

⁶ See Energy Management Basics for Municipal and State Planners and Managers in Massachusetts at www.mass.gov/doer

⁷ Financing Energy Efficiency in Buildings, (May 1998), U.S. DOE

II: THIRD-PARTY FINANCING OVERVIEW

Third-Party Financing is an alternative means of financing energy and water conservation projects. For this method, an Energy Services Company arranges financing for the building owner through a third-party to design, purchase, install, operate and maintain the energy and water conservation improvements. The building owner agrees to accept responsibility for the debt and, in return, the ESCO guarantees the building owner a certain level of savings. Since Third-Party financing projects include management of the installed services, the contract term is usually between five and ten years. The ESCO's return from the project is determined by the amount of energy and water savings generated by the improvements. Procedures for calculating savings and returns are included in the terms of the contract.

While budget and resource constraints make investing in energy efficiency projects a challenge, Third-Party Financing may offer several benefits. This type of contract enables an owner to upgrade energy and water-related equipment and the building envelope with little or no up-front investment. A third-party contractor designs, installs, finances, and, if required, operates the new technology. The ESCO guarantees annual savings in energy and water. Eventually the owner assumes management of the buildings with reduced energy and water consumption, and with staff trained to operate and maintain the new equipment. The contractor is then paid according to the savings achieved.

The ESCO often manages the operation of the improvements to ensure the realization of anticipated savings. To mitigate risks for both parties, the contract may also include other clauses that address such issues as buy-out or early termination options. Payment and operating requirements vary from contract to contract. By using a Request for Response (RFR) process, the Awarding Authority can pursue an approach that provides the opportunity to evaluate several alternatives and choose a satisfactory package that meets the criteria of all parties involved.

Ordinarily, the savings are determined by using a standard Measurement and Verification Protocol (M & V) that identifies an energy and/or water consumption baseline by using historical utility billing data. Adjustments to this data reflect changes in usage patterns, weather conditions and building function so that the savings are not over or under estimated. The International Performance Measurement and Verification Protocol (MVP) provides an overview of current best practice techniques available for verifying the results of energy efficiency, water efficiency, and renewable energy projects. In addition, facility operators may use it to assess and improve facility performance. For a copy of the *International Performance Measurement & Verification Protocol*, go to <http://www.ipmvp.org>.

Cost-Benefit Analysis Methods

The major function of investment analysis is to determine which projects have greater benefits than costs (e.g., the most profitable investments). The cost-benefit method for evaluating project alternatives can range from simple to sophisticated. In evaluating investments in energy efficiency, you can use the three primary cost-benefit methods discussed either separately or together.

These methods include the following:

- Simple payback analysis
- Internal rate of return (IRR)
- Net present value (NPV)

Simple Payback

Using the simple payback method, divide a project's total cost by the energy-cost savings accruing to it in the first year after it has begun. A simple payback calculation provides a rough initial estimate of the time needed to recover the initial investment. This cost-benefit method is a valuable tool in marketing energy projects since individuals with minimal financial expertise easily understand it. However, investors are likely not interested in projects presented with simple payback scenarios because of the following drawbacks:

- Simple payback⁸ analysis does not reflect savings that will continue to accrue to the project after reaching the payback point. If the payback periods for two different projects are 2.5 years and 4 years, respectively, a decision based on simple payback ignores cumulative lifetime savings. Disregarding the benefits that accrue over the useful life of a project encourages smaller total savings through cream skimming.
- Simple payback analysis does not take into account the time value of money. This is a crucial drawback, especially in cases where the dollar value of a project is large and/or the useful life of the improvements is long. In order to properly compare the economic benefits of competing long-range upgrade projects, you need to discount the value of future dollars relative to today's dollars.

Internal Rate of Return

Internal rate of return (IRR) is a cost-benefit method that evaluates the profitability of capital expenditures over their useful lives. It essentially gives an annualized rate of return for an investment based on life-cycle payments (negative cash flows) and income (positive cash flows from energy savings).

IRR is the rate of return at which the sum of discounted future cash flows equals the initial investment outlay. Most government and private sector organizations set internal return rates that must be met. IRR gauges the useful life of an improvement and incorporates the time value of money.

Net Present Value (NPV)

Net present value (NPV) is a profitability indicator that takes into account both life-cycle cash flows and the time value of money. The higher the NPV, the greater the profitability of an investment. The following table, Table 1, compares the profitability of a non-comprehensive and a comprehensive

project using NPV calculations.

Calculate NPV by adding the initial investment (always a negative cash flow) to the present value of anticipated future cash flows (estimated savings) over the useful life of an improvement. In this example, this investment is \$100,000 for just a lighting system and \$400,000 for the comprehensive project and the useful life is assumed at ten years. The initial investment and annual cash flows are discounted at a rate of 12% to derive the present value for each year. The sum of the annual cash flow values gives the NPV.

Table 1 illustrates the effect of discounting on consecutive yearly cash flows. The discount rate of 12% reflects the organizations required rate of return that must be met before they will invest in a project. The key to performing this type of discounted cash flow analysis is to use a basic discounting formula, which is $1/(1+r)^n$ (where r = discount rate and n = number of years). Use of this formula yields a discount factor. By multiplying the projected yearly cash flow by the discount factor, the present value for that year is determined. Discounting accounts for the time value of money by adjusting the worth of future dollars to the value of today's dollars.

⁸ The time it takes for the savings from an energy conservation measure to pay for the cost of the investment to implement that measure.

The sum of the discounted annual cash flows (including the original investment or outflow) yields the NPV for the investment, and clearly shows the higher profitability of the more comprehensive project.⁹

Table 1: Calculating Net Present Value

Lighting System Only				Comprehensive Retrofit		
Year	Cash Flow	Discount Factor (@12% rate)	Present Value of Cash Flows	Cash Flow	Discount Factor (@12% rate)	Present Value of Cash Flows
0	-\$100,000	1.000	-\$100,000	-\$400,000	1.000	-\$400,000
1	40,000	.893	35,720	100,000	.893	89,300
2	40,000	.797	31,880	100,000	.797	79,700
3	40,000	.712	28,480	100,000	.712	71,200
4	40,000	.636	25,440	100,000	.636	63,600
5	40,000	.567	22,680	100,000	.567	56,700
6	40,000	.507	20,280	100,000	.507	50,700
7	40,000	.452	18,080	100,000	.452	45,200
8	40,000	.404	16,160	100,000	.404	40,400
9	40,000	.361	14,440	100,000	.361	36,100
10	<u>40,000</u>	.322	<u>12,880</u>	<u>100,000</u>	.322	<u>32,200</u>
Total	\$300,000		\$126,040	\$600,000		\$165,100

Discount Factor= $1/(1+r)^n$

Source: USDOE

In Summary

Energy Management Services through Third-Party Financing enables installation of efficiency improvements without requiring any up-front investment. Unique to this type of financing is the guaranteed net positive cash flow. The customer is only obliged to pay the ESCO (or Third-Party financier) a portion of the energy and water cost reductions actually achieved for the duration of the contract. Because the project's savings are contingent upon the proper maintenance of the water and energy-related equipment, there is a strong incentive for ESCOs to maintain such equipment and to choose long-lasting, high-performance equipment, as part of the project.

⁹ Financing Energy Efficiency in Buildings, (May 1998), U.S. DOE

III: ADVANTAGES AND DISADVANTAGES OF PERFORMANCE TYPE CONTRACTS

Using a EMS contracting arrangement streamlines the process for installation of energy conservation improvements and enables one to deal with a single company. While most companies are reputable, some ESCOs have taken advantage of owners by failing to explain or inform them of the key technical and financial decisions necessary in developing a project. Despite these drawbacks, EMS Contracting has a number of advantages. EMS, using MGL c 25A, §11c simplifies the method for funding energy and water efficiency improvements when working within tight budget constraints. It also allows for a more comprehensive project.

Benefits

Expressly discuss any benefits with the ESCO to ensure they are met. You may want to consider an Energy Management Services Contract for the following reasons:

- **Accountability** – The ESCO is the single point of financial and technical accountability for all project measures.
- **Risk Reduction** – By guaranteeing a minimum level of performance, the contractor takes away much of the risk of project non-performance from the owner.
- **No Capital Outlay** – EMS contracting eliminates capital investments by providing an alternative method of financing projects.
- **Equalized Cash Flow** – Payments for services are structured to maintain a constant fee schedule funded from actual savings realized.¹⁰
- **Technical Risk** – An ESCO's main job is managing technical risk – The EPC shifts that risk from your organization to the ESCO. The ESCO assumes the risk that the project performs as designed, while remaining within budget and that the equipment operates properly after installation.
- **Project Financing** – Cash flow demonstrates the intrinsic value to energy savings projects most clearly. While most energy savings projects are funded like capital works upgrades, ESCOs can demonstrate how to fund an energy savings project out of cash flow rather than capital expenditure. If structuring the funding as an operating lease, the project then becomes fully self-funded rather than a debt on your balance sheet. *Although not all EPC customers are able to take advantage of this, it is worth discussing this option with the ESCO and your financial department.*
- **Guaranteed Savings** – EMS Contracts involve a guarantee of achieved savings by the ESCO. This is normally structured so the loan repayment is less than, or equal to, the savings guarantee amount. In this way, you are assured of being able to meet your loan or lease payment obligations from the savings generated by the project. This is important if you are skeptical about the ability of identified improvements to achieve the energy savings claimed under a traditional tendered approach.

¹⁰ U.S. Department of Energy

- **Expertise** – Since energy efficiency is its core business, the ESCO brings expertise to a project. While consulting engineers can offer similar expertise, and indeed frequently work for ESCOs, using a performance contracting arrangement enables one to streamline and deal with only one company. In addition, because the ESCO is interested in a partnership with the building owner and is always looking to improve the performance of the project, it can bring a level of continuous improvement that would ordinarily not happen.
- **Environment** – Environmental benefits achieved by reduced energy consumption include a reduction in greenhouse gas emissions (either directly from burning fossil fuels on-site or indirectly from electricity that is generated from fossil fuel power stations), reduced water consumption, reduced chemical use and reduced solid waste.¹¹

Drawbacks

Unfortunately, the problems of implementing an Energy Services Management Contract are well documented. When selecting this financing option, avoid the following drawbacks:

- **Energy Baseline Development** – Establishing an energy baseline is crucial for project development since energy savings are an estimate between actual use and the energy baseline (the energy usage if the energy conservation measures had not been implemented).
- **Adjustments to the Energy Baseline** – Define clearly the method of adjusting for changes in weather, occupancy, etc.
- **Operational Savings** – Owners cannot procure services and equipment **primarily** intended to reduce operational and maintenance costs under Chapter 25A, §11C for Energy Management Services -- besides, the owner may never actually realize these savings unless they dismiss employees.
- **Cost Avoidance** – This term applies to implementing measures that allow owners to avoid future costs, but does not save hard dollars compared to past budgets.
- **Excessive Finance Charges** – Check interest rates on the funds borrowed against local banks or other national institutions to assure the competitiveness of finance charges.
- **Required Maintenance Agreements** – Maintenance agreements may be expensive in relation to the value provided. The ESCO may claim that they cannot assure guaranteed savings unless their own staff performs the maintenance. Other ESCOs guarantee savings while providing training for maintenance staff so they can handle maintenance requirements.
- **Terms of Savings Reconciliation Versus Budget Cycle** – Several standard ESCO performance contracts allow the ESCO to carry over savings that occur in early years to offset losses in later years. *These terms do not benefit the Awarding Authority. For the owner's benefit, all savings should be reconciled annually and stand alone on that basis.*

¹¹ A Best Practice Guide to Energy Performance Contracts, Commonwealth of Australia 2000, Australasian Energy Performance Contracting Association

- **Quality Control** – Before entering into a contract, ask the ESCO to provide detailed descriptions of both products and services proposed. *Poorly defined contracts may mean lower quality products.*
- **Excessive Guarantee Costs** – In some cases, the risk of failure to meet savings projections does not warrant or justify the cost of the guarantee. Example, if it costs \$10,000 to guarantee an energy conservation measure that saves \$20,000.¹²

Cream Skimming

“Cream skimming” is often an undesirable yet all too common practice of investing in simple projects with relatively low initial costs and quick paybacks. While such investments are financially attractive in the short term, pursuing them may prevent a building owner from capturing significant long-term benefits likely to result from more comprehensive retrofits. Cream-skimming projects have impressive initial returns on investment, yet they commonly yield lower absolute energy and cost savings when compared to projects that are all-inclusive. Moreover, due to their emphasis on short-term paybacks, cream skimming weakens an organization's ability to finance more capital intensive improvements that leverage the value of those short-term paybacks.

By utilizing bundling, project managers can more fully realize energy and cost savings objectives, while also meeting reasonable payback criteria. *Bundling refers to the practice of including both short- and long-term energy-efficiency measures in the same project planning and financing scheme.* When planning a comprehensive energy-efficiency project, using paybacks from short-term measures, like lighting system retrofits, offset costs for more system-wide measures with longer payback periods. By bundling all energy-efficiency measures for a single project into one financially viable package, projects can realize a more attractive total return¹³ and allows for a comprehensive project.

Risk Sharing and Assurances

Among the key barriers to investment in energy efficiency improvements, are uncertainties about attaining projected energy savings and apprehension about potential disputes over these savings.¹⁴ **Risk** is a measure of the potential inability to achieve overall program objectives within defined cost, schedule, and technical constraints and has two components: (1) the *probability/likelihood* of failing to achieve a particular outcome, and (2) the *consequences/impacts* of failing to achieve that outcome.¹⁵ In any performance contract, the contractor takes on the risk of not achieving the expected savings. A contract can take account of factors that would affect the savings such as warmer winters or cooler summers, or changes in the use of the building. There are several ways to diminish risk, including the use of due diligence when assessing the project.

There is an increased use of technical strategies to reduce the risk of underperformance in energy savings projects. These include a host of diagnostics and commissioning processes that detect potential causes of underperformance and remedy them early on. The inclusion of commissioning in the ENERGY STAR Buildings process, and basing the Building Label on actual (measured) energy use are prominent examples of this trend. The International Performance Measurement and Verification

¹² Guide to Energy Performance Contracting, July 1998, Hawaii Department of Business, Economic Development, & Tourism Energy, Resources, & Technology Division

¹³ Financing Energy Efficiency in Buildings, May 1998, U.S. DOE

¹⁴ Risk Transfer via Energy Savings Insurance, October 1, 2001, Evan Mills, Energy Analysis Department, Lawrence Berkeley National Laboratory at <http://eetd.lbl.gov/insurance>

¹⁵ Risk Management Guide for DOD Acquisition, Fourth Edition, February 2001, Department of Defense, Defense Acquisition University, Defense Systems Management College

Protocol (IPMVP) is another type of technical strategy to reduce performance risk. Financial strategies are also increasingly used to reduce the risk of underperformance. These include Savings Guarantees, Performance Bonds (also known as “Surety Bonds”), and Energy Savings Insurance (ESI).¹⁶

- **Energy Savings Insurance** – ESI is a formal insurance contract between an insurer and either the building owner or third party provider of energy services. In exchange for a premium, the insurer agrees to pay any shortfall in energy savings below a pre-agreed baseline, less a deductible.
- **Surety Bonds** – Surety Bonds offer another method of risk transfer applied to either the construction phase of an energy savings project or the ongoing savings stream. Surety bonds are three-party contracts among insurer, contractor, and property owner. If the contractor does not perform, the contractor has to reimburse the insurer. Performance bonds are not true risk transfers for the contractor in that, unlike ESI, they remain liable for any shortfall. Surety companies also prefer not to take liability for periods exceeding three years.
- **Savings Guarantees** – Guarantees are offered by providers of energy management services, who effectively self-insure the energy savings, i.e., retain the risk internally rather than selling the risk to a provider of insurance or bonds. Disadvantages of savings guarantees include the nontransparency of costs, given that they’re bundled in with the broader performance contract, and the potential conflict of interest arising from the fact that those liable for underperformance are also typically those performing the savings measurement.¹⁷

¹⁶ U.S. Department of Energy, Rebuild America Program

¹⁷ U.S. Department of Energy, Rebuild America

IV: OVERVIEW OF THE DECISION PROCESS

Figure 2 on the following page illustrates the decision process for EMS. For the most effective application of EMS projects a site should have:

1. Two or more years of stable energy consumption of greater than average use;
2. Reliable records of energy consumption;
3. On-site staff who are familiar with operations and are willing to provide assistance;
4. Predictable occupancy patterns;
5. A number of potential capital improvements;
6. No plans for major-structural improvements for the length of the contract (usually 5 to 10 years). (Please note: major structural improvements will distort savings calculations)

Once the site selection is completed, write an RFR for the project. The RFR must contain a general description of the buildings, site-specific information regarding energy and water consumption and cost, minimum energy and water service and related requirements, and facility occupancy and use patterns. This data provides ESCO's with an understanding of the facility and allows them to evaluate their interest in the project. Send a copy of the RFR to the Division of Energy Resources and then post it in a conspicuous place in or near the offices of the Awarding Authority and publish it in the Central Register.

