U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

Performance-Based Contracting:
A Primer for K-12 Schools

Energy Savings Performance Contracting: A Primer for K-12 Schools

April 2016

Disclaimer: This document is a primer covering the basics and best practices for establishing Energy Savings Performance Contracting (ESPC) in K-12 school districts. This primer was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of the authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

CONSENSUS, LLC, in conjunction with *The Cadmus Group, Inc*., prepared this primer under the contract No. 4200000342: Task Order No. 5 DOE ORNL # 4000121587 with *Oak Ridge National Laboratory (ORNL)*, managed by *UT-Battelle, LLC* under contract with the *US Department of Energy* No. DE-AC05-00OR22725.

Acknowledgements: The authors of this primer would like to thank Cal Clark of Mesa County Valley School District 51 in Grand Junction, Colorado, and Michael Barancewicz and John Lord of Loudoun County Public Schools in Ashburn, Virginia, for their contributions to this primer.

FOR MORE INFORMATION

Additional resources and information regarding *Energy Savings Performance Contracting: A Primer for K-12 Schools*, is available on the DOE Technical Assistance Program's Solution Center located at www.eere.energy.gov/wip/solutioncenter or contact:

Alice Dasek alice.dasek@ee.doe.gov
US Department of Energy

About this Primer

This primer explains how schools can use ESPC to save money by improving building energy efficiency and reducing operating costs while increasing occupant comfort and productivity. The following chapters provide K-12 faculty, school boards, and building managers with an introduction to ESPC benefits, guidance for getting started, and resources to support the ESPC implementation process. The organization of this primer is as follows:

With aging school infrastructure, increasing energy costs, and tighter budgets, school administrators need additional funds to provide a safe, secure, and comfortable learning environment. Those funds are not always immediately available. ***Energy Savings Performance Contracting*** *(ESPC) enables schools to pay for energy efficiency upgrades using the savings generated by those upgrades over time.*

- **Chapter 1: Challenges Facing Schools and the Benefits of Energy Efficiency**—Chapter 1 describes what is achievable through performance contracting, including not only the financial and environmental benefits, but also the advantages for student health and performance.
- **Chapter 2: What is Energy Savings Performance Contracting?—** Chapter 2 provides an overview of ESPC, a brief history of how ESPC emerged as a mechanism for financing energy efficiency upgrades, and a look at the 59.3 trillion kBtu opportunity for potential energy savings in US schools.
- **Chapter 3: Getting Started with ESPC**—Chapter 3 provides directions on how schools can get started with ESPC and outlines steps to follow from the evaluation phase through post-construction operations.
- **Chapter 4: Technical Assistance**—Chapter 4 covers how and when a school should secure support from a knowledgeable third party to help navigate the process of energy savings performance contracting.

This document provides numerous specific examples of K-12 schools that have successfully improved their buildings using an energy savings performance contract. It also includes tips and advice on performance contracting from school staff and energy industry professionals.

This primer also serves as a companion resource to the US Department of Energy's (DOE's) *Financing Energy Efficiency Upgrades for K-12 School Districts,*[1] which provides valuable guidance to school districts on how to fund energy efficiency improvements, including ESPCs.

Finally, ESPC practices and legal requirements vary by state. This primer presents a general overview of ESPC implementation; however, schools should research and understand applicable state and local laws regarding ESPC and tailor the approaches provided in this primer to meet their local requirements.

[1] "Financing Energy Efficiency Upgrades for K-12 School Districts." (2013). US Department of Energy. http://emp.lbl.gov/publications/financing-energy-upgrades-k-12-school-districts-guide-tapping-funding-energy-efficiency

Terminology

This document and its appendices use the following common terms throughout:

Energy Consultant, Owner's Representative, and Facilitator all refer to the entities that may assist schools through an ESPC program.

Energy Savings Performance Contract, ESPC, Energy Performance Contract, and **Performance Contracting** are synonymous in this document.

Energy Service Company (ESCO) and Contractor are synonymous in this document unless the text specifies that the **Contractor** is an ESCO subcontractor, general construction firm, or construction manager.

Energy Conservation Measures (ECMs) are upgrades to equipment or processes that result in energy savings.

Common Acronyms

BBA	Better Buildings Alliance
BBC	Better Buildings Challenge
BTU	British Thermal Unit
CDD	Cooling Degree-Days
CHP	Combined Heat & Power
DOE	United States Department of Energy
ECM	Energy Conservation Measures
EIA	United States Energy Information Agency
EPA	United States Environmental Protection Agency
ESC	Energy Services Coalition
ESCO	Energy Service Company
ESPC	Energy Savings Performance Contract
FEMP	Federal Energy Management Program
HDD	Heating Degree-Days
HVAC	Heating Ventilation and Air Conditioning
IGA	Investment Grade Audit
IPMVP	International Performance Measurement and Verification Protocols
kWh	kilowatt-hour
LBNL	Lawrence Berkley National Laboratory
LOC	Life of Contract
MOU	Memorandum of Understanding
M&V	Measurement & Verification
NAESCO	National Association of Energy Service Companies
NREL	National Renewable Energy Lab

O&M	Operation & Maintenance
ORNL	Oak Ridge National Laboratories
RFP	Request for Proposal
RFQ	Request for Qualifications
PM	Project Manager/Management
ROI	Return on Investment
SEO	State Energy Office
SEP	State Energy Program
Specs	Specifications
TA	Technical Assistance
TDD	Tubular Daylighting Devices

Table of Contents

Figures

Chapter 1. Challenges Facing Schools and the Benefits of Energy Efficiency

Schools face many facility-related challenges ranging from aging infrastructure to increasing operational costs and rising energy prices. This chapter highlights how energy efficiency can help schools address some of these challenges while achieving other benefits in the process.

> *"Every dollar that pays an unnecessarily high energy bill could be spent for a much better purpose: teaching children."*
>
> -Loudoun County Public Schools, Loudoun County, Virginia[2]

Challenges Facing Schools

Increasingly limited resources challenge schools to do more with less. Schools try to provide stimulating educational experiences inside aging school buildings while rising energy costs deplete school funds. As operating and maintenance (O&M) costs increase, deferred maintenance is escalating to critical levels in school districts across the country. The cost savings attainable through increased energy efficiency can help schools fund critical facility upgrades, such as roof replacement, asbestos and mold remediation, security camera installation, classroom renovations, and other critical facility needs. Therefore, energy savings achieved through an ESPC project benefit everyone by shifting money, otherwise spent on utility bills, back into critical building improvement projects.

Increasing Energy Costs

Between 2000 and 2010, the cost of energy in the United States increased by approximately 80 percent[3], and the US Energy Information Administration (EIA) projects that energy costs will continue to increase through 2040.[4] Today the nation's schools spend about $8 billion each year on energy alone—more than the cost of textbooks and computers combined.[5]

Figure 1 demonstrates the effect of escalating utility and maintenance costs over time. If schools do not take steps to combat the rising price of utility bills, they must dedicate an increasing portion of their annual budgets to utility payments in order to maintain the same services.

[2] Loudoun County Public Schools Energy & Environment Team Motto (2013). http://www.lcps.org/Domain/121

[3] "Annual Energy Review 2011." (2012). US Energy Information Administration. DOE/EIA-0384(2011). September 2012. Page 72. http://www.eia.gov/totalenergy/data/annual/pdf/aer.pdf.

[4] "Annual Energy Outlook 2013." (2013). US Energy Information Administration. DOE/EIA-0383(2013). April 2013. Page 97–98. http://www.eia.gov/forecasts/aeo/pdf/0383(2013).pdf.

[5] "Energy Efficiency Programs in K-12 Schools: A Guide to Developing and Implementing Greenhouse Gas Reduction Programs." (2011). US EPA's State and Local Climate and Energy Program. US Environmental Protection Administration. Page 2. http://www.epa.gov/statelocalclimate/documents/pdf/k-12_guide.pdf