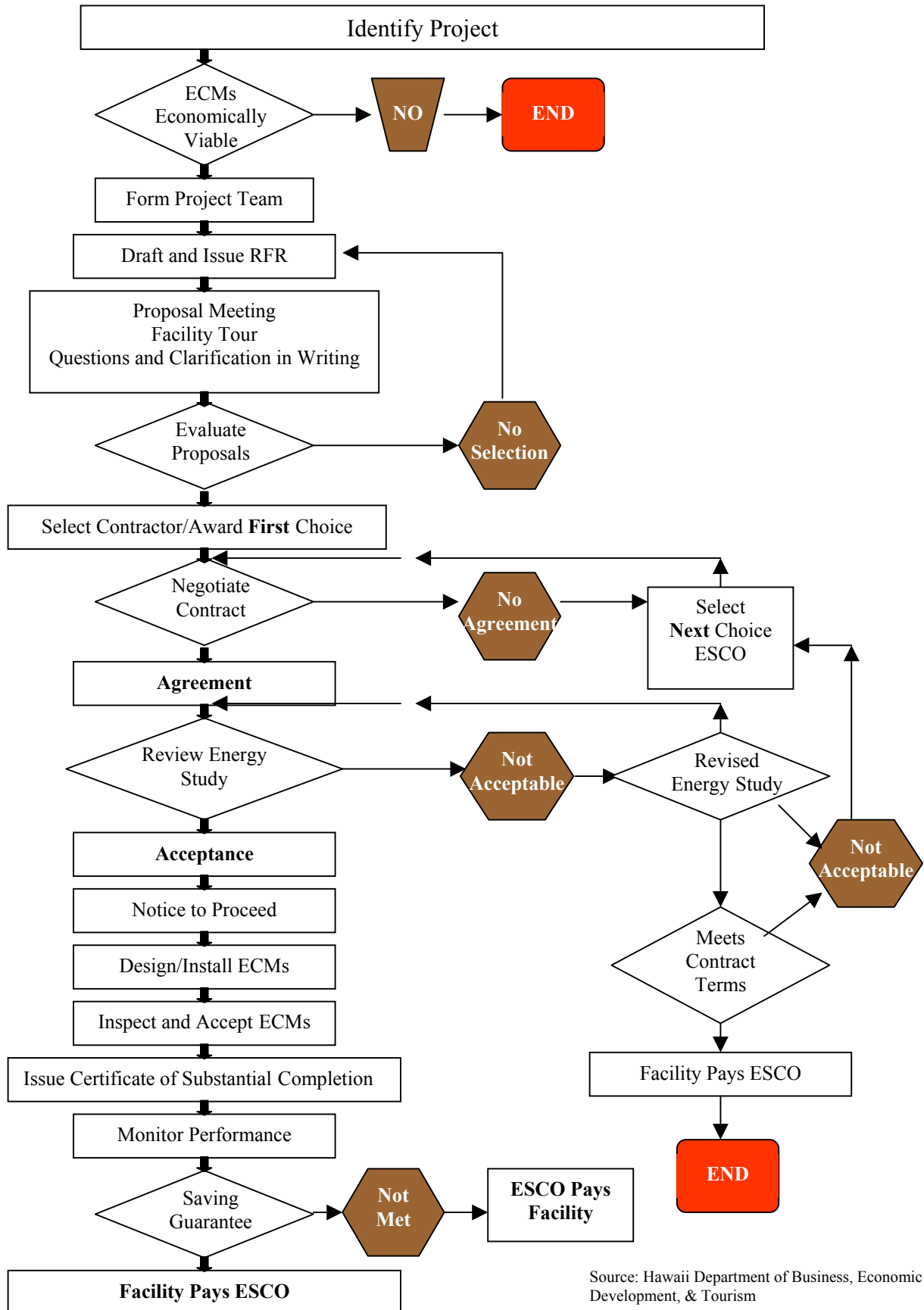
The next step is to invite all interested contractors to attend a pre-response meeting and to tour the facility, so that they may gain a better understanding of site and facility characteristics. ***Note: Pre-response meetings and facility tours must be open to all interested firms and be voluntary; making attendance mandatory limits the competitive field to those firms that learn in advance and are able to attend.*** Make sure to record all inquiries and responses during the pre-response meeting and facility tour and send copies to all contractors that have expressed an interest in the project. Also, make any changes needed to the original RFR at this time and distribute a list of these changes, as an addendum, to all parties in receipt of the RFR. ***Note: Provide proof of delivery by using registered mail.***

Following this process, contractors submit their responses. Allow at least four (4) weeks or longer for ESCOs to submit responses, depending upon the complexity of the project and required certifications. Publicly open the responses in the presence of at least two (2) witnesses at the time specified in the RFR. Make sure to record the date and time of receipt for each response – reject all responses received after the deadline stated in the RFR.

Engineers and staff (including the participating facility and project team members) then evaluate the responses. The first step is to check to make sure that all of the mandatory minimum qualifications listed in the RFR are satisfied. The responses are then evaluated against many criteria, including: net financial return to the municipality over the length of the contract; protection of the municipality against risk; explicitness and comprehensibility of methods for computing energy and water baseline and savings; the responding firm's ability to finance and implement capital expenditures of the scale appropriate for the facility; and their track record in all areas of contract services.

After selecting a contractor, the ESCO is responsible for completing a thorough energy audit of the facility. If substantial savings exist, use of Energy Services Agreement (ESA) implements the efficiency improvements identified in the audit.

Figure 2: Decision Process



Source: Hawaii Department of Business, Economic Development, & Tourism

V: UNDERSTANDING HOW BUILDINGS USE ENERGY

Before determining how to reduce energy consumption, you will require some base line¹⁸ information to understand where things stand and what measures can help you reduce energy use. The information needed includes the characteristics of your building and the amount of fuel and electricity consumed.

Use the following table to record fuel consumption and cost data. Enter fuel codes for electricity (E), natural gas (N), distillate oil (D#2, D#4), etc. Enter the year and month of the data and the quantity in kilowatt-hours, gallons, therms or CCF, etc. If possible, have a record of this data for at least three years. Average the three-year data to eliminate any fluctuations.

Table 2: Fuel Consumption and Cost Data

Building Name: _____

	Fuel Code	E (electricity)	Fuel Code	N (natural gas)	Fuel Code	D (distillate oil #2)	Fuel Code	QTY
FY Year	Qty(kWh)	Cost	Qty (CCF)	Cost	Qty (gals)	Cost	Qty	Cost
July								
August								
September								
October								
November								
December								
January								
February								
March								
April								
May								
June								
Total								

Use building plans and first-hand measurements and observations to determine:

- **Building age and general condition:** include the types of windows, roofing and wall material and the approximate percentage of glass to wall space.

¹⁸ See glossary

- **The total conditioned area (heated and cooled interior) of the building:** measured in square feet, not including unheated basement or attic space.
- **The average daily number of occupants:** include normal operating hours and any weekend or special events.
- **The number of hours each day your building is used:** include weekdays, weekends, special holidays, and evening hours.
- **Brief descriptions and the locations of:**
 - ✓ Primary heating systems
 - ✓ Cooling systems
 - ✓ Ventilation systems
 - ✓ Lighting
 - ✓ Hot Water
- **Brief descriptions of any special systems:** include energy using areas such as laundries, kitchens, elevators, machine and electric shops, greenhouses, swimming and locker areas, etc.

This information gives you a building profile to help you spot potential areas of energy waste for each building involved.

Energy Efficiency and Indoor Air Quality

There are potential positive and negative influences of specific energy conservation measures on indoor environmental quality (IEQ). Many energy upgrades have little impact on IEQ such as those upgrades related to fans, motors, drives etc., while other measures can improve IEQ. Some energy projects have the potential to degrade IEQ, but can be made compatible with appropriate adjustments.¹⁹ Interest is growing in studying the connection between indoor air quality and respiratory illnesses. For instance, while asthma affects about one in 20 Americans, in recent years some Boston neighborhoods were reporting rates of up to 30 percent. Two Boston Housing Authority properties had self-reported rates of 20 percent to 45 percent.²⁰ The following table highlights some areas where adjustments may be necessary.

Table 3: Energy Efficiency Measures and Potential Adjustments

Measure	Comment
Air-side economizer	Uses outdoor air to provide free cooling. Can improve IEQ when economizer is operating by helping to ensure that the outdoor air ventilation rate meets IEQ requirements. Calibrate on/off set points to both the temperature and moisture conditions of outdoor air (for example, by using an enthalpy controller) to avoid indoor humidity problems. May need to disengage economizer during an outdoor air pollution episode.
CO ₂ controlled ventilation	CO ₂ controlled ventilation varies the outdoor air supply in response to the CO ₂ level, which is used as an indicator of occupancy. This may reduce energy use for general meeting rooms, theaters, etc., where occupancy is highly variable. The system should incorporate a minimum outside air setting to dilute building-related contaminants during low occupancy periods.

¹⁹ U.S. Environmental Protection Agency, Energy Efficiency and Indoor Environmental Quality in Schools, August 2000

²⁰ U.S. Department of Energy, Rebuild America Program

Measure	Comment
Extending temperature control setpoints	Some energy managers may be tempted to allow space temperatures or humidity to go beyond the comfort range established by applicable standards. This is not recommended, as occupant health, comfort, and productivity are compromised. The lack of overt occupant complaints is NOT an indication of a healthy environment.
Improved building shell (e.g., lights, office equipment)	If reducing infiltration, may need to increase mechanically supplied outdoor air to meet applicable ventilation standards.
Night pre-cooling	Cool evening air pre-cools the building while simultaneously exhausting accumulated pollutants. To prevent microbiological growth, controls should stop pre-cooling if the dew point of outdoor air is high enough to cause condensation on equipment.
Reducing demand (kilowatt) charges	Caution is advised when using night pre-cooling and sequential startup of equipment to eliminate demand spikes if load-shedding strategies include changing the space temperature set points or reducing outdoor air ventilation during occupancy.
Reducing HVAC operating hours	Delayed start-up or premature shutdown of the HVAC system may create IEQ problems and lead to occupant complaints. Insufficient lead-time before occupancy can cause thermal discomfort and pollutant related health problems if the HVAC system cannot sufficiently deal with loads from both the nighttime setbacks and current occupancy. It may be acceptable to shut down equipment before occupants leave if fans are kept operating to ensure adequate ventilation.
Reduced internal loads	Reduced loads lessen supply air requirements in VAV systems. May need to increase outdoor air to meet applicable ventilation standards.
Reducing outdoor air ventilation	Applicable ventilation standards usually specify a minimum continuous outdoor airflow rate per occupant, and/or per square foot, during occupied hours. Reducing outdoor airflow below applicable standards degrades IEQ, and is not recommended.
Variable Air Volume (VAV) systems with fixed percentage outdoor air	VAV systems can yield significant energy savings over Constant Volume systems (CV) systems in many schools. However, many VAV systems provide a fixed percentage of outdoor air (e.g., fixed outdoor air dampers), so that during part-load conditions when the supply air is reduced, the outdoor air may also be reduced to levels below applicable standards.

Source: U.S. EPA, Energy Efficiency and Indoor Environmental Quality in Schools

VI: REQUEST FOR RESPONSE DRAFTING GUIDELINES

Have the team develop RFR specifications – *do not leave this up to the ESCO*. To ensure full and fair competition among vendors and provide a basis of comparison for responses, M.G.L. c.25A §11C sets out a number of requirements for the contents of Request for Responses (RFRs).

- 1) RFRs must describe the required services without “having the effect of requiring a proprietary supply of service, or procurement from a sole source.” Provisions that pertain to performance guarantees may conflict with the statute if they eliminate all competitors except affiliates of particular manufacturers of energy conservation equipment. Note: However, this is not meant to restrict high efficiency standards in the project specifications.
- 2) All RFRs issued for Energy Management Services must include (1) a description of the services being procured, (2) all evaluation criteria, and (3) proposed contract terms including whether such contract terms are mandatory and non-negotiable. The energy study provides a description of the type of services being procured and suggests appropriate evaluation criteria. This is the basis of your RFR.
- 3) Public Agencies must evaluate responses and award the contract based solely on the criteria set forth in the RFR. The RFR criteria must include (but is not limited to) responsiveness, responsibility, qualifications, technical merit and cost.

A boilerplate RFR and a boilerplate EPC is included in this manual. To obtain a word version of the boilerplate RFR or EPC for your own edits please contact the Division of Energy Resources at 617-727-4732 or email doer.energy@state.ma.us.

Improving the RFR Process

In addition to the requirements of the statute, the following procedures are designed to improve the RFR process by ensuring full and fair competition in fact as well as appearance:

- 1) Avoid unduly restrictive provisions.

Example: A provision requiring the manufacturer of energy equipment to guarantee satisfactory completion of services if the ESCO of those services fails to complete the contract. As a practical matter, manufacturers warranty equipment not the performance of the contract.

Possible Solution: The requirement of an appropriate performance bond provides protection for the public interest.

- 2) Request rather than require letters of intent to bid. This keeps the field of potential vendors open as long as possible, and maximizes competitive pressures on price.
- 3) Provide ESCOs with as much notice as possible for attendance at pre-bid meetings. ESCOs generally need at least three (3) weeks notice in order to attend meetings. The amount of notice is especially important in cases where failure to attend is grounds for automatic disqualification.

- 4) While the statute establishes two week minimum for the submission of a response in answer to an RFR, as a practical matter a longer period may be beneficial. Preparation of a bid to provide Energy Management Services requires a thorough understanding of the current operations and energy usage of the facilities.

In other comparable competitive processes, it is not unusual to allow at least one (1) to two (2) months for preparing such a bid. If the response period is too brief, vendors who are already familiar with the facility and its operation may have an undue advantage over other competitors in preparing its bid.

- 5) Given that the implementation of many Energy Management Services projects occur outside of the heating season, early planning for the procurement process is essential. If a project must be completed in time for the following heating season, then issue an RFR no later than March of that year.

M.G.L. c.25A §11C and 225 C.M.R. 10.03 authorizes DOER (and in certain circumstances, DCAM) to have a consultative role, at the election of the Awarding Authority, regarding the content of RFRs for Energy Management Services.

VII: ENERGY AUDIT

After the selection process is complete, deciding on capital improvements requires further study by a professional engineer or architect and the attention of financial and administrative personnel. The objective is to select the most cost-effective capital improvements (see Section II: Third Party Financing Overview for methods to calculate cost effectiveness). The initial walk-through survey provides a preliminary list of capital improvements, however not all of these are cost-effective. The ESCO needs information to carefully evaluate each measure so one is able to select those improvements that save the most energy at the least cost. An energy audit is the further study to determine the nature, costs, and savings presented by these improvements.

To obtain the best information, the ESCO provides an on-site professional technical audit. An engineer or architect trained in the design and maintenance of mechanical and electrical systems conducts an objective and detailed on-site audit of the building (s), quickly recognizing the sources of energy waste and the options available to correct them.