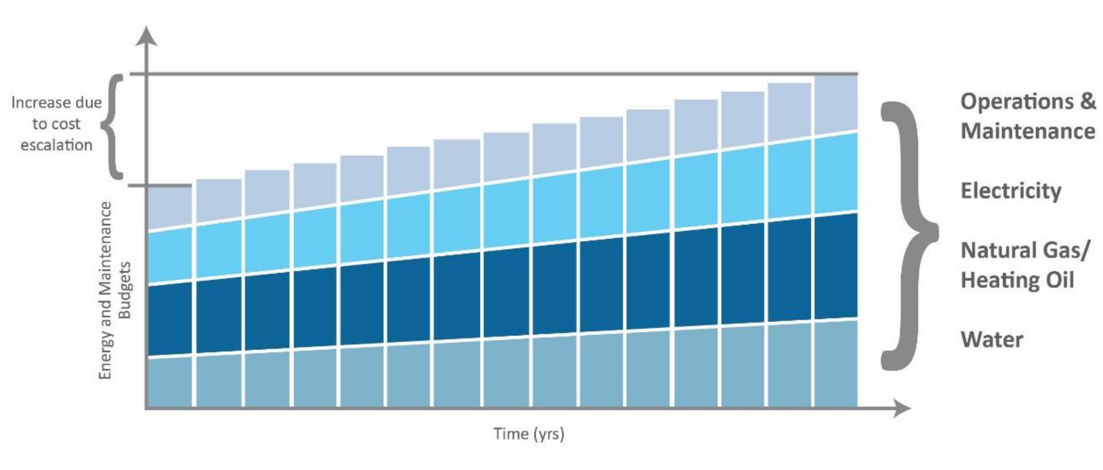


Figure 1: Rising Cost of Utilities and O&M[6]

Unfortunately, many existing school buildings were designed when energy was relatively inexpensive, and concern for long-term energy price escalation was not factored into their construction. Many school buildings are therefore ill-equipped to adapt to rising energy costs. Similarly, when the cost of gasoline was under a dollar per gallon, consumers shopping for a vehicle typically did not consider fuel efficiency an important factor in their purchase decision-making. Now that fuel prices are higher, those inefficient vehicles are very expensive to operate. However, unlike cars, buildings last many decades, and their longevity compounds the impact of rising energy costs on schools, leaving a large portion of the building stock outmoded from an energy perspective.

Deferred Maintenance

Deferred maintenance is the postponement of building repairs and maintenance due to budget shortfalls or for short-term cost savings. According to a report prepared for the American Federation of Teachers, compared to other public facilities in the United States, schools are the oldest buildings and have the largest deferred maintenance needs.[7] In fact, the authors estimate that K-12 schools have a deferred maintenance (infrastructure funding need) backlog of up to $254 billion. Many districts lack the funds required to complete these retrofits, including those related to basic building infrastructure maintenance, energy efficiency, and renewable energy; all of which might keep buildings operating more efficiently, saving money in the long term. As a result, operational inefficiencies, utility expenses, and emergency equipment maintenance continues to put increasing pressure on available school funding.

Installation of Retrofits

Need for Better School Environments

Parents and taxpayers expect schools to provide an environment in which students can thrive. Aging school infrastructure can hinder the ability of schools to provide a positive educational environment for students. Poor ventilation can contribute to air quality problems by introducing contaminants from the outside or by preventing dust and chemicals from venting to the outdoors. Poor indoor air quality can lead to diminished teacher and student performance. Children are of higher concern because they are more sensitive than adults are to indoor pollutants, partly because they breathe a higher

---

[6] "ESPC Overview: Cash Flows, Scenarios, and Associated Diagrams for Energy Savings Performance Contracts", pg. 2. Tetreault, T., Regenthal, S. (2011). NREL Technical Report. NREL/TP-7A30-51398. http://www.nrel.gov/docs/fy11osti/51398.pdf.

[7] "Building Minds, Minding Buildings: School Infrastructure Funding Need: A State-by-State Assessment and an Analysis of Recent Court Cases." Crampton, F., & Thompson, D. (2008). American Federation of Teachers, December. http://www.aft.org/pdfs/psrp/bmmbfunding1208.pdf

volume of air relative to their body weight.[8] Pollutants, allergens, and other contaminants can lead to respiratory infections and other physical ailments, which in turn lead to diminished attention spans and increased absences among both students and teachers. Absences delay educational progress and increasingly can put a student academically behind his or her peers.

Other conditions also compromise the learning environment. Classroom temperature can adversely affect student performance—an indoor climate outside the range of 67°–74°F can impair reading and mathematics skills.[9] Classrooms with insufficient natural daylight and poor quality indoor lighting can also negatively affect student learning. The challenge of aging facilities and the costs associated with necessary upgrades to lighting, HVAC systems, and other infrastructure can make it difficult for schools to fulfill their missions to provide safe, comfortable educational environments for their students.

---

[8] "Energy Efficiency and Indoor Air Quality in Schools." (2003). US EPA. http://www.epa.gov/iaq/schools/pdfs/publications/ee_iaq.pdf

[9] Harner, D. P. (1974). "Effects of Thermal Environment on Learning Skills." *CEFPI Journal*. 12, pp. 4-8.