Expect to receive a complete, professional audit report that includes:

- A detailed analysis of the energy profile of the building, including consumption analysis at current levels and at levels of optimal efficiency.
- A listing of O&M measures not already identified, along with potential savings.
- A description and analysis of all applicable capital measures, including estimated costs of design, acquisition, and installation.
- The expected useful life of each capital improvement, and
- The estimated savings over the useful life of the improvement.
- The method used to derive these estimates.

In addition, the auditor can look at such options as solar and renewable energy projects and bring to your attention any zoning ordinances, building codes or other regulations that pertain to your plans or the possible need for an environmental study.

Not only does the audit focus on the specifications for a particular capital investment, but also the overall potential efficiency of the building and ways in which to improve it. Since energy systems are highly interrelated, evaluating one possible alteration must include an analysis of how that change might affect other parts of the energy system. For example, doing major work on part of the HVAC system may require that the entire system be rebalanced by a qualified HVAC technician, or excessive delamping in an area with incandescent lights may increase the heat demand for that area due to the loss of heat from removed lamps.

The energy audit becomes part of your Energy Management Services Contract as an attachment or schedule. If the project is abandoned, the ESCO usually receives an audit fee (the amount agreed upon by both parties).

VIII: SAVINGS CALCULATION OPTIONS

The problem of identifying and capturing energy savings is very real. The purpose of the feasibility study or energy audit is to track energy use in buildings, understand opportunities for saving energy, and implement cost effective measures that save energy. The ESCO has the ability to identify, analyze, and recommend energy saving strategies.

Basic Steps

According to the International Performance Measurement & Verification Protocol, proper savings determination is a necessary part of good design of the savings program itself. The basic approach in savings determination is closely linked with some elements of program design. As indicated by the IPMVP, the basic approach common to all good savings determination entails the following steps:

1. Select the measurement and verification option consistent with the intended scope of the project.
2. Determine whether to adjust post-retrofit conditions.
3. Gather relevant energy and operating data from the baseyear and record it for current and future use.
4. Design the energy savings program. Include documentation of both the design intent and methods for demonstrating achievement of the design intent.
5. Prepare a measurement and verification (M&V) plan. Include a definition of the word “savings” for each project. Include the information from the previous steps. This plan also defines the subsequent steps.
6. Design, install, and test any special measurement equipment needed under the M&V Plan.
7. After the energy savings program is implemented, inspect the installed equipment and revised operating procedures to ensure that they conform with the design intent of the energy savings program. This process is commonly called "commissioning." ASHRAE defines good practice in commissioning most building modifications (ASHRAE 1996).
8. Gather energy and operating data from the post-retrofit period, consistent with that of the baseyear and as defined in the M&V Plan. The inspections needed for gathering this data should include periodic repetition of commissioning activities to ensure equipment is functioning as planned.
9. Compute and report savings in accordance with the M&V Plan.

Repeat steps eight and nine whenever you need a savings report.

Savings Calculations and Verification Methodology

Various general methodologies exist for calculating and verifying energy savings. This document discusses two broad categories: the **whole-building approach** and the **individual-measure approach**. Both methods require a number of similar tasks.

First, perform a reasonable calculation of predicted energy savings (an audit). This requires an appropriate model of existing energy use (energy use before implementation of conservation measures or the baseline). This model or calculation contains the critical assumptions driving the existing and proposed building energy use profile. These critical assumptions include the major independent parameters such as weather, schedule, and loading. The energy savings methodology must also account for interactive effects between various retrofit measures. The audit should also include a detailed plan to perform the measured verification of energy savings.

Following the audit, conducting baseline metering improves confidence in the theoretical calculations. Baseline metering consists of an agreed-upon level of real-time monitoring of existing (pre-retrofit) equipment to confirm the audit assumptions and predictions of the existing energy use profile. The foundation of the savings calculation is the baseline estimate of consumption. This estimate is used not only for energy use but also for any factors assumed to cause changes in consumption such as weather, hours of operation, occupancy rates, or production levels. In cases where these factors change, alter the baseline consumption to reflect changes in usage caused by non-measure related factors. The verification plan identifies any factors that cause energy usage to change, estimates the magnitude of the effect, and delineates how and under what circumstances modification of the baseline estimates occurs.

During the retrofit, the use of field inspections verifies the installation of proposed retrofit equipment and the necessary instruments for energy use metering. Conducting commissioning ensures proper operation and maximum savings.²¹ After implementation and commissioning is complete, the verification period begins. This is where the two guaranteed savings calculation methodologies begin to differ significantly.

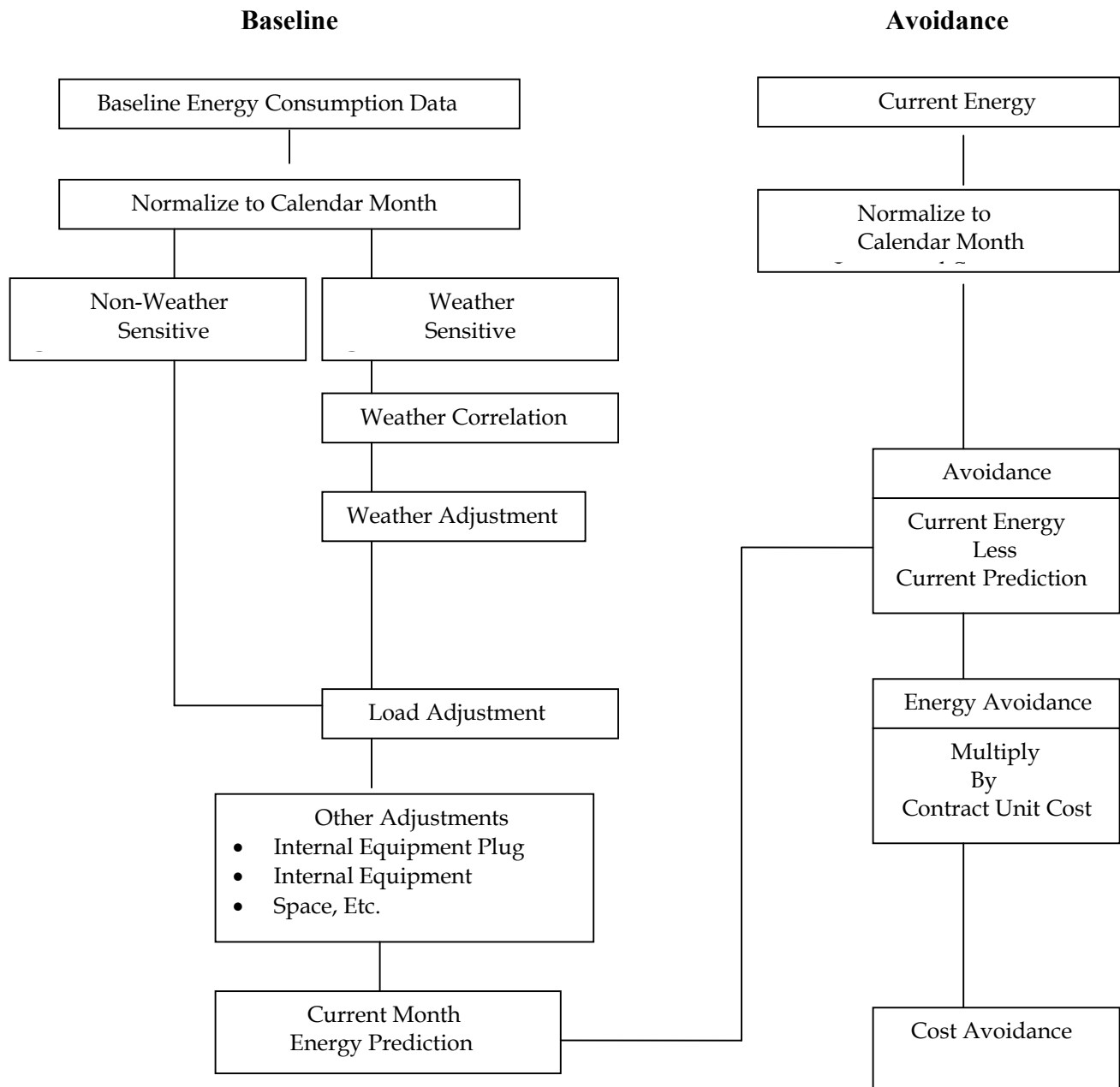
Whole-Building Approach

The basis for the whole-building approach is a comparison of the entire building energy use at the meter for the current time period (generally a year) versus a mutually selected baseline time period. The current time period is usually adjusted “back” to the baseline parameters with adjustments for weather, internal equipment, occupant loads, and hours of operation. These adjustments occur on a monthly, quarterly or annual basis.

On the following page, Figure 3 flowchart illustrates a Whole-Building Approach.

²¹ **Building Commissioning**—“In the broadest sense, a process for achieving, verifying, and documenting that the performance of a building and its various systems meet design and intent and the owner and occupants’ operational needs. The process ideally extends through all phases of a project, from concept to occupancy and operation.” Building Commissioning Guide, Version 2.2, Sponsored by U.S. General Services Administration & U.S. Department of Energy, Federal Energy Management Program, July 30, 1998

Figure 3: Whole Building Approach



According to the IPMVP, it is widely recognized that an integrated or whole-building approach is the most effective means of saving energy in buildings because the energy performance of the building depends on the interactions of building systems and their control and operation. The indoor environmental quality (IEQ) performance of a building also depends on the interactions among building design, materials and operation, control, and maintenance.²²

²² International Performance Measurement & Verification Protocol, Concepts and Practices for Improved Indoor Environmental Quality Volume II, Revised March 2002

Individual Measure Approach

The Individual-Measure Approach may include similar adjustments but on a per-retrofit basis. In addition, this approach accounts for interaction between measures (e.g., premium-efficiency motor upgrade savings interacting with variable speed drive installation savings). See Figure 4 on the following page for an individual measure approach flowchart.

Individual energy-efficiency measures fall into four broad categories requiring differing amounts of detail to perform energy savings verification. Metering for each of these may differ in the level of detail required, the equipment necessary to obtain that detail, and the duration of metering required.

- **Type 1: Constant load with fixed operating schedule.** This simplest of the load shapes can be verified using an instantaneous demand reading of the equipment or circuit. Savings are the difference in demand multiplied by the operating hours over a fixed period.
- **Type 2: Constant load with varying operating schedule.** Like the previous example, instantaneous demand readings are required with a continuously installed elapsed time meter during the post-installation period. Savings is the difference in demand multiplied by the post-installation operating hours over a fixed period.
- **Type 3: Consistently varying load with fixed operating schedule.** Interval demand metering is required for a period long enough to establish the consistency of the operating schedule and load levels. A continuously installed elapsed time meter installed during the post-installation period and the length of the normal operating schedule is used to determine the number of cycles in any period. Savings is the number of cycles multiplied by the difference in energy per cycle for the pre and post-periods.
- **Type 4: Varying load with varying operating schedule.** In this most complex case, interval demand recorders are needed. Load data is collected until all of the likely operating conditions are experienced. The factors causing the variation in loads or in operating schedules are identified and data on those factors, concurrent with the metered demand, are collected. The relationship among the various factors and the load levels is established using multiple regression analysis.²³ During the verification period, data on the causal factors is collected and the pre and post consumption levels estimated using the regression-derived relationships. The saving is the difference in the regression estimates for the values of the factors observed within any verification period.

²³ The general purpose of multiple regression is to explore the relationship between several independent or predictor variables and a dependent or criterion variable. For example, fuel consumption might depend not only upon the average hourly temperature but also upon the cost of fuel or the occupancy rate.

Figure 4: Individual Measure Approach

Energy Audit

Proposed Energy Audit

Statement of Critical Assumptions



Baseline Metering

Real-time Measurement

Regression Correction of Existing Energy

Use to Related Parameters



Implementation

Construction Observation

Commissioning



Verification Metering

Real-time Metering of Energy

Real-time Metering of Input Parameters



Energy Avoidance

Baseline Energy - Current Energy = Energy Avoidance



Cost Avoidance

Energy Avoidance x Contract Unit Energy Cost = Cost Avoidance

IPMVP Options

International Performance Measurement & Verification Protocol (IPMVP) provides an overview of current best practice techniques available for verifying results of energy efficiency, water efficiency, and renewable energy projects in commercial and industrial facilities. The protocol defines the following four broad techniques for determining savings from both a whole facility and an individual technology.²⁴

Option A) Measured Capacity, Stipulated Consumption Approach. The first approach to M&V presented in the IPMVP, is intended for retrofits where end use capacity, demand or power level can be measured or stipulated with the manufacturer's measurements, and energy consumption or operating hours are known in advance, stipulated or agreed upon by both parties. Option A usually involves a one-time measurement of the instantaneous baseline energy use, and a one-time measurement of the instantaneous post-installation energy use.

Option B) Measured Capacity, Measured Consumption Approach. Option B is intended for retrofits where the end use capacity, demand or power level can be a measured baseline, and the energy consumption of the equipment or sub-system can be measured post-installation over time. Option B can involve a continuous measurement of energy use both before and after the retrofit for the specific equipment or energy end use effected by the retrofit or measurements for a limited period of time necessary to determine retrofit savings.

Option C) Whole-Facility or Main Meter Measurement Approach. Encompasses whole-facility or main-meter verification procedures that provide retrofit performance verification for those projects where whole-facility baseline and post-installation data is available to measure savings. Option C usually involves a continuous measurement of whole-facility baseline energy use and electric demand, and a continuous measurement of the whole-facility energy use and demand post-installation.

Option D) Calibrated Simulation Approach. Option D is intended for energy conservation retrofits where calibrated simulations of the baseline energy use and/or calibrated simulations of the post-installation energy consumption are used to measure savings from the energy conservation retrofit. Option D can involve measurements of energy use both before and after the retrofit for specific equipment or energy end use as needed to calibrate the simulation program.²⁵

Improving the accuracy of a savings estimate happen in two general ways:

- 1) By reducing biases, by using better information or by using measured values in place of assumed or stipulated values, and
- 2) By reducing random errors, either by increasing the sample sizes, using a more efficient sample design or applying better measurement techniques.

The concerned parties establish the appropriate level for any savings determination. Where the firm performing the energy savings determinations has more experience than the owner, the owner may seek assistance in reviewing savings reports. Full review of baseline adjustments requires good understanding of the facility and its operations.²⁶

Note: The IPMVP document contains examples of the aforementioned options. We suggest a review of this information to help determine which savings calculation is best for your circumstance.

²⁴ For a copy of the International Performance Measurement & Verification Protocol, go to <http://www.ipmvp.org>.

²⁵ Using Guaranteed Energy Savings Performance Contracts to Reduce Utility Use, Finance Capital Improvements and Reduce Deferred Maintenance, Texas State Energy Conservation Office

²⁶ International Performance Measurement & Verification Protocol, October 2000, U.S. Department of Energy

Renewable Energy Projects

Strategies for M&V of renewables are important in designing, commissioning, serving as a basis for financing payments, and providing ongoing diagnostics. Characteristics unique to renewable energy systems require M&V techniques distinct from those applied to energy efficiency projects. Renewable energy such as wind, rely on intermittent resources requiring special procedures to measure effects on the integrated energy system — including proper valuation of increased capacity and redundancy. Many of the benefits of renewables are external to conventional evaluation and accounting techniques. A sound protocol for measuring the performance and quantifying benefits unique to renewable energy systems can be a valuable part of recognizing real benefits of renewables that are often not part of current evaluation and accounting techniques.²⁷

Each of the four M&V options, with modification, can be used for renewable energy projects:²⁸

Option A: Measured verification of equipment rating and capacity with performance based on stipulated production and/or consumption values. An example would be verifying solar thermal collector performance values and then using typical year solar insulation values to calculate hot water production.

Option B: Measured production and consumption at the system level can be used with most renewables projects with mechanical and/or electrical sub-systems. Architectural passive solar systems can usually not take advantage of Option B. An example would be measuring the thermal output of a solar collector system to determine the amount of hot water that is produced and that displaces conventional fuels.

Option C: Whole facility or sub-meter analysis can be used to compare conventional fuel use before and after the installation of a renewable energy project. An example would be comparing natural gas use in a facility before and after a solar thermal collector system is installed to displace conventional, domestic hot-water production.

Option D: Calibrated simulation can be used to model the expected performance of a renewable energy system, with calibration of key parameters using short-term metering or performance tests. An example would be using a computer simulation model, calibrated with short-term performance data, to predict long-term savings from the installation of a solar-thermal collector system.

²⁷ International Performance Measurement & Verification Protocol, October 2000, U.S. Department of Energy

²⁸ M&V Guidelines: Measurement and Verification for Federal Energy Projects, Version 2.2, September 2000, U.S. Department of Energy

IX: ELEMENTS OF THE ENERGY MANAGEMENT SERVICES CONTRACT

The intention of this section is to **suggest** elements of the contract to consider, **not to prescribe** the elements of the contract. Awarding Authority's have the right to include additional terms or refrain from including terms in the contract. Parts of DOER's boilerplate EMS contract are outlined here along with provisions common to most contracts.

Types of Contracts

The services provided under an EMS contract incorporate financing, design, installation, repair, maintenance, management, technical advice, and/or training. EMS contract options for public facilities include leasing, shared savings plans, joint ventures, or energy service contracts.

Leasing

Under a lease (or lease-purchase) agreement, the Awarding Authority agrees to make a fixed payment to the ESCO for a fixed term. In addition to designing, operating, and maintaining the improvements, the ESCO guarantees that energy and maintenance savings realized from implementing the project exceed the payments made to the ESCO. The net effect is similar to that under a shared savings plan. Please note that as a financing source, under a lease-purchase agreement, the ESCO may seek secondary repayment sources through the collateralization of Awarding Authority buildings, furniture, fixtures, and equipment.

Shared Savings Plans

Under a shared savings plan, the Awarding Authority agrees to pay a contractually specified amount²⁹ of measured energy cost savings for the ESCO's design, installation, operation, and maintenance of the Awarding Authority's facility. Shared savings plans are very simple in concept and have the advantage of being easily explained to administrators and policymakers.

The Awarding Authority and ESCO agree on a method of measuring savings and a formula for "splitting" these savings. This arrangement automatically ensures that the Awarding Authority pays less after implementing an EMS contract. ***It is important to note that both the guaranteed lease and shared savings approaches offer the same scope of services to the Awarding Authority.*** The key difference between the two is the method used to determine price, payments, and the mechanism that guarantees the performance contract reduce your overall costs.³⁰

Key Elements

Definitions: This section contains definitions relevant to the contract and project. Make sure definitions match those commonly used in engineering.

Term: This sets the duration of the contract. In Massachusetts, EMS contracts issued under the enabling law M.G.L. c.25A, § 11C may not have a term of more than ten years or twenty years for cogeneration.

²⁹ Energy savings in units (ccf, kWh, gallons, etc.) multiplied by unit cost.

³⁰ Guide to Energy Performance Contracting, June 1998, South Carolina Energy Office

ESCO's Services: This describes the scope of work that the ESCO performs in the implementation and design of the energy conservation measures. This section outlines responsibilities related to the energy audit, equipment design and construction, maintenance, upgrades or alterations including timelines and standards of service.

Responsibilities of the Customer: This outlines the customer's responsibility to conduct certain necessary measures to achieve savings. This ensures that the Awarding Authority understands its commitment and prevents the Contractor from unreasonably claiming that omissions by the customer resulted in unachieved savings.

Savings: In an EMS contract, savings measurement is a vital issue. Savings calculation should be stated in energy saved multiplied by the per unit cost of that energy. The total savings cover the total cost of the contract over the contract term. You may use internal funds to finance some ECMs. Make sure to account for the use of these funds in the savings calculations.

Measurement & Verification Plan

- Baseline Development Procedure including detailed methodology for calculating savings, the energy baseline, utility rate schedules and floor and ceiling prices for energy and water.
- Monthly Savings Calculation
- Reconciliation of Dollar Estimate of Guaranteed Savings

All savings should be consistent with the savings presented in the technical audit (TA). The TA report should become part of the contract.

Ownership of Property: Ownership describes how and when ownership of installed equipment passes to the customer, references a list of equipment warranties, and also defines proprietary rights and risk of loss. Equipment ownership may be important to the Contractor for purposes of securing financing or for the tax treatment of the Contractor's revenues under the performance contract. Specific language may include that all equipment installed by the Contractor remains the property of the Contractor during the term and that ownership transfers to the Awarding Authority at the expiration of the performance contract. You may want to consult your attorney should the proposer wish to alter this provision.

In cases where the Contractor's equipment includes software, you should ensure that you receive a license, both during the contract term and perpetually afterwards, to use the software to the extent necessary to operate facility equipment.³¹

Payment and Guaranty of Savings: Defines compensation, energy cost savings stated annually, references savings calculations and the method used in those calculations, and any adjustments. Defines the customer's right to retain an independent audit.

Termination: Defines the conditions whereby the customer notifies the ESCO of termination, sets a notice schedule, and defines "material breach" and "termination value". Defines actions or conditions that would result in default of the contract by the owner and any that would result in default of the contract by the ESCO. ***Note: Early Termination describes terms and/or conditions for early termination by the owner and the financial considerations of early termination such as penalties, payments, etc.***

³¹ Guide to Energy Performance Contracting, June 1998, South Carolina Energy Office

Performance Bonds for Construction: This section describes in detail the payment and performance bonds provided with the project as they pertain to construction. Performance guarantees such as performance bond, parent or affiliate guarantee, letter of credit or deposit of cash or securities presented to ensure performance, and whether or not restrictions are placed on the guarantees. This section also describes a separate bonding associated with the guaranteed savings.

Insurance:

1. Describes provisions for worker's compensation and protective public liability insurance and property damage.
2. Provides for errors and omissions insurance

Record Keeping: Outlines requirements for record keeping.

Force Majeure: There are events outside the ability of the parties to control, such as any cause beyond the reasonable power of the party claiming Force Majeure. It may include sabotage, strikes, acts of God, war, riot, civil disturbance, drought, earthquake, flood, explosion, fire, lightning, landslide, etc. However, customers should not accept risks properly borne by the ESCO. Economic hardship of either party does not constitute Force Majeure.

Choice of Law and Forum: Any agreement should be governed by the laws of the Commonwealth of Massachusetts

Dispute Resolution: Describes methods for resolving disputes and a venue for any dispute resolution.

X: COMMISSIONING AND MONITORING

Commissioning new equipment is defined as “the process of ensuring that systems are designed, installed, functionally tested and capable of being operated and maintained to perform in conformity with the design intent.” (ASHRAE, 1996)

Commissioning

Building commissioning is a systematic process of ensuring that a building performs in accordance with the design intent, contract documents, and the owner's operational needs. Due to the sophistication of building designs and the complexity of building systems constructed today, commissioning is necessary, but not automatically included as part of the typical design and construction process. Commissioning is critical for ensuring that the design developed through the whole-building design process is successfully constructed and operated.³² Please see References for a guide to commissioning.

Both the customer's and the ESCO's operation and maintenance responsibilities are defined in the final contract. Both parties have a strong incentive to ensure maintenance is properly performed. Poor operation and maintenance reduces savings causing standards of service and comfort to deteriorate below the contract requirements. To avoid this situation, integrate project operations and maintenance into overall facility operations and maintenance using appropriate procedures to measure and verify the performance and savings from the project. Summarize and report performance and savings results regularly to key decision-makers. Continue tracking over the long term to identify and correct for any performance deviations.

Monitoring

For projects financed using Energy Management Services Contracts, an annual verification of cost savings is provided. Instrumentation and measurement plays a role throughout the process, from measuring baseline energy use, to commissioning new systems, to optimizing long-term performance and serving as the basis of performance metrics and contractor payments.

The International Performance Measurement and Verification Protocol (IPMVP) provides a wide range of measurement and verification (M&V) alternatives, including stipulation based on engineering calculations, metering, and using the results of a short-term test to calibrate computer models. In general, more detailed and labor-intensive efforts yield more information, but the value of the information must be weighed against the cost of the M&V program. Simple, low-cost measurements are often adequate and cost effective. Energy management system tracking features are an effective way to collect consumption and demand information.

Factors affecting the costs of measurement and verification include these:

- Number of energy measures implemented
- Size and complexity of energy conservation measures
- Interactions between energy conservation measures
- How risk is allocated between the owner and the contractor in an EMS contract.

³² U.S. Department of Energy

In an ESPC, the M&V program would evaluate all measures of performance in the contract. For example, a lighting contract might include measurements of both electric power consumption and lighting levels.

Electric Energy

Determining electrical energy consumption is relatively straightforward, and an ordinary electrical meter is adequate for simple daily, weekly, or other longer electrical energy determinations. If consumption versus time is required, automated data collection is necessary. For the collection of time-based information, special equipment (a current monitor) can be installed without disconnecting power. Data loggers can be used to collect data, which can then be downloaded as needed.

Electrical Demand

Time-based information is needed if electrical demand is to be determined. For this purpose, it is essential to have the appropriate software to determine the "peak" value. The peak can be a time-averaged value over a sliding 15- or 30-minute time frame in which single or multiple spikes are not indicative of the peak as measured by the local utility. Others simply measure the highest demand in a month and base demand charges on that value.

Chilled and Hot Water

Btu meters can be installed to determine the energy consumption of HVAC equipment lines: chilled water, hot water, and steam. Simple, reasonably accurate meters can be installed "hot," that is, without needing to turn off the system.

Indoor Environmental Quality (IEQ)

Measuring the benefits of IEQ is difficult but not impossible. IEQ is an aggregate of the environment created by air quality, light, noise, temperature, and humidity conditions. Indoor air quality has received the most attention recently, but the other factors are also important contributors to the sense of well being of facility occupants. There are methods and instrumentation for measuring pollution levels (including carbon dioxide, carbon monoxide, volatile organics, ozone, particulates, and other air emissions), light levels, noise levels, and indices of comfort, such as mean radiant temperature. Employees can be surveyed to determine their reactions to their indoor environment and their perceptions of its effects on their performance and sense of satisfaction.

It is also important to assess objectively the impacts on employees' performance of measures designed to improve IEQ. Although these measures are more indirect, some of the statistics that may be examined include absenteeism, sick days, and drops in productivity. The Rocky Mountain Institute and Pacific Gas and Electric have conducted several studies linking improvements in IEQ to improvements in productivity. Please refer to the References section to access this information.

XI: FREQUENTLY ASKED QUESTIONS

1) What payment arrangements are available for Energy Management Services (EMS)?

There are various types of payment arrangements. Third-Party Financing is an alternative method of procuring energy and water conservation equipment at little or no up-front cost. Equipment is generally purchased through the energy and water cost savings generated by the conservation equipment installed. This type of arrangement may require a 5 to 10 year contract whereby the ESCO guarantees that the energy savings resulting from the improvements will be greater than the project costs. For more information on Third-Party Financing or Guaranteed Savings, see II:Third-Party Financing Overview.

2) What is an Energy Service Company or ESCO?

Energy Service Companies (known as ESCOs) are firms that coordinate all of the activities of a performance contracting project, including: technical audits, design engineering, equipment installation, construction management, project financing, staff training, equipment maintenance and project monitoring. There are many qualified ESCOs pursuing Energy Management Services Contracting projects in New England. For a complete list of companies certified in Energy Management Services in Massachusetts, go to <http://www.state.ma.us/cam/> or contact:

Division of Capital Asset Management
One Ashburton Place, 15th Floor
Boston, MA 02108

3) EMS contracting allows the same contractor to perform both design and construction. Does that conflict with M.G.L. c. 30B?

No. One may undertake EMS contracting as specified in Massachusetts General Laws Chapter 25A §11C. This statute allows for the purchase of a “program of services” including, design and construction work that is primarily intended to reduce energy and water consumption.

4) Why should I consider EMS contracting instead of a regular construction project?

You would want to consider EMS contracting to reduce your energy bills and obtain new capital equipment with little or no up-front capital investment. Most public agencies consider EMS contracting when they have identified energy conservation potential in their buildings, but do not have sufficient funding to make the improvements.

In addition, EMS contracting offers facility managers significant benefits that are not usually associated with standard construction projects, such as staff training for preventative maintenance. Over the contract term, ESCO staff trains facility staff how to optimize the performance of installed equipment.

EMS Contracting also allows the contracting entity to minimize risks related to the recouping of costs associated with new efficiency equipment when the ESCO guarantees a specified amount of energy savings as a result of the installed measures. When guaranteeing a certain level of savings, if those guaranteed savings do not materialize the ESCO then pays the difference.

5) What sorts of equipment can I fund with an EMS contract?

In general, EMS Contracts fund projects that have a simple payback from energy savings of fewer than seven years. Individual measures with shorter paybacks may help municipalities pay for other measures with longer paybacks (this is called “bundling”). For example, Public Agencies may procure the following equipment under an EMS contract: energy controls, lighting retrofits, HVAC upgrades, fuel switching, high efficiency motors and pumps, heat recovery systems and cogeneration.

6) We have insufficient funds to support an EMS contract for all of the efficiency improvements that we would like to make. Can we add bond funds?

Municipalities may provide bond funding. Supplying additional funding may allow you to add improvements with longer paybacks such as windows or insulation, which would not normally be considered by an ESCO.

Although you may “subsidize” an EMS Contracting project, clearly state the value that the funds add to a project. For instance, if you consider a cost-based approach to the final contract, you might identify the specific equipment installed as a result of your investment in the project.

7) What can we do if our energy and water bills are high, but we have very limited funds?

If you are short on funds but your annual energy and water utility bills total over \$200,000, you may have the potential to develop a successful EMS Contract, depending on the energy efficiency opportunities of your facilities. If your energy and water consumption is too small, consider collaborating with other entities.

The amount you can save on your utility bills depends on many things: the design of your building, how heavily it is used, whether you are already conserving effectively, alternate fuels available, the amount of capital you can invest, etc.

8) I need a custodian. Can I get one through EMS contracting?

No. To hire a custodian or procure services that are primarily maintenance in nature, you must follow specifications outlined in M.G.L. c. 30B. You cannot procure services and equipment primarily intended to reduce operational and maintenance costs under Chapter 25A, §11C for Energy Management Services.

9) We are planning major renovations to our buildings in the next few years. Should we still consider EMS Contracting?

Only if energy and water baselines can be established as reference points for the EMS contract. EMS contracting is a viable financing option if you are planning to improve your energy and water systems, but if renovations increase utility costs, reconsider or delay implementing an EMS contract. Improvements with little impact on utility costs, such as roofing or disability access, have little effect on energy savings from an EMS contract.

10) Our town hall needs a lot of work, but it is not big enough for an EMS contract. What can we do to develop a viable project?

The buildings in a project should cost enough in annual utility bills, including gas, electricity, water and oil to generate sufficient savings to cover the investment. Often a single building is not big enough to support a successful EMS contracting project. If this is the case, expand the scope of the project by either including more buildings or evaluating additional conservation improvements. For example, consider expanding the project to include schools, libraries and water treatment plants over which the city or town has jurisdiction, or consider joining with another municipality in a combined bid.

Some of the smaller towns may want to explore advertising their project with others. For successful projects, determine the evaluation criteria, the method of allocating savings, and the contract monitoring before advertising the project. The simplest approach would be to include “common measures” to purchase in bulk by a joint bid. Additional information is at <http://www.state.ma.us/doer/rb-ma/rebuild.htm#tools>.

11) A contractor told me that our buildings have great potential for energy and water efficiency improvements. They offered to perform an audit and give me a sample Request for Responses. Should I accept?

Do not rely on a contractor to develop your Request for Responses (RFR), either for the document itself or for audit services if the contractor may bid on the RFR. Working with an ESCO, either before or during the procurement process may be perceived as giving unfair preference and hindering fair competition. You may face bid protests; legal protests or, at a minimum, forced to re-bid the project.