Benefits of Energy Efficiency and Energy Savings Performance Contracting (ESPC)

Improving energy efficiency in schools can help address the challenges schools face: increasing energy costs and compromised classroom conditions. By eliminating waste and reducing operating costs, improved energy efficiency frees up a larger portion of the school's budget for educational programs and facility improvements, which can enhance the quality of educational services and thus student prospects. According to a report by Lawrence Berkeley National Laboratory (LBNL) and the National Association of Energy Service Companies (NAESCO), schools that pursue ESPC can reduce their energy consumption by an average of 23 percent for major HVAC equipment replacement and 21 percent for combinations of other low-cost improvements in hot water production, lighting, and refrigeration, without sacrificing occupant comfort or building operations.[10] Over time, schools will reap the benefits of energy efficiency, including lower energy costs, and students will gain improved health and academic performance.

The benefits of energy efficiency are clear, but how can schools pay for energy efficiency upgrades? Many schools do not have immediate access to the necessary funds. Unfortunately, waiting for underperforming equipment to fail before upgrading or replacing it is costly and counterproductive. There are four possible approaches to dealing with equipment upgrades:

1. Use currently available capital budgets to install immediately
2. Wait for future capital budget appropriations
3. Finance the installation of upgrades immediately
4. Do nothing

Figure 2 shows the relative cost of pursuing these four options. The lowest-cost option is to make improvements with the capital budget funding that is available today (**Funding available today**). While this scenario is ideal, it is rarely feasible for school districts facing limited budgets. The next option is to wait for future capital budget appropriations (**Delayed funding**). The accumulated cost of waiting for future capital budget appropriations before replacing inefficient equipment is actually greater than the cost of the third option (**Financing).** Under many scenarios, the cost of the energy saved by making the upgrade immediately more than offsets the cost of financing the replacement. Under the same logic, the final option of doing nothing (**No action taken**) is by far the most expensive option, as schools continue to pay expensive energy bills and defer needed maintenance.[11]

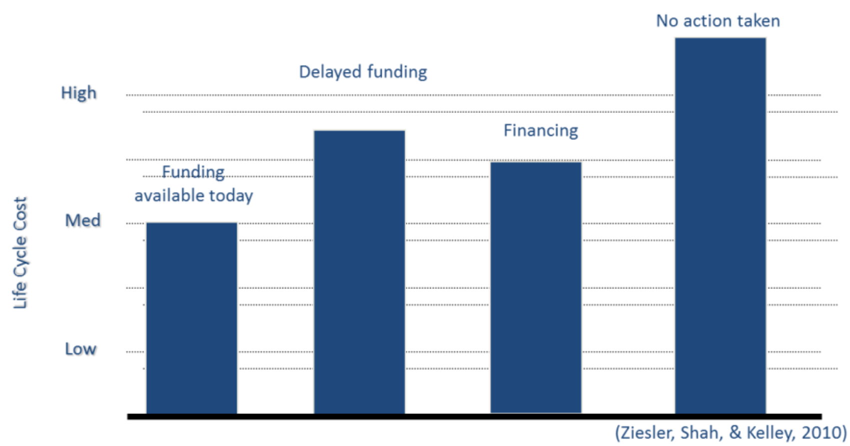


Figure 2: Cost of Doing Nothing[12]

[10] "K-12 School Project Performance Benchmarks (All ASHRAE Zones)." (Undated). US Department of Energy. EECBG & SEP Technical Assistance Program. http://www1.eere.energy.gov/wip/solutioncenter/pdfs/k12schoolsprojectperformancebenchmarks.pdf

[11] You can evaluate different funding approaches for your school using the Cash Flow Opportunity Calculator and Financial Value Calculator located at http://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/find-financing/calculate-returns-energy-efficiency

[12] Ziesler, J.; Shah, C.; Kelley, J. (2010). "Alternative Financing Options for Energy Projects." Webinar presented June 29, 2010. P. 131. http://www1.eere.energy.gov/femp/pdfs/afo_ppt.pdf.

ESPC enters the discussion about energy efficiency improvements when it turns to financing. By enabling schools to pay for upgrades over time with the future savings generated by those upgrades, ESPC helps to bridge the financing gap to make energy efficiency upgrades a reality today.

Energy Savings Performance Contracting Pays for Itself

ESPC enables schools to cover the costs of energy efficiency upgrades over time using the savings generated by those very same upgrades—also known as energy conservation measures (ECMs). The "savings" generated by ECMs are effectively *avoided costs*. Performance contracts operate on the understanding that schools will use the avoided cost to pay off the cost of installed ECMs. Figures 3 and 4 present the example of a school that is initially paying an amount "A", which equals $1 million per year in utility bills. In this example, the school estimates that by installing various ECMs it could reduce its utility bills by $300,000 per year, resulting in a post-upgrade bill of amount "B" or $700,000 per year. The $300,000 difference is the "avoided annual cost", money that would have been spent on energy bills but can now be used to finance ECMs.