However, hiring a consultant to conduct an energy audit of the premises and to assist in establishing Measurement and Verification standards and to monitor the actual energy savings achieved may prove to be very helpful, so long as they (and any ESCO’s they are associated with) are forbidden from bidding on the project.

12) Will I get contractors that are more qualified if I require several DCAM certifications?

In accordance with M.G.L. c.25A §11C and 225 C.M.R. 10.00, Public agencies must require that firms obtain DCAM certification. However, a company needs only **one** Energy Management Services certification. Requiring additional certifications, such as Electrical or HVAC, will unnecessarily limit competition to those few firms that possess the combination of certifications that you are requesting. Firms that meet the criteria for Energy Management Services are fully capable of performing extensive electrical, heating, and ventilation services.

13) We would like to expedite this process. How long do I need to advertise?

The law requires you to allow two (2) weeks between initial advertising and response submission deadline. However, good business practices would indicate that six (6) weeks is a more realistic period given the level of complexity of these projects. You will want to ensure that ESCOs responding to your RFR have enough time to review the buildings and accurately assess their energy savings potential.

Giving firms at least six (6) weeks to respond to the RFR, also decreases the likelihood of bid protests based on the perception that one firm had prior or preferential access to the site during the brief two-week interval. The six-week timeframe will also give more firms time to learn of the project, thus increasing the competition and quality of responses.

14) I do not know how to verify the savings. Should I let contractors suggest the best method?

Do **not** rely on ESCOs who will be bidding on the project to develop the baseline or measurement and verification method. You will want to base the contract on a baseline that fairly and accurately reflects the facility's energy consumption patterns. However, you may consider hiring a consultant to assist in establishing Measurement and Verification standards and to monitor the actual energy savings achieved, so long as they (and any ESCO's they are associated with) are forbidden from bidding on the project.

GLOSSARY

Baseline — Current energy utility and fuel costs.

Baseline Adjustments — The non-routine adjustments arising during the post-retrofit period that cannot be anticipated and which require custom engineering analysis.

Baseyear Conditions — The set of conditions that gave rise to the energy use/demand of the baseyear.

Baseyear Energy Data — The energy consumption or demand during the baseyear.

Baseyear — A defined period of any length before implementation of the ECM(s).

Commissioning — A process for achieving, verifying and documenting the performance of equipment to meet the operational needs of the facility within the capabilities of the design, and to meet the design documentation and the owner's functional criteria, including preparation of operator personnel.

Degree Day — A degree-day is measure of the heating or cooling load on a facility created by outdoor temperature. When the mean daily outdoor temperature is one degree below a stated reference temperature such as 18°C, for one day, it is defined that there is one heating degree-day. If this temperature difference prevailed for ten days there would be ten heating degree-days counted for the total period. If the temperature difference were to be 12 degrees for 10 days, 120 heating degree-days would be counted. When the ambient temperature is below the reference temperature, it is defined that heating degree-days are counted. When ambient temperatures are above the reference, cooling degree-days are counted. Any reference temperature may be used for recording degree-days, usually chosen to reflect the temperature at which heating or cooling is no longer needed.

Energy Conservation/Efficiency Measure (ECM or EEM) — A set of activities designed to increase the energy efficiency of a facility. An ECM may involve one or more of: physical changes to facility equipment, revisions to operating and maintenance procedures.

Energy Management System — A computer that can be programmed to control and/or monitor the operations of energy consuming equipment in a facility. (Not to be confused with the term "Energy Management Services".)

Energy Performance Contract — A contract between two or more parties where payment is based on achieving specified results; typically, guaranteed reductions in energy consumption and/or operating costs.

Energy Savings — Actual reduction in electricity use (kWh), electric demand (kW), or thermal units (Btu).

ESPC or Energy Savings Performance Contract — A term used in the United States equivalent to Energy Performance Contract.

ESCO or Energy Services Company — A firm which provides a range of energy efficiency and financing services and guarantees that the specified results will be achieved under an energy performance contract.

M&V or Measurement & Verification — The process of determining savings using one of the four IPMVP Options.

Metering — Collection of energy and water consumption data over time at a facility by using measurement devices.

Monitoring — The collection of data at a facility over time for the purpose of savings analysis (i.e., energy and water consumption, temperature, humidity, hours of operation, etc.)

M&V Option — One of four generic M&V approaches defined herein for energy savings determination.

Post-Retrofit Period — Any period of time following commissioning of the ECM.

Regression Model — Inverse mathematical model that requires data to extract parameters describing the correlation of independent and dependent variables

Simulation Model — An assembly of algorithms that calculates energy use based on engineering equations and user-defined parameters.

Verification — The process of examining the report of others to comment on its suitability for the intended purpose.

Typical Electricity Rate Schedule Terminology

Contract Demand — Power level that the utility guarantees to supply to the building, usually the maximum demand level required for a building to operate.

Demand Charge — A charge for the maximum rate at which electricity is used during peak hours of the billing period (Peak Demand), in \$/kW-mo. May also have reduced charges for off-peak demand.

Energy Charge — A charge for the amount of electricity used in the billing period, in \$/kWh-mo. May be separated into peak- and off-peak components of consumption and may vary seasonally.

Fuel Cost Adjustment, or FCA — Consumption cost adjustment used to reflect the varying market value of fuel, in \$/kWhmo.

Late Charge — A fee applied to the entire monthly balance for overdue payment, usually 5% of the total monthly bill, in dollars.

Peak Hours — Daily operating hours during which the highest level of demand for electricity from the utility exists. Electricity costs during these hours may be higher as the utility tries to encourage customers to reduce their demand.

Purchased Power Cost Recovery Factor — Costs passed on to the customer for power purchased by the utility from other suppliers in \$/kWh-mo.

Sales Tax — Tariff based on amount of energy consumed in \$/kWh-mo.

Service Charge — An administrative charge fixed at a small flat rate based on services provided.

Typical Gas Rate Schedule Terminology

Allocation Charge — Charge for consumption in excess of monthly gas allocation as defined in the service contract, in \$/CCF-mo. or \$/therm-mo. Usually only applied to larger customers.

Contract Demand — Maximum daily amount of gas that utility agrees to supply to the building, usually the maximum daily amount of gas that a building requires to operate.

Demand Charge — A charge for the maximum daily consumption of gas during the billing period, in \$/CCFday or \$/thermday.

Energy Charge — A charge for the amount of gas consumed during the billing period, in \$/CCF-mo or \$/therm-mo. This charge may fluctuate seasonally.

Late Charge — A fee applied to the entire monthly balance for overdue payment, usually 5% of the total monthly bill, in dollars.

Pipeline Charge — Utility costs for rental of pipeline space and recovery fees for financial losses resulting from deregulation, \$/CCF-mo or \$/therm-mo.

Purchase Gas Cost Adjustment — Costs passed on to the customer that reflect the fluctuations in the market value of gas, in \$/CCF-mo or \$/therm-mo.

Ratchet Clause — Penalty for an unusually high monthly demand. The ratchet demand will replace the actual demand levels on bills for 12 months following the peaking incident.

Sales Tax — Tariff based on amount of gas consumed, in \$/CCF-mo or \$/therm-mo.

Service Charge — An administration charge fixed at a small flat rate based on services provided, in dollars.³³

³³ Source: U.S. Department of Energy, Energy Smart Schools Program.

REFERENCES

GUIDES AND DOCUMENTS

A Best Practice Guide to Energy Performance Contracts, 2000, The Australasian Energy Performance Contracting Association for the Energy Efficiency Best Practice Program in the Australian Department of Industry Science and Resources

For an online copy of this document, go to <http://www.aepca.asn.au/epcguide.pdf>

Building Commissioning: The Key to Quality Assurance, Rebuild America Guide Series, U.S. Department of Energy

Designed to help building owners and retrofit project managers understand and successfully oversee the commissioning process. You can find this and other guides at <http://www.rebuild.org/attachments/guidebooks/commissioningguide.pdf>.

Financing Energy Efficiency in Buildings, Rebuild America Guide Series, U.S. Department of Energy

Written for organizations considering investments in energy efficiency projects, this document provides definitions, descriptions, and advice for implementing financial strategies. You can find this and other guides at <http://www.rebuild.org/attachments/solutioncenter/financeEE.pdf>.

Green Office Guide, City of Portland, Office of Sustainable Development.

To download, go to <http://www.rmi.org/images/other/GDS-GrnOfficeGuide.pdf>

Greening the Building and the Bottom Line, Rocky Mountain Institute.

For a downloadable copy, go to <http://www.rmi.org/images/other/GDS-GBBL.pdf>

Guide to Energy Performance Contracting, June 1998, South Carolina Energy Office

This is a systematic guide to Energy Performance Contracting. For more information on this guide or to get an online copy, go to <http://www.state.sc.us/energy/PDFs/epc1.pdf>. *Note: this guide contains many helpful attachments. However, please be aware that the enabling laws for performance contracting in South Carolina differ from those in Massachusetts.*

Guide to Energy Performance Contracting, July 1998, Hawaii Department of Business, Economic Development, & Tourism, Energy, Resources, & Technical Division. For more information go to <http://www.state.hi.us/dbedt/ert/epc.pdf>. *Note: this guide contains many helpful attachments. However, please be aware that the enabling laws for performance contracting in Hawaii differ from those in Massachusetts.*

Guide To Energy Performance Contracting: Measurement and Verification of Energy Savings in Energy Performance Contracting, July 2000, Hawaii Department of Business Economic Development & Tourism: Energy, Resources and Technology Division.

The International Performance Measurement & Verification is the basis for this guide. For a copy go to <http://www.hawaii.gov/dbedt/ert/epcguide.pdf>.

High Performance Commercial Building Systems, October 2003 Lawrence Berkeley National Laboratory for the California Energy Commission

Summarizes the work performed by the Lawrence Berkeley National Laboratory's High Performance Commercial Building Systems (HPCBS) program. http://www.energy.ca.gov/reports/2003-11-20_500-03-097F.PDF

International Performance Measurement & Verification Protocol

The International Performance Measurement and Verification Protocol (MVP) provides an overview of current best practice techniques available for verifying results of energy efficiency, water efficiency, and renewable energy projects in commercial and industrial facilities. It may also be used by facility operators to assess and improve facility performance. Energy conservation measures (ECMs) covered in the protocol include fuel saving measures, water efficiency measures, load shifting and energy reductions through installation or retrofit of equipment, and/or modification of operating procedures. To download an online copy and find out more about the IPMVP to <http://www.ipmvp.org>.

International Performance Measurement & Verification Protocol, Concepts and Practices for Improved Indoor Environmental Quality Volume II, Revised March 2002.

This document provides information to help energy efficiency professionals and building owners and managers maintain or improve IEQ during the implementation of building energy conservation measures in retrofits or new construction. These documents lists common energy conservation measures, describing their potential influence on IEQ and identifies precautionary actions or mitigation. To download an online copy and find out more about the IPMVP to <http://www.ipmvp.org>.

M&V Guidelines: Measurement and Verification for Federal Energy Projects, Version 2.2, September 2000, U.S. Department of Energy

The Federal Energy Management Program (FEMP) M&V Guideline contain specific procedures for applying concepts originating in the International Performance Measurement and Verification Protocol (IPMVP). For a downloadable copy, go to www.eren.doe.gov/femp/financing/measureguide.html

Risk Transfer via Energy Savings Insurance, October 1, 2001, Evan Mills, Energy Analysis Department, Lawrence Berkeley National Laboratory.

This and other reports on the nexus of insurance and energy management can be found online at http://eetd.lbl.gov/EMills/PUBS/PDF/Energy_Savings_Insurance.pdf

Risk Management Guide for DOD Acquisition, Fourth Edition, February 2001, Department of Defense, Defense Acquisition University, Defense Systems Management College. For a downloadable copy, go to <http://www.dau.mil/pubs/pdf/RiskMgmtGuide2001.pdf>

ORGANIZATIONS AND AGENCIES

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

U.S. Environmental Protection Agency, <http://www.epa.gov/>

Canadian Association of Energy Service Companies (CAESCO)

The primary organization representing the energy performance contracting industry in Canada. <http://www.ardron.com/caesco>

Federal Energy Management Program, <http://www.eere.energy.gov/femp>

Illuminating Engineering Society of North America, <http://www.iesna.org>

Massachusetts Department of Labor and Workforce Development, Division of Occupational Safety, Preventing Indoor Air Quality Problems during Construction and Renovation
<http://www.state.ma.us/dos/iaqdocs/IAQ-388.htm>

Washington State University, Total Efficiency Network

The Total Efficiency Network provides the information, training, and support necessary to save money and resources through efficient resource management at large public and private facilities. <http://www.energy.wsu.edu/ten/Default.htm>

TOOLS

DOE-2 Once it is determined that you have energy saving opportunities, an engineer or architect may use a simulation package to verify performance of the retrofit. The software program **DOE-2** can predict energy consumption after the retrofit. Hourly, whole-building energy analysis program calculating energy performance and life-cycle cost of operation. Can be used to analyze energy efficiency of given designs or efficiency of new technologies.
http://www.eren.doe.gov/buildings/tools_directory/software/doe-2.htm

ENERGY STAR Energy Star Label. ENERGY STAR offers businesses and consumers energy efficient solutions — helping to save money while protecting the environment for future generations.
<http://www.energystar.gov/default.shtml>

Federal Energy Decision System. Provides a comprehensive method for quickly and objectively identifying energy improvements that offer maximum savings. FEDS (Facility Energy Decision System) makes assessments and analyzes energy efficiency of single buildings, multiple buildings, or all buildings of an entire facility. http://www.eren.doe.gov/buildings/tools_directory/software/feds.htm

School Benchmarking. The U.S. Department of Energy's Oak Ridge National Laboratory has a [school benchmarking tool](http://schoolbenchmarkingtool) that allows you to compare your school's EUI against others in your DOE region.
<http://eber.ed.ornl.gov/benchmark/bldgtype.htm>

APPENDIX A
Certificate of Compliance Checklist

All state agencies and government bodies contracting for the procurement of energy management services under M.G.L. c.25A § 11C and 225 C.M.R. 10.00 are required to file a “Notice of EMS Procurement” with the Commissioner of the Division of Energy Resources.

Such notice shall include:

- ▶ The name of the government body procuring the energy management services, and
- ▶ The name (s) and building address (es) where energy management services will be performed, and
- ▶ A copy of the RFR, and
- ▶ A Certificate of Compliance.

The checklist that follows is a Certificate of Compliance, which must be filled-out and sent together with the copy of the RFR under the cover “Notice of EMS Procurement” to:

Massachusetts Division of Energy Resources
Attn: Eileen McHugh
70 Franklin Street, 7th Floor
Boston, MA 02110-1313

Certificate of Compliance Checklist
As Required by M.G.L. Chapter 25A, Section 11C &
225 C.M.R. 10.00

Pursuant to 225 CMR 10.00 _____,
(Name of Governmental Body)

hereby certifies that the attached RFR regarding procurement under MGL c.25A, § 11C complies with the following statutory and regulatory requirements. The initializing of each requirement and signature on this Certificate indicates compliance by a duly authorized representative of:

(Name of Governmental Body)

Forms Attached must include:

_____	Request for Responses (RFR).
_____	Identification of Public Agency: Contact Name, Title, Address, Telephone, and FAX.
_____	Building List: Name(s) and Address (es).

REQUIREMENTS

INITIALS

Provided notification to the Commissioner of the Division of Energy Resources of intent to solicit responses for an EMS contract at least one week before public advertisement. Procurement is in a Request for Responses (RFR) format.

RFR requests competitive sealed responses.

The RFR specifies the term of the contract is ten (10) years or less.

Twenty (20) years or less for co-generation.

The RFR:

- ✓ Provides building descriptions as per 225 C.M.R. 10.03 (1) (a).
- ✓ Provides a general statement of the scope of the project as per 225 C.M.R. 10.03 (1) (b).
- ✓ Requests that each bidder provide recommendations for energy savings as per C.M.R. 225 CMR 10.03 (1) (c)
- ✓ Includes a statement of objectives identifying the project's priorities on which responses will be evaluated as per 225 C.M.R. 10.03 (1) (d)
- ✓ Contains a request for measure by measure cost savings and calculation methodology as per 225 C.M.R. 10.03 (1) (e).
- ✓ Contains a request for measure by measure price data as per 225 C.M.R. 10.03 (1) (f).
- ✓ Requests Certificates of Eligibility and Update Statements as per 225 C.M.R. 10.03 (1) (g)
- ✓ Lists minimum contract and payment terms as per 225 C.M.R. 10.03 (1) (h)
- ✓ Includes time and date for receipt of responses.
- ✓ Includes address of the office to where responses are to be delivered.
- ✓ Includes a description of services to be procured.
- ✓ Includes specific requirements of services.
- ✓ Includes the RFR evaluation criteria which provide the means of measuring standards of responsiveness, including:

- ✓ Vendor responsibilities.
- ✓ Response's technical merit.
- ✓ Cost to the governmental body.
- ✓ Comprehensiveness of services.
- ✓ Energy and/or water cost savings.
- ✓ Revenues to the governmental body.
- ✓ Identification of mandatory and non-negotiable contract terms and conditions.
- ✓ References to other documents include the location as to where documents can be found.
- ✓ Public notice provided as per section M.G.L. c. 149 § 44J.
- ✓ Certification requirements as per M.G.L. c. 149.
- ✓ RFR requires responses to be opened publicly with two or more witnesses.
- ✓ Responses designated as available for public inspection.
- ✓ RFR does not have the effect of exclusively requiring a proprietary supply or service.

I, _____, hereby certify that the information
(Typed name of Authorized Signatory)

contained herein is, to the best of my knowledge, complete and accurate and complies with 225
CMR 10.00 and M.G.L c.25A, section 11C.

Signature: _____ Date: _____

Title: _____

For DOER use only: Acknowledgement of receipt by DOER	
	Office Signature
	Title
	Date

APPENDIX B
M.G.L. c.25A §11C. SUMMARY
As applies to governmental bodies

M.G.L. c.25A §11C.

DISCLAIMER.

Please note that we have not discussed every element of the statute as detailed in Massachusetts General Laws. Do not rely solely on our summary for a complete understanding of M.G.L. 25A § 11C; it is provided only as an overview of the energy management services legislation and is not to be used in place of seeking legal advice.

M.G.L. c.25A §11C.

DEFINITIONS.

Governmental Bodies—All public agencies, which are not state agencies or building authorities.

Public Agencies—All public agencies, including state agencies, building authorities and governmental bodies.

M.G.L. c.25A §11C.

TEXT.

- Public Agencies may enter contracts for the procurement of energy management services.
 - Contract term of ten (10) years or less.
 - Contract term of twenty (20) years or less for cogeneration projects.
- The public agency must:
 - Use an RFR to solicit competitive sealed responses.
 - Notify the commissioner of DOER, in writing, at least one (1) week before soliciting responses.
 - Send a copy of the RFR with the notice to DOER.
 - *DOER will issue a letter acknowledging receipt of notice of EMS procurement.*
- The RFR shall include:
 - A deadline for receipt of responses and a delivery address.
 - A description of the services to be procured.
 - Include specific requirements and evaluation criteria.
 - Proposed contract terms and conditions.
 - Identify which terms are mandatory and non-negotiable.
- The RFR may incorporate documents by reference:
 - Specify where prospective offerors may obtain copies.
 - Make copies available to all on an equal basis.
- Public notice of the RFR (M.G.L. 149 § 44J). Click [here](http://www.state.ma.us/legis/laws/mgl/149%2D44j.htm) <http://www.state.ma.us/legis/laws/mgl/149%2D44j.htm> to read the full text version of M.G.L. 149 § 44J.
 - Post RFR for at least one (1) week in a conspicuous place in or near the offices of the awarding public agency.
 - Publish RFR at least once in the Central Register at least two (2) weeks before response deadline.

- Responses shall be:
 - Opened publicly.
 - In the presence of at least two (2) witnesses.
 - At the time specified in the RFR.
 - Available for public inspection.
 - Accompanied by:
 - A copy of a certificate of eligibility issued by the Division of Capital Asset Management and Maintenance (DCAM).
 - An update statement.
- If the awarding agency determines that an offeror is not responsible or eligible, then they shall reject the offer and give written notice of basis to DCAM.
- Please Note-- Contractors wishing to submit prime bids on public building projects estimated to cost more than twenty-five thousand dollars (\$25,000) for the construction, reconstruction, installation, demolition, maintenance, or repair of any publicly owned building must first be certified by the Division of Capital Asset Management. Certification is not required for filed sub-bids. The Division of Capital Asset Management's Contractor Certification Office conducts the certification process. See: <http://www.state.ma.us/cam/>
- In solicitations by governmental bodies, the specifications (scope of services) in the RFR shall not be written in a manner so restrictive that:
 - Only one ESCO will be able to satisfy them.
 - Only equipment made by a particular manufacturer will satisfy them.
 - Unless the governmental body explains, in writing, why no other description will suffice.
- Responses shall be accepted without alteration or correction.
 - An offeror may correct, modify, or withdraw a response by written notice before the date set for opening the responses.
 - After the responses are opened, an offeror may not change any provisions of the response.
 - The governmental body shall waive minor informalities or allow the offeror to correct them.
 - If the mistake and intended response are clearly evident from the face of the document, then the governmental body shall make the correction.
 - If the mistake is clear but the intended correction is not, then the offeror may withdraw the response.
- Use only the criteria listed in the RFR to evaluate each response and award each contract. The RFR must indicate how the criteria will be evaluated. Governmental bodies are **required** to evaluate the following criteria, **in addition to** any other criteria that it may choose:
 - Responsiveness.
 - Responsibility.
 - Qualifications of the Offeror.
 - Technical Merit.
 - Cost to the Governmental Body.
- Specify in the RFR how the responses will be evaluated to determine Lowest Overall Cost, taking into consideration:
 - Comprehensiveness of services.
 - Energy or water cost savings.

- Costs to be paid by the governmental body.
- Revenues to be paid to the governmental body.
- The evaluations of the responses must specify whether any revisions are needed.
 - Negotiate any revisions **before** the contract is awarded.
 - An award of the contract may be conditioned on the successful negotiation of the revisions in the evaluation.
 - Explain in writing the reasons for omitting a revision to a response.
- A governmental body may cancel an RFR or reject a response that is not in the best interest of that governmental body.
 - The governmental body must state the reason for cancellation or rejection **in writing**.
- Publish notice of the offeror awarded the contract in the Central Register.
 - File a copy of this notice with the commissioner of DOER within thirty (30) days of awarding the contract.

Go to <http://www.state.ma.us/legis/laws/mgl/25a%2D11c.htm> to read the *full text version of M.G.L. Chapter 25A, §11C*.

APPENDIX C
Chapter 25A §11C.
Contracts for procurement of energy management services.

Section 11C. (a) A public agency may, in the manner provided by this section, contract for the procurement of energy management services. Such contracts may include terms of ten years or less. Contracts that include cogeneration projects shall have terms of twenty years or less. The public agency shall solicit competitive sealed responses through a request for responses. At least one week prior to soliciting responses for a contract pursuant to this section, a public agency shall notify the commissioner of energy resources in writing, in such form and including such information as the commissioner shall prescribe by regulation, of the agency's intent to solicit responses. Such notification shall include, at a minimum, a complete copy of the agency's request for responses. An acknowledgment of receipt, in such form and by including such information as the commissioner shall prescribe by regulation, shall be issued to the public agency upon successful compliance with the requirements of this paragraph.

Requests for responses for an energy management services contract to be entered into on behalf of a state agency or a building authority, shall be developed jointly by the division of capital asset management and maintenance and the using agency. Such responses shall only be solicited by the division of capital asset management and maintenance after the commissioner of said division has given his prior written approval, and no contract for energy management services shall be valid unless approved and signed by said commissioner. Said commissioner may delegate to state agencies and building authorities the authority to enter into such contracts with an estimated construction cost of less than two hundred thousand dollars. Such delegation shall be in writing from the commissioner to the regulating agency or building authority.

The request for responses published by a public agency under this section shall include: (1) the time and date for receipt of responses and the address of the office to which the responses are to be delivered; (2) a description of the services to be procured, including specific requirements and all evaluation criteria that will be utilized by the state agency or building authority; and (3) proposed contract terms and conditions and an identification of such terms and conditions which shall be deemed mandatory and non-negotiable. The request for responses may incorporate documents by reference, if the request for responses specifies where prospective offerors may obtain the documents. The public agency shall make copies of the request for responses available to all persons on an equal basis. Public notice of the request for responses shall conform to the procedures set forth in subsection (1) of section forty-four J of chapter one hundred and forty-nine. Responses shall be opened publicly, in the presence of two or more witnesses, at the time specified in the request for responses, and shall be available for public inspection.

The provisions of sections forty-four A, forty-four B and forty-four E through forty-four H, inclusive, of chapter one hundred and forty-nine shall not apply to contracts procured pursuant to this section. The provisions of section forty-four D of chapter one hundred and forty-nine shall apply as appropriate to responses submitted for contracts under this section, and every such response shall be accompanied by (1) a copy of a certificate of eligibility issued by the commissioner of the division of capital asset management and maintenance, and (2) by an update statement. The division of capital asset management shall evaluate the offeror's qualifications and maintenance in a manner designated by the commissioner of said division. If the public agency determines that any offeror is not responsible or eligible, the public agency shall reject the offeror, and shall give written notice of such action to the division of capital asset management and maintenance.

State agencies and building authorities shall award contracts under this section to the lowest offeror demonstrably possessing the skill, ability, and integrity necessary to perform faithfully energy management services.

Payments under a contract for energy management services may be based in whole or in part on any cost savings attributable to a reduction in energy and water consumption due to the contractor's performance or revenues gained due to the contractor's services that are aimed at energy and water cost savings.

(b) The provisions of this subsection shall apply to a governmental body, as defined in this section, procuring contracts under this section.

Unless no other manner of description suffices, and the governmental body so determines in writing, setting forth the basis for the determination, all requirements shall be written in a manner which describes the requirements to be met without having the effect of exclusively requiring a proprietary supply or service, or a procurement from a sole source.

Subject to a governmental body's authority to reject, in whole or in part, any and all responses, as provided in this section, a governmental body shall unconditionally accept a response without alternation or correction, except as provided in this paragraph. An offeror may correct, modify, or withdraw a response by written notice received in the office designated in the request for responses prior to the time and date set for opening the responses. After response opening, an offeror may not change any provisions of the response in a manner prejudicial to the interests of the governmental body or fair competition. The governmental body shall waive minor informalities or allow the offeror to correct them. If a mistake and the intended response are clearly evident on the face of the response document, the governmental body shall correct the mistake to reflect the intended correction and so notify the offeror in writing, and the offeror may not withdraw the response. An offeror may withdraw a response if a mistake is clearly evident on the face of the response but the intended correction is not similarly evident.

The governmental body shall evaluate each response and award each contract based solely on the criteria set forth in the request for responses. Such criteria shall include, but not be limited to, all standards by which the governmental body will evaluate responsiveness, responsibility, and qualifications of the offeror, technical merit, and cost to the governmental body. The request for responses shall specify the method for comparing responses to determine the response offering the lowest overall cost to the governmental body, taking into consideration comprehensiveness of services, energy or water cost savings, costs to be paid by the governmental body, and revenues to be paid to the governmental body. If the governmental body awards the contract to an offeror who did not submit the response offering the lowest overall cost, the governmental body shall explain the reason for the award in writing.

The evaluations shall specify revision, if needed, to each response obtained by negotiation before awarding the contract to the offeror of the response. The governmental body may condition an award on successful negotiation of the revisions specified in the evaluation, and shall explain in writing the reasons for omitting any such revision from a plan incorporated by reference in the contract.

(c) The public agency may cancel a request for responses, or may reject in whole or in part any and all responses when the public agency determines that cancellation or rejection serves the best interests of the public agency. The public agency shall state in writing the reason for a cancellation or rejection. The public agency shall promptly publish in the central register notice of the offeror awarded the contract.

The public agency shall file, within thirty days, a copy thereof with the commissioner of energy resources.

The commissioner of energy resources, in consultations with the commissioner of the division of capital asset management and maintenance, shall promulgate regulations for the procurement of energy management services under this section, provided however, that the commissioner of the division of capital asset management and maintenance shall promulgate regulations for services to be procured for state agencies and building authorities, and further provided, that regulations affecting the operations of housing authorities within the jurisdiction of the department of housing and community development shall be promulgated in consultation with the director of housing and community

development. Such regulations may limit the scope of services procured and the duration of contracts, and shall include any requirements that the commissioner of energy resources or commissioner of the division of capital asset management and maintenance deems necessary to promote prudent management of such contracts at the appropriate facilities. Such regulations shall require the submission, at least annually, of such information as the commissioner of energy or commissioner of the division of capital asset management and maintenance may deem necessary in order to monitor the costs and benefits of contracts for energy management services.

(d) The commissioner of energy resources shall enforce the requirements of this section and regulations promulgated hereunder as they relate to public agencies except for state agencies and building authorities and shall have all the necessary powers to require compliance therewith. The commissioner of the division of capital asset management and maintenance shall enforce all such regulations as they relate to state agencies and building authorities. Any order of the commissioner of energy resources under this subsection shall be effective and may be enforced according to its terms, and enforcement thereof shall not be suspended or stayed by the entry of an appeal therefrom. The superior court for Suffolk county shall have jurisdiction over appeals of orders of the commissioner of energy resources under this subsection, and shall also have jurisdiction upon application of said commissioner to enforce all orders of said commissioner under this subsection. The burden of proof shall be upon the appealing party to show that the order of said commissioner is invalid. An aggrieved person shall not be required to seek an order from said commissioner as a condition precedent to seeking any other remedy.

(e) As used in this section, the following words and terms shall have the following meanings:

"Building authority", the University of Massachusetts Building Authority, the Southeastern Massachusetts University Building Authority, the University of Lowell Building Authority or any other building authority which may be established for similar purposes.

"Eligible", able to meet all requirements for offerors or bidders set forth in this section and section forty-four D of chapter one hundred and forty-nine and not debarred from bidding under section forty-four C of said chapter one hundred and forty-nine or any other applicable law, and who shall certify that he or she is able to furnish labor that can work in harmony with all other elements of labor employed or to be employed on the work.

"Governmental body", a city, town, district, regional school district, county, or agency, board, commission, authority, department or instrumentality of a city, town, district, regional school district or county, and all other public agencies which are not a state agency or building authority.

"Minor informalities", minor deviations, insignificant mistakes, and matters of form rather than substance of the response or contract document which can be waived or corrected without prejudice to other offerors, potential offerors, or the public agency.

"Person", any natural person, business, partnership, corporation, union, committee, club, or other organization, entity or group of individuals.

"Public agency", a department, agency, board, commission, authority, or other instrumentality of the Commonwealth or political subdivision of the commonwealth or two or more subdivisions thereof.

"Responsible", demonstrably possessing the skill, ability and integrity necessary to faithfully perform the work called for by a particular contract, based upon a determination of competent workmanship and financial soundness in accordance with the provisions of this section and section forty-four D of chapter one hundred and forty-nine.

"Responsive offeror", a person who has submitted a response which conforms in all respects to the requests for responses.

"State agency", a state agency, board, bureau, department, division, section, or commission of the commonwealth.

APPENDIX D

225 C.M.R. 10.00. SUMMARY

225 C.M.R. 10.00

DISCLAIMER.

Please note that we have not discussed every element of the regulations as detailed in the Code of Massachusetts Regulations (CMR). Do not rely solely on our summary for a complete understanding of 225 C.M.R. 10.00; it is provided only as an overview of the energy management services legislation and is not to be used in place of seeking legal advice. This summary should not be construed in any manner, which is inconsistent with the explicit provisions of the statute or regulations. If you have any questions or comments, feel free to contact the Division of Energy Resources at (617) 727-4732.