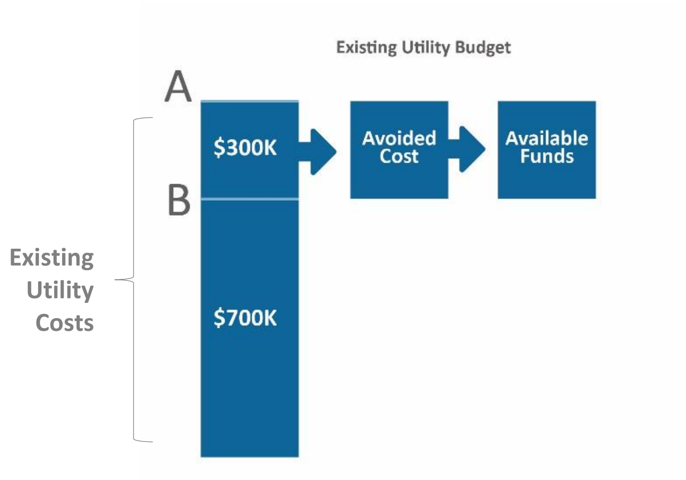


Figure 3: ESPC Uses Funds Made Available by Avoiding Unnecessary Costs

Over time, these annual avoided costs accumulate, enabling the school to pay for the initial upgrade and then implement additional upgrades that save even more energy (see Figure 4). In essence, ESPC pays for itself. After repaying the initial financing costs, the result is a permanent decrease in operating costs. Even before full repayment, the school and its occupants enjoy the environmental and health benefits of new equipment, such as improved thermal comfort and improved indoor air quality.

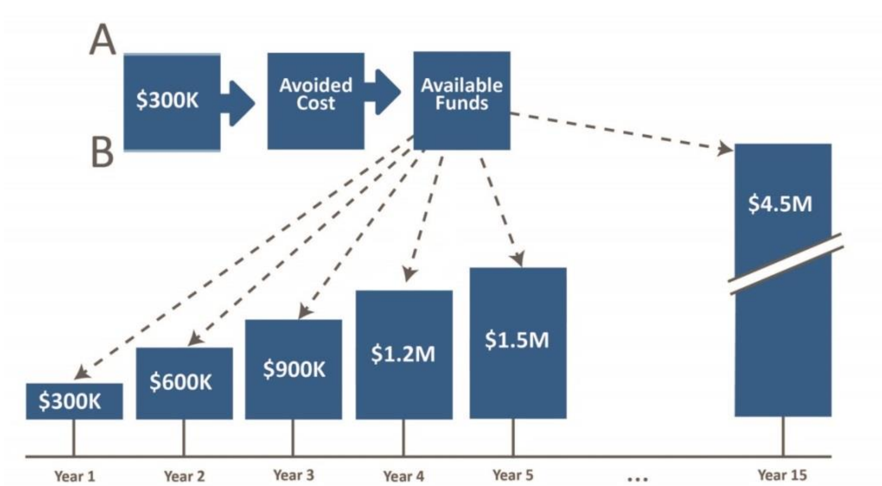


Figure 4: Recurring Avoided Costs Accumulate Over Time

Figure 5 summarizes the school's choices:

Choice 1: Defer upgrades and pay unnecessarily high energy bills
or
Choice 2: Finance and start saving now

A school will continue to pay the same amount "A" whether they implement a project or not. The difference is that by choosing to implement an ESPC project, the school gains the immediate benefits associated with better equipment and access to the long-term savings that will occur once the payments associated with financing are complete.

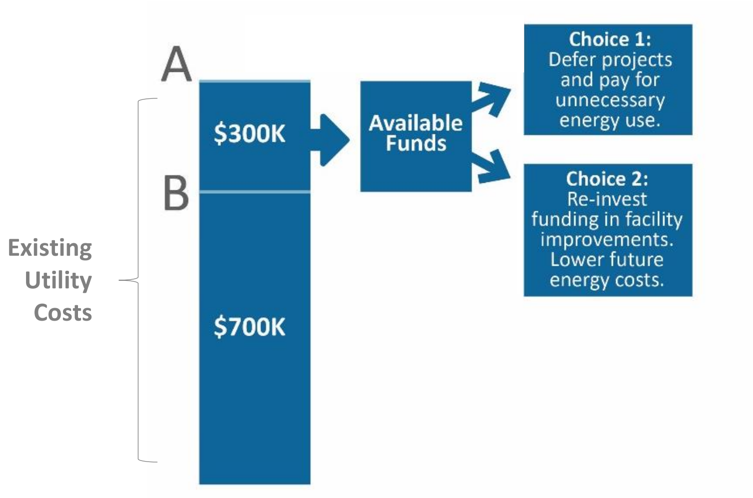


Figure 5: Choices Available to Schools

Case Study Examples of School Saving Using ESPC

School board officials and administrators unfamiliar with ESPC frequently ask whether ESPC is new and therefore risky. It is neither—ESPC is an established financing mechanism among schools. In fact, K-12 schools are the largest market for ESCOs in the United States, comprising 33 percent of all ESCO projects.[13] In Colorado, for example, as of 2010, more than 50 school districts have leveraged and benefited from an ESPC. Mesa County Valley School District 51 (MCVSD51) in Grand Junction, Colorado is one of many great examples of a school district that has used ESPC. In 2010, the district used ESPC as a means to complete a multi-million-dollar retrofit project without increasing capital spending. Figure 6 shows a comparison of energy use intensity among Colorado schools between FY 2006–2007 (light blue) and FY 2010–2011 (dark blue). Using ESPC, MCVSD51 was able to reduce its energy use intensity from 74.30 kBtu/ft^2 to 54.74 kBtu/ft^2 annually.

[13] Larsen, P.H., Goldman, C.A., and Satchwell, A. *(2012). "*Evolution of the U.S. Energy Service Company Industry: Market Size and Project Performance from 1990–2008." Lawrence Berkeley National Laboratory. LBNL-5447-E. Page 15. http://emp.lbl.gov/sites/all/files/lbnl-5447e.pdf

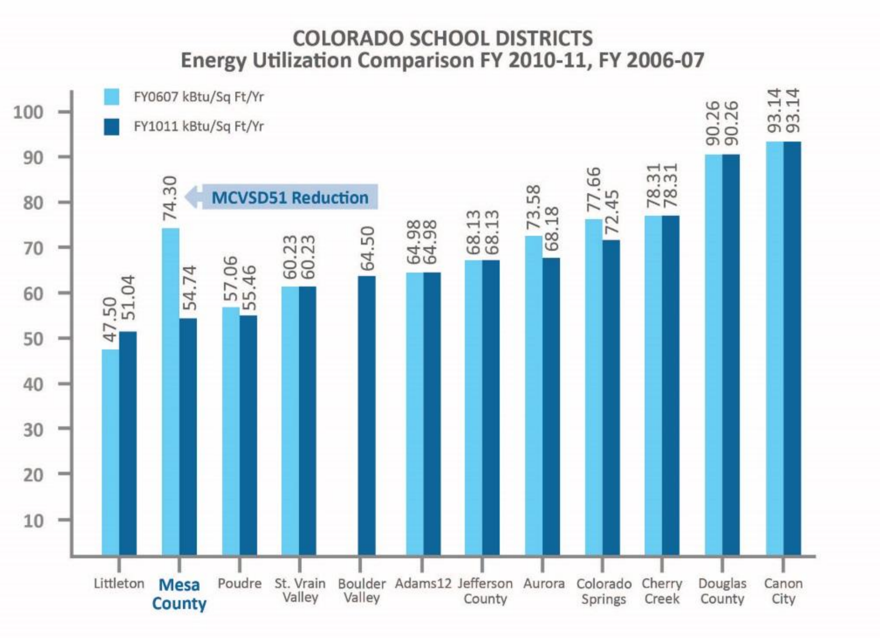


Figure 6: Energy Performance in Colorado School Districts (Example of Improvements in Mesa County Valley School District 51) [14]

MCVSD51 utilized multiple phases of an ESPC to reduce its energy intensity (kBtu/ft^2) by nearly 30 percent (see selected financial details in Figure 7). MCVSD51 is now one of the top performers in Colorado and continues to find ways to save. MCVSD51 participated in DOE's Better Buildings Challenge (BBC) by committing to a 30 percent reduction in energy use compared to a selected baseline year. The district exceeded that goal. MCVSD51's benchmarking results in the US Environmental Protection Agency's (EPA's) ENERGY STAR Portfolio Manager demonstrate an ENERGY STAR score improvement of 32 points. MCVSD51's baseline average ENERGY STAR score was initially in the 59th percentile compared to similar school buildings across the country. After committing to the challenge, MCVSD51's score rose to the 91st percentile. Of the 48 facilities in the district's portfolio, 43 have earned ENERGY STAR certification.