Note: The Division of Capital Planning and Operations (DCPO) is now known as the Division of Capital Asset Management.

225 C.M.R.10.00

DEFINITIONS.

Governmental Bodies—All public agencies, which are not state agencies or building authorities.

Public Agencies—All public agencies, including state agencies, building authorities and governmental bodies.

225 C.M.R. 10.00

TEXT.

- **RFR TERMS**—Governmental bodies shall solicit competitive sealed responses through an RFR. Include in the RFR:
 - A deadline for receipt of responses and a delivery address.
 - A description of the services to be procured.
 - Include specific requirements and evaluation criteria.
 - A list of proposed contract terms and conditions.
 - Identify which terms are mandatory and non-negotiable.
 - A general description of buildings to be addressed by the RFR, including where applicable:
 - The purpose for which the building is used and approximate hours of daily occupancy.
 - The approximate size, age and condition of building envelope.
 - A description of heating and cooling systems, including age, condition, and fuel type(s).
 - A description of heating and cooling distribution and control systems.
 - A description of lighting and lighting control systems.
 - Fuel, electricity, and water consumption data for the past three- (3) years.
 - The minimum scope of building improvements requested.
 - A request that the bidder provide recommendations to address these improvements.
 - A request that the bidder provide recommendations to address:
 - Building Envelope.
 - Heating and Cooling Systems.
 - Lighting and Control Systems.
 - Any other recommendations for energy savings sought by the governmental body.
 - A statement of objectives.
 - Identify project priorities on which responses will be evaluated, including:
 - Energy and water cost savings.

- Reducing consumption.
 - Funding major capital improvements.
 - Improving building operating conditions.
- A request for estimated energy and water cost savings based on the specified savings calculation methodology.
- Requests for price data on each energy and water conservation measure.
- Mandatory business specifications.
- DCAM Certificate of Eligibility.
- Update Statement.
- Minimum contract and payment terms.
 - Utility and water savings and revenues.
 - Payments to the contractor.
 - Payments to the governmental body.
- **FILING NOTICE WITH DOER**—File a copy of the RFR labeled, “notice of EMS procurement” with DOER. Include in the notice:
 - A copy of the RFR.
 - The identity of the governmental body procuring EMS.
 - The names and addresses where EMS will be performed.
 - A Certificate of Compliance Checklist.
 - Certifies that the RFR satisfies the requirements of 225 C.M.R. 10.00 and M.G.L. c.25A §11C.
 - Indicates whether the governmental body is seeking DOER review and comments on its RFR.
- **RECEIPT**--DOER will acknowledge receipt of the notice within two (2) business days.
 - The acknowledgement is not an indication of review or approval, only receipt.
 - If the filing is incomplete, DOER will identify the information necessary to complete the filing.
 - Governmental Bodies may not publish their RFR until they receive acknowledgement from DOER.
- **SEEKING DOER REVIEW**—
 - If seeking DOER review, then file notice of EMS procurement thirty-five (35) days prior to publishing RFR.
 - If foregoing DOER review, then file notice of EMS procurement at least seven (7) days prior to publishing the RFR.
- **FILING CONTRACT WITH DOER**—File a copy of the EMS contract with the Commissioner of DOER within thirty (30) days of contract signing.
- **MANDATORY CONTRACT TERMS**—In addition to other terms required by law, governmental bodies **must** include the following provisions in their EMS contracts:
 - A description of required energy conservation measures being performed by the contractor including the:
 - Cost of each measure.
 - Energy cost savings.
 - Method to be used to verify savings.

- Payment terms.
 - Mechanism to secure any guaranteed energy or water cost savings.
 - A detailed description of all services to be provided by the contractor, including but not limited to, operation, and maintenance services.
- **FILING CONTRACT AMENDMENTS WITH DOER**—File copies of all contract amendments with the Commissioner of DOER at least thirty (30) days before the effective date of the amendment.
 - Amendments may not exceed ten (10) percent of the total project cost.
 - **ANNUAL FILING WITH DOER**—File an annual report with DOER containing:
 - A summary of energy and, if applicable, water cost savings.
 - A summary of the cost of each conservation measure and the total contract price as of the time of each annual filing with DOER.
 - The identity of the official responsible for overseeing the contract and contact information.
 - **FILING COMPLAINTS WITH DOER**—Mail complaints regarding non-compliance with M.G.L. c.25A §11C and 225 C.M.R. 10.00 to the Commissioner of DOER. The complaint must include:
 - The identity of the person filing complaint and contact information.
 - The identity of the governmental body involved.
 - A detailed description of the alleged non-compliance.
 - A statement showing that the non-compliance has been brought to the attention of the governmental body involved and describing all efforts to resolve or correct the situation.
 - Any supporting documentation.
 - **ADVISORY OPINION**—DOER may issue an advisory opinion to the person filing the complaint and the relevant governmental body when it has all the facts and information necessary to evaluate the complaint.
 - **DISPUTE RESOLUTION**--Upon request from a governmental body, DOER may assist in dispute resolution.
 - **FILE WAIVER REQUESTS WITH DOER**—The Commissioner of DOER may waive any of the requirements of 225 C.M.R..10.00 upon written request of a public agency and a showing of special or exceptional circumstances. The waiver request must be:
 - In writing.
 - Signed by the governmental body requesting the waiver.
 - Specify the provisions to be waived.
 - Sent by certified mail, return receipt requested, to the Commissioner of DOER; and containing:
 - A detailed explanation of why the waiver should be granted.
 - Certification that the governmental body has made a good faith effort to comply with the requirements.

APPENDIX E
225 CMR 10.00

225 CMR 10.00: ENERGY MANAGEMENT SERVICES (EMS) CONTRACTS

Section

- 10.01: Application; Purpose; Authority
- 10.02: Definitions
- 10.03: Request for Responses; Responses
- 10.04: Contract Award
- 10.05: Contract Terms
- 10.06: Contract Amendments
- 10.07: Monitoring; Reporting Requirements
- 10.08: Complaint Process Procedures; Disputes
- 10.09: Severability
- 10.10: Waivers

10.01: Application, Purpose, and Authority

(1) Application. 225 CMR 10.00 shall apply to the procurement of energy management services pursuant to M.G.L. c.25A, §11C by a governmental body or a public agency, as specified. Services that are primarily intended to reduce operational and maintenance costs, including but not limited to personnel costs, shall not be procured under 225 CMR 10.00. Any dispute as to inclusion or exclusion within the provisions of 225 CMR 10.00 shall be determined by the Division of Energy Resources.

(2) Authority. 225 CMR 10.00 is promulgated under the direction of M.G.L. c.25A, §11C.

10.02: Definitions

Terms defined in M.G.L. c.25A, §§ 3 and 11C, which are also used in 225 CMR 10.00, shall have the same meaning as set forth in M.G.L. c.25A, unless said term is otherwise defined in 225 CMR 10.00.

Certificate of Eligibility. A certificate provided by DCPO pursuant to M.G.L. c. 149, § 44D, indicating a contractor's qualifications to perform energy management services (EMS), and any update statements issued by DCPO.

DCPO. Division of Capital Planning and Operations, established by M.G.L. c. 4, § 7A.

DHCD. Department of Housing and Community Development.

DOER. The Division of Energy Resources, established by M.G.L. c.25A, §1.

10.02 continued

Energy Audit. A determination of the energy consumption characteristics of a building or facility which identifies the type, size, and rate of energy consumption of the building or facility and the major energy systems of the building or facility; determines appropriate energy conservation maintenance and operating procedures; and indicates the need, if any, for the acquisition and installation of energy conservation measures.

Energy Conservation Project. A project to promote energy and water conservation, including but not limited to energy conserving modification to windows and doors; caulking and weather-stripping; insulation; automatic energy control systems; hot water systems; equipment required to operate steam, hydraulic, and ventilating systems; plant and distribution system modifications including replacement of burners, furnaces, or boilers; devices for modifying fuel openings; electrical or mechanical furnace ignition systems; utility plant system conversions; replacement or modification of lighting fixtures; energy recovery systems; and cogeneration systems.

Governmental Body. A city, town, district, regional school district, county, or agency, board, commission, authority, including but not limited to housing authorities whether funded by state or federal funds, department or instrumentality of a city, town, district, regional school district or county, and all other public agencies which are not a state agency or building authority.

Lease. A financing mechanism included in a legally binding and enforceable agreement which enables a governmental body to use and, if applicable, purchase and own, by means of installment payments, equipment for the implementation of energy management services.

Local housing authority. A body politic and corporate created pursuant to M.G.L. c.121B or similar provisions of earlier general or special laws.

Public Agency. A department, agency, board, commission, authority, including but not limited to housing authorities whether funded by state or federal funds, or other instrumentality of the Commonwealth or political subdivision of the Commonwealth or two or more subdivisions thereof, including, but not limited to, governmental bodies, state agencies and building authorities.

RFR. A request for responses, which is referred to in M.G.L. c.25A, §11C as a “request for proposals”, consisting of a written document issued by a public agency which invites bidders to submit responses outlining their qualifications, the desire to perform the energy management services for the public agency, a cost proposal, and other information required by 225 CMR 10.03(1) and the public agency.

RFR Compliance Certification. A certification form issued and revised from time to time by the Commissioner of DOER, which is completed and signed by a governmental body and filed with DOER, certifying in writing that the governmental body’s RFR for EMS is in full compliance with 225 CMR 10.00 and M.G.L. c.25A, §11C.

10.02 continued

Total Project Price. The total payments made by a governmental body to a contractor for energy management services, including but not limited to, the total capital investment, the contractor's return on investment, utility sponsored rebates, tax or other incentives, any direct governmental subsidies, interest payments, and energy and water cost savings.

10.03: Request For Responses; Responses

(1) RFR Terms. A governmental body shall solicit competitive sealed responses through an RFR, which shall at a minimum include, in addition to the requirements of M.G.L.

c.25A, §11C, the following:

(a) a general description of those buildings to be addressed by the RFR, including where applicable:

1. the general purpose for which the building is used, and approximate hours of daily occupancy;
2. the approximate size, age and condition of the building envelope;
3. a general description of the heating and cooling systems including the approximate age, condition, and fuel type(s);
4. a general description of the heating and cooling distribution systems and control systems;
5. a general description of the lighting and lighting control systems; and
6. fuel, electricity, and water consumption data for the past three years (if applicable).

(b) a general statement of the minimum scope of building improvements requested by the governmental body;

(c) a request that the bidder provide recommendations to address building improvements referenced in 225 CMR 10.03(1)(b), and where applicable, to additional improvements for:

1. the building envelope;
2. the heating and cooling systems (if applicable);
3. the lighting and control systems; and
4. any other recommendations for energy savings sought by the governmental body;

(d) a statement of objectives, identifying the project's priorities on which responses will be evaluated, which may include saving energy and water costs, reducing consumption, funding major capital improvements, and improving building operating conditions;

(e) a request for estimated energy and water cost savings based on the specified savings calculation methodology;

(f) a request for price data on each proposed energy and, if applicable, water conservation measure;

(g) mandatory business specifications, including a DCPO Certificate of Eligibility and Update Statement; and

(h) minimum contract and payment terms, including, but not limited to, any related utility and water savings and revenues which are factored in said payments, payments to the contractor and payments to the governmental body.

10.03: continued

(2) Filing of RFR with DOER. Public agencies procuring EMS under 225 CMR 10.00 are required to file a copy of the RFR, along with other information, in a Notice of EMS Procurement, in accordance with the procedures established in 225 CMR 10.03, except that state agencies and building authorities shall only be required to file a copy of the RFR. Local housing authorities shall also file the RFR, prior to publication, with DHCD.

A governmental body may choose to either:

- (a) obtain DOER's review of and comments on the RFR, as provided in 225 CMR 10.03(3) through (5); or
- (b) forego DOER's review, as provided in 225 CMR 10.03(6).

Governmental bodies requesting DOER's review and comments on an RFR must file a Notice of EMS Procurement at least 35 business days prior to publishing the RFR.

Governmental bodies foregoing DOER's review and comments on an RFR must file a Notice of EMS Procurement at least seven days prior to publishing the RFR.

Governmental bodies are strongly encouraged to obtain DOER's review of an RFR.

(3) Notice of EMS Procurement to DOER. Governmental bodies filing an RFR with DOER shall file the RFR in a Notice of EMS Procurement which shall:

- (a) include a copy of the RFR;
- (b) identify the public agency procuring EMS, including the name, address, telephone and fax number, and title of the person responsible for said procurement;
- (c) identify the name(s) and building address(es) where EMS will be performed for the public agency;
- (d) be labeled as "Notice of EMS Procurement" and delivered by the public agency to the Commissioner of DOER by certified mail, return receipt requested; and
- (e) include a completed RFR Compliance Certification form, certifying that the governmental body's RFR fully meets the RFR requirements of 225 CMR 10.00 and M.G.L. c.25A, §11C.

(4) Acknowledgment of Receipt.

(a) Within two business days of DOER's receipt of:

- 1. a Notice of EMS Procurement;
- 2. a copy of an RFR, as applicable, DOER shall mail to the public agency, by certified mail, return receipt requested, an Acknowledgment of Receipt of the documents. An Acknowledgment of Receipt is not an indication of DOER's review or approval of an RFR.

(b) If the filing is incomplete, DOER shall identify the documents or information necessary to complete the filing. A governmental body shall refrain from publishing an

RFR until the governmental body receives an Acknowledgment of Receipt from DOER confirming a complete filing.

(5) Request for DOER's review of an RFR. A governmental body may request DOER's review of and comments on an RFR by indicating said request to the Commissioner of DOER in the governmental body's RFR Compliance Certificate form in the Notice of EMS Procurement. In such cases, the Notice of EMS Procurement, including the RFR Compliance Certificate, must be filed with DOER at least 35 business days prior to publishing the RFR.

10.03: continued

DOER shall not review or comment on any RFR unless the request complies with the requirements of 225 CMR 10.03(5). Governmental bodies are strongly encouraged to incorporate DOER's comments into the RFR prior to publication to mitigate the likelihood of potential disputes. However, if a governmental body has received an Acknowledgment of Receipt from DOER indicating that the Notice of EMS Procurement is complete, the governmental body may publish the RFR. DOER's review of an RFR shall be limited to the requirements of 225 CMR 10.00 and M.G.L. c.25A, §11C relating to RFR terms. DOER's review of and comments on an RFR shall not concern or endorse any technical or financial information included in the RFR. Within 25 business days after DOER receives a complete Notice of EMS Procurement requesting DOER's review, DOER shall deliver to the governmental body, by certified mail, return receipt requested, a letter providing DOER's comments on the RFR.

(6) Foregoing DOER's Review and Comments of an RFR. If a governmental body chooses to forego DOER's review of and comments on an RFR, the governmental body shall indicate said decision to the Commissioner of DOER in the governmental body's RFR Compliance Certificate, which is included in a complete Notice of EMS Procurement. In such cases, the governmental body shall file the Notice of EMS Procurement, including the RFR Compliance Certificate, at least seven days before publishing the RFR. DOER shall continue to have the right to investigate any apparent non-compliance with 225 CMR 10.00, in accordance with the provisions of 225 CMR 10.08.

(7) Publication of RFR. A governmental body may only publish an RFR for EMS procured in compliance with 225 CMR 10.03(3). Such publication of an RFR shall comply with the requirements of M.G.L. c. 149, § 44J(1). Governmental bodies are encouraged to provide longer than required posting and publication periods, when appropriate, to increase fair competition among bidders.

(8) Response Evaluation. A governmental body shall open and evaluate proposals by a governmental body pursuant to the procedures established by M.G.L. c.25A, §11C.

10.04: Contract Award

A governmental body shall award a contract for EMS procured under 225 CMR 10.00 in accordance with the provisions of M.G.L. c.25A, §11C. Within 30 business days after the contract is signed, the governmental body shall file a copy of said contract with the Commissioner of DOER.