Figure 7: Project Statistics for Phase I and II Projects Implemented by MCVSD51

Construction Costs	$10,700,000
Utility Demand Side Management (DSM) Rebates	-$1,563,204
Grants/American Recovery and Reinvestment Act (ARRA) Incentives	-$100,000
Net Annual Savings (after ongoing services)	$750,000
Estimated Average Financing Rate (Includes $2M in low-interest	3.55%

ESPC Addresses Deferred Maintenance and Non-Energy Opportunities for Efficiency

In many cases, energy savings achieved through an ESPC project can help fund other critical projects for the school or district, such as roof replacement, parking lot repairs, safety/security systems, and other compelling needs, whether energy-oriented or not. According to Lawrence Berkeley National Laboratory, between 2005 and 2008, 40 percent of K-12 schools pursuing ESPC installed "non-energy" retrofits to address deferred maintenance needs such as new roofs, asbestos abatement, wiring, exit signs, and alarm systems.[15]

[14] Facts and figures provided by Mesa County Valley School District 51, http://www.mesa.k12.co.us/departments/energy/index.cfm

[15] Larsen, P.H., Goldman, C.A., and Satchwell, A. *(2012). "*Evolution of the U.S. Energy Service Company Industry: Market Size and Project Performance from 1990–2008." Lawrence Berkeley National Laboratory. LBNL-5447-E. Page 15. http://emp.lbl.gov/sites/all/files/lbnl-5447e.pdf

MCVSD51 used energy savings to fund roof work that included the installation of SolaTubes (Tubular Daylighting Devices or TDDs) throughout the classrooms and gymnasiums of two schools. The rooftop technology consists of highly reflective tubes attached to a skylight that brings daylight directly into the facility.

ESPC Improves School and Classroom Instructional Environment[16]

Energy efficiency upgrades can go hand in hand with improvements that benefit student health, comfort, and performance.[17] Improving the educational environment has shown a positive correlation with improving student performance in the classroom.[18] When students have better facilities and healthier environments in which to learn, they perform better and have a greater chance of success. The American Association of School Administrators (AASA) notes that poor indoor health environments pose health risks in schools for both students and staff, leading to asthma attacks, decreased performance, and diminished concentration.[19] EPA remarks:

> "School environments play an important role in the health and academic success of children. Children spend 90 percent of their time indoors and much of that time is spent in school. Unhealthy school environments can affect children's health, attendance, concentration, and performance, and lead to expensive, time-consuming cleanup and remediation activities. To foster children's health and academic achievement, healthy school environments should be addressed and integrated within the education system."[20]

School performance is not just about test scores. It also includes responsible stewardship that supports a healthy and positive place of learning. For example, high-performing schools provide good indoor air quality for students and teachers. Implementing an ESPC to improve energy efficiency includes heating, ventilation, and air conditioning (HVAC) systems that meet or exceed standards for air quality set in place by the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE).

> *"Good teachers and motivated students can overcome inadequate facilities and perform at a high level almost anywhere, but a well-designed facility can truly enhance performance and make education more enjoyable and rewarding."*
>
> – Colorado Collaborative for High Performance Schools (CHPS)

New equipment, engineering, and architectural designs implemented in schools via ESPC also improve the aesthetics of the indoor environment. For example, implementing a natural daylight design solution not only reduces energy use associated with artificial lighting, but also improves visibility and the school's atmosphere. Students reap the benefits of a more pleasant educational environment, better visibility in the classroom, and a better chance at academic success.

---

16 Quotes from Developmental Studies Center (http://www.devstu.org/research-articles-and-papers-the-role-of-supportive-school-environments-in-promoting-academic-success) and Collaborative for High Performance Schools (http://www.chps.net/dev/Drupal/node/166).

17 "Energy Efficiency and Indoor Air Quality in Schools." (2003). US EPA. http://www.epa.gov/iaq/schools/pdfs/publications/ee_iaq.pdf

18 "Student Health and Academic Performance: Quick Reference Guide." (2012) US EPA. http://www.epa.gov/iaq/schools/pdfs/student_performance_findings.pdf

19 "Healthy School Environments." (Undated). American Association of School Administrators. http://www.aasa.org/healthyschoolenvironments.aspx

20 "Healthy School Environments." (2013) US EPA. – http://epa.gov/schools/

ESPC Projects Provide Educational Opportunities for Students

The Power of Competition in Schools

Friendly competition can be a powerful motivator for improved energy efficiency in schools. Students enjoy competition and are eager to receive recognition for their efforts. Any type of organization can tailor energy efficiency competitions to their circumstances. For example, competition can take place between classrooms in a school, schools in a district, or districts in a state.