10.05: Contract Terms

A governmental body shall include the following provisions in all contracts awarded by a governmental body pursuant to 225 CMR 10.00, in addition to other terms required by law and by the governmental body:

- (1) a description of required energy conservation measures to be performed by the contractor, including the cost of each measure, energy cost savings, and the method to be used to verify said savings;
- (2) the payment terms;

10.05 continued

- (3) the mechanism to be used to secure any guaranteed energy and water cost savings, particularly if the contract includes leasing of equipment which the governmental body intends to fund through cost savings; and
- (4) a detailed description of all services to be provided by the contractor, including but not limited to, operation and maintenance services.

10.06: Contract Amendments

A contract may be amended, so long as the amendment does not increase the total project cost by 10%, and so long as the contract term does not exceed the requirements established in M.G.L. c.25A, §11C. The governmental body must file a copy of a contract amendment with the Commissioner of DOER on or before 30 days after the effective date of the applicable contract amendment.

10.07: Monitoring; Reporting Requirements

For the duration of the contract term, the governmental body shall annually file with DOER a report containing the following information:

- (1) a summary of energy and, if applicable, water cost savings for the previous 12 month period, the methodology used for calculating said savings, and a description of conservation measures installed to date;
- (2) the cost of each conservation measure, the total project price, as of the time of each annual filing with DOER; which shall at a minimum itemize principal and interest payments, the value of any rebates provided by a utility, any direct government subsidy payments, and any tax or other incentives provided; and
- (3) the name, telephone number and address of the governmental body official responsible for overseeing the EMS contract;

A governmental body shall file the information described in 225 CMR 10.07 annually with the Commissioner of DOER beginning on the first anniversary of the effective date of the contract, and every year thereafter on the same date, ending with a final report on or before six months after the contract termination date.

10.08: Complaint Processing Procedures; Disputes

DOER shall investigate any complaints of a governmental body's non-compliance with M.G.L. c.25A, §11C and 225 CMR 10.00 subject to the following procedures and requirements:

- (1) Any person may file with DOER a complaint of non-compliance with the requirements of M.G.L. c.25A, §11C and 225 CMR 10.00. The complaint shall be in writing, mailed to the Commissioner of DOER and the relevant governmental body, certified mail return receipt requested, and shall include the following information:
 - (a) the name, address and phone number of the person filing the complaint;
 - (b) the name of the governmental body about whom the complaint is filed;

10.08 continued

- (c) a detailed description of the nature of the alleged non-compliance, including but not limited to, all applicable dates, the applicable statutory and regulatory requirement(s) allegedly violated, and names of any other persons involved in and aggrieved by the non-compliance;
 - (d) a statement demonstrating that the complaint has been brought to the attention of the governmental body and describing all previous efforts to resolve or correct the non-compliance with the governmental body; and
 - (e) any supporting documentation.
- (2) Upon receiving a written complaint which complies with the requirements established in 225 CMR 10.08(1), DOER, in its sole discretion, shall determine whether it has jurisdiction and whether the complaint is reasonable, and merits further investigation. If its finding is affirmative, DOER:
 - (a) may contact the person filing the complaint to request additional information;
 - (b) shall contact the relevant governmental body and provide the governmental body with an opportunity to respond to the complaint;
 - (c) may request information, including existing documentation and verbal or written explanations, from the governmental body regarding the complaint; and
 - (c) may contact other persons, including bidders and the selected contractor, to seek additional information regarding the complaint.
- (3) All persons, including but not limited to bidders, governmental bodies, and contractors, involved in the EMS procurement which is the subject of a complaint under investigation by DOER, shall comply fully with any such investigation and provide such information as DOER may require.
- (4) When DOER has gathered all the facts and information it deems necessary to evaluate the complaint, it shall render an advisory opinion to the person filing the complaint and to the governmental body about whom the complaint was filed, which shall explain, based upon DOER's findings, whether the governmental body violated any provision or requirement of M.G.L. c.25A, §11C or 225 CMR 10.00.
- (5) If DOER determines that a governmental body violated any provision or requirement of M.G.L. c.25A, §11C or 225 CMR 10.00, DOER may:
 - (a) include in its advisory opinion a recommendation that the governmental body take specific action to correct or remedy the non-compliance;
 - (b) forward its advisory opinion to the Office of the Inspector General and the Office of the Attorney General, requesting further investigation.

Upon receiving DOER's advisory opinion, the parties to the complaint may request a DOER hearing to review DOER's findings in its advisory opinion. Such request must be in writing, delivered to the Commissioner of DOER by certified mail return receipt requested, and postmarked no later than 15 calendar days from the date of DOER's advisory opinion.
- (6) In the event that DOER determines a hearing is reasonable and necessary to address any non-compliance issues, DOER shall schedule the hearing at the earliest possible time and provide timely notice of the hearing and an opportunity to participate to all persons who have a substantial interest in the outcome of the proceeding.

10.08 continued

Within 14 days of said hearing, DOER shall issue an appropriate order which may require that the governmental body take any action necessary to comply with the provisions of M.G.L. c.

25 A, § 11C and 225 CMR 10.00 or terminate any action which violates the provisions of said statute or regulation.

(7) DOER reserves the right to refer any complaint to the Superior Court of Suffolk County.

(8) DOER may, upon its own initiative, investigate any apparent non-compliance with the provisions of M.G.L. c.25A, §11C and 225 CMR 10.00 and take further action consistent with procedures established in 225 CMR 10.08.

(9) In the event that a governmental body and a contractor or bidder are unable to resolve a dispute, which involves the application or interpretation of 225 CMR 10.00, the governmental body may, after making a good faith effort to resolve the dispute, seek assistance from the Commissioner of the DOER to assist in the resolution of the dispute or to provide a determination as to the application or interpretation of 225 CMR 10.00.

10.09: Severability

If any provision of 225 CMR 10.00 is declared or found to be illegal, unenforceable or void, public agencies shall be relieved of all obligations under that provision only, and all other provisions shall remain in full force and effect.

10.10: Waivers

(1) The Commissioner of DOER may grant a waiver from one or more provisions or requirements of 225 CMR 10.00 upon written request of a public agency and a showing of special or exceptional circumstances or need, provided that such written request shall at a minimum contain the following:

- (a) the waiver request must be in writing, signed by the public agency and specify the provisions of 225 CMR 10.00 to be waived;
- (b) the written waiver request must be mailed to the Commissioner by certified mail, return receipt requested;
- (c) the waiver request must provide a detailed explanation of why the waiver should be granted, including all documentation supporting the special circumstances and need for such waiver; and
- (d) the waiver request must include certification that the public agency has made a good faith effort to comply with the applicable requirements of 225 CMR 10.00.

(2) Any waiver granted by the Commissioner of DOER shall not relieve the public agency from any responsibility or obligation to comply with the other provisions of 225 CMR 10.00 or any other requirement of the law.

REGULATORY AUTHORITY

225 CMR 10.00: M.G.L. c.25A, §11C.

APPENDIX F: PRELIMINARY SITE ASSESSMENT ³⁴

Date _____

Facility Name _____

Contact Name/ph# _____ / _____

Bldg. A _____

B _____

C _____

Potential EEM

BUILDINGS

I. Building Envelope	A	B	C	Comments
1. Install double glazing				
2. Infill glazing				
3. Solar film for glazing				
4. Weatherstrip/caulk windows				
5. Install insulated doors				
6. Weatherstrip doors				
7. Insulate roof (rigid)				
8. Insulate ceiling (batt/blow)				
9. Insulate wall				
10. Insulate floor				
11. Lower ceiling				
12. Vestibule entry				
13.				

II. HVAC

A. Boilers				
1. Replace boilers				
2. Upgrade existing boiler				
3. Replace burners				
4. Fuel switch				
5. Reduce steam dist. pressure.				
6. Tune up boiler				
7. Insulate shell and piping				
8. Replace/repair condensate system				
9. Replace/repair steam traps				
10. Install boiler flue damper				
11. Preheat boiler feed water				
12. Preheat combustion air				
13. Time clock w/low temp. override				
14. Zone controller				
15. Boiler reset control				
16.				

Note: All energy conservation measures must comply with current local, state, and federal construction and environmental codes and regulations.

Comments:

³⁴ Source: Washington State University, Total Efficiency Network

B. Furnace/U.V./Roof Top				
1. Install high eff. Unit				
2. Recondition units				
3. Replace inefficient burners				
4. Install electronic ignition				
5. Install auto flue damper				
6. Fuel switch				
7.				
C. Heat Pumps				
1. Repair				
2. Install new				
3. Install economizer cycle				
4.				
D. Cooling Systems				
1. Upgrade inefficient chillers				
2. Install var. speed chiller motor				
3. Add head pressure control				
4. Install strainer cycle to chillers				
5. Utilize evap. cooling				
6. Install cooling tower stage control				
7. Upgrade cooling tower				
8. Install local air conditioners				
9. Install economizer cycles				
10.				
E. Controls				
1. Install an EMCS				
2. Install optimum start/stop				
3. Install night setback				
4. Install load shedding				
5. Install system optim. cap.				
6. Install warm up cycle				
7. Install deck temp. reset				
8.				
F. Vent/Dist/Term. Equipment				
1. Convert to VAV				
2. Reduce outside air %				
3. Adjust ventilation rates				
4. Install auto. dampers				
5. Reduce air stratification				
6. Insulate pipes &/or ducts				
7. Modify zoning				
8. Reduce/elim. heat to h-ways				
9. Reduce/elim. air to unocc. areas				
10. T-stat. rad. control valves				
11. Rebuild/replace steam traps				
12.				

G. Domestic Hot Water				
1. Install flow restrictors				
2. Install auto-off faucets				
3. Decentralize hot water heating				
4. Insulate HX piping & tank				
5. Install summer heater				
6. Lower temp. & install boosters				
7. Install instant DHW heaters				
8. DHW pump/tank timers				
9.				
III. Lighting				
1. Incand. To flour./HID				
2. MV to MH/HPS				
3. Install eff. Ballasts & lamps				
4. Lower fixtures				
5. Delamp & discon. ballasts				
6. Install occup. sensors				
7. Install local switches				
8. Exit light replacement				
9. Install photocell exterior				
10. Timer control exterior				
11.				
IV. Electric Equipment				
1. De-energize equip. not used				
2. Reduce loads when not req'd				
3. Improve power factor				
4. Convert to eff. motors				
5. Install var. speed motors				
6. Replace oversized motors				
7.				
V. Meters Numbered				
1. Gas				
2. Electric				
VI. Visual Est. of Potential Savings				(1=low, 5=high)
VII. Training Needs				

Note: All energy conservation measures must comply with current local, state, and federal construction and environmental codes and regulations.

Comments:

Equipment Replacement³⁵

Replacing HVAC equipment at or near the end of its useful life more efficient equipment. For example, most older boilers seldom operate at their rated output. Replacing old boilers with smaller, high-efficiency, modular (multiple) boilers can boost seasonal efficiencies by 5% to 10% or more.

Replacing existing electric resistance heating systems with heat pumps or other systems that are more efficient or use lower-cost fuel can also provide substantial energy savings.

Replacing existing cooling equipment with higher-efficiency equipment provides attractive paybacks. High-efficiency, direct-expansion cooling units (referred to as packaged or split systems) are twice as efficient as older systems with standard efficiencies.

During replacement or conversion of a chiller, consider upgrades to energy systems that cool or affect cooling load. Installing efficient chiller systems, rather than simply converting them or replacing them with units that meet minimum efficiency criteria, can be an important energy-saving upgrade.

Reducing cooling loads enables you to "downsize" your chiller, saving energy and costing less. You may reduce cooling loads through high-efficiency lighting upgrades or other measures.

The savings associated with purchasing a smaller chiller allows a building owner to buy a more efficient model. Savings from lighting or other upgrades also offset the cost of a more efficient replacement chiller. Another way to reduce new chiller size and cost is to install new, more efficient HVAC auxiliaries (e.g., evaporative cooling towers, coils, variable-speed drives). Alternatively, look for ways to improve the efficiency and operation of auxiliary chiller components and distribution systems.

Integrating Measures

Another approach to energy efficiency is considering load-, system-, and plant-level savings opportunities in strict progression. Proponents of this approach cite the multiplier effect that can be achieved if plant-level equipment is significantly downsized as a result of reduced energy requirements at the load and systems levels. For example, the size of plant replacement chillers can be significantly downsized if the building's thermal load and system inefficiencies are reduced. (In large schools, more energy-efficient, computer-driven food preparation equipment lowers the cooling load and simultaneously reduces cooling requirements.) With limited capital, however, this approach will not necessarily achieve the greatest energy and cost savings. Always consider the energy use impacts and interaction of the building, its equipment, and the occupants.

For example, analyze the potential interactions between lighting improvements and mechanical equipment. Lighting improvements generally lower generated heat in the building. As a result, cooling energy will decrease and heating energy will increase. Since overall cost benefits are highly dependent on heating and cooling system efficiencies and fuel costs, dramatic cost benefits might occur in one building, while another building with high heating costs might achieve only half of the predicted savings.

Another example is the interaction between mechanical system upgrades and improvements to the building shell. In some cases, upgrading the heating or cooling system while simultaneously adding insulation can dramatically decrease the savings that might have otherwise been gained from the addition of the insulation alone. In this scenario, either measure alone could be cost-effective, but the second measure would deliver less benefit per dollar of investment. Both examples illustrate the value of examining overall building energy impacts.

³⁵ Source: U.S. Department of Energy, Energy Smart Schools Program

APPENDIX G: FACILITY DATA

Date: _____

Building: _____

Contact Name: _____

Address: _____

Phone: _____ Fax: _____

Email: _____

1. Number of buildings at the site: _____ Year Built: _____

2. Total Square Footage of Conditioned Area: _____

3. Total annual energy bill: \$ _____ Mbtu: _____

a. Electricity: \$ _____ kWh: _____

b. Other (Oil, steam, NG): _____ Btus: _____

4. Identification of previous audit(s): Yes _____ No _____

a. Type: _____

b. Name of Firm: _____

c. Description of changes made to building as result of audit: _____

5. Is there a site energy management plan? Yes _____ No _____ If yes, attach copy

6. Description of methods used to track energy use and cost.

7. Description of metering set-up and methods used to estimate individual building consumption.

Direct metering _____

Other _____

8. Description of site technical expertise in building systems and energy management (check all that apply).

_____ Building/Facility Manager on site

_____ Energy manager on site

_____ HVAC technician on site

_____ Electrician on site

_____ Engineering expertise on site

_____ No technical staff on site

9. Identify any planned or anticipated mission or usage changes for the near future.

10. Person managing utility budget/bill: _____

Phone: _____

11. Identify any major challenges to the use of EMS Contracting for energy retrofit projects at this facility.

12. Operating Schedules:

Describe the facility's normal operating schedule noting weekday fully and partially: weekend partially and time of year (example, September through June and July and August).

General Information for Each Building
(Relevant Descriptions that could aid in project data development)³⁶

- **Building Construction** – Steel, masonry, wood frame, single or double glaze windows, insulated walls and roof, etc.
- **Hot Water and Cooling Systems** – Hot water or steam boiler, forced air furnace, electric resistance, solar etc. Central electric, absorption, or gas driven chillers, window units, rooftop packaged units, etc.
- **Ventilation System** – Ducted single zone, multizone, VAV, dual duct system, through the wall ventilators, no ventilation, etc.
- **Lighting Systems** – Fluorescent T12 or T8, ballast type, incandescent, controls, etc.
- **Renewables** – Solar, wind, geothermal energy in use.
- **Controls** – Ability to shut off equipment or setback temperatures when unoccupied, energy management system, etc.
- **Hazardous Materials Present** – Asbestos, PCB ballast, etc.
- **Upgrades** – What energy system upgrades, equipment changeouts, retrofits or other projects accomplished in building in the last three years?
- **Other Relevant Information Relating to Building or Energy Use** – Historical preservation considerations, etc.
- **Attach a Simple Building or Site Floor Plan.**