Schools can also participate on a national level in EPA's ENERGY STAR National Building Competition for buildings of all shapes, sizes, and types. In the 2012 competition, Demarest Elementary School of Bloomfield, New Jersey won the "Battle of the Buildings," competing against a pool of more than 3,000 buildings, including office and retail buildings, hospitals, and more. The school **reduced energy consumption by 52 percent and saved more than $76,000** without sacrificing tenant comfort or services.[21]

Mesa County Valley School District 51 has used energy efficiency competition to reduce not only operating costs, but **also strain on a tightening budget that would have otherwise resulted in personnel cuts**. By improving energy efficiency, MCVSD51 has freed resources to meet student needs, improved the lighting and indoor air quality of its classrooms, **obtained a refund from its utility** by identifying billing errors, and achieved national recognition in the President's Better Buildings Challenge.

Loudoun County Schools has harnessed the power of competition by participating in EPA's National Building Competition (shown below).

The energy efficiency achieved through ESPC yields environmental benefits by decreasing emissions of harmful pollutants into the environment. Sharing these improvements through student instruction can foster awareness about current environmental issues and teach the value of sustainability. Energy efficiency improvements lend themselves well to teaching opportunities about sustainable energy, clean energy, and environmental stewardship; several sources are available to provide input on educational training opportunities in those areas.

ESPC can help create an environment where students learn not only in the classroom, but also through direct participation in the effective and efficient operation of the school. The same technology tools that help administrators manage buildings can include interactive components that involve students to help manage their own schools. Students as ESPC participants gain valuable knowledge for later in life when they enter the workforce. Some schools may work with their consultants to launch behavior change campaigns that encourage their students to shut off lights in unoccupied rooms and to turn off unused computer monitors. Kiosks can display graphs of the quantitative impacts of these student actions. Students will begin to see and learn about the science, engineering, mathematics and the consequences behind their choices and their actions or the impacts of their actions. The school can also reward the student body for implementing energy-efficient behaviors to reinforce the importance of good resource stewardship. Teachers and students may consult DOE's Office of Energy Efficiency and Renewable Energy (EERE) Energy Literacy Guide available at http://www1.eere.energy.gov/education/pdfs/energy_literacy_1_0_high_res.pdf.

Teachers can integrate actual school data and these lessons into curricula, design competitions, and other programs to make saving energy and learning math and science practical and fun. Mathematics classes can include instruction on unit conversions for energy. Using energy data and hours of operation, students can calculate watt-hours (Wh), kilowatt-hours (kWh), and megawatt-hours (MWh). They can even apply the cost of electricity per unit to calculate the cost of operating their school. Courses or workshops on public speaking can compile the results of energy performance tracking for presentation to the student body or even the school board.

Teachers and administrators can also integrate existing curricula on energy-related topics into the classroom. For example, EPA and DOE have created valuable materials to help teachers guide their classrooms through learning about energy efficiency and environmental impacts. EPA's *ENERGY STAR Guide to Energy Efficiency Competitions for Buildings & Plants* is a 22-page resource that walks through the steps involved in planning and launching an energy efficiency competition.[21] Assigning this process as a class project can provide students with a valuable experience with event and campaign coordination, public communications, and even data analysis. The guide is available for download at www.energystar.gov/competitionguide, and many other ENERGY STAR resources are available at www.energystar.gov/buildings.

Loudoun County Public School District in Ashburn, Virginia, engaged its students by recruiting teams of students interested in energy and the environment to participate in new energy conservation programs in their school buildings.[23] This involvement fosters a sense of pride and responsibility in the students and creates a pattern of behavior that supports positive contributions to society.

EPA's ENERGY STAR Guide to Energy Efficiency Competitions for Buildings & Plants

[21] "ENERGY STAR® Guide to Energy Efficiency Competitions for Buildings & Plants." (Undated). US EPA. http://www.energystar.gov/CompetitionGuide

[22] "Bloomfield, New Jersey Elementary School Wins "Battle of the Buildings." (4/24/2013). US EPA. http://yosemite.epa.gov/opa/admpress.nsf/0/B2B4001812F21BC085257B57006D4A3A

[23] Loudoun County Public Schools, LCPS Energy & Environment Team - http://www.lcps.org/Page/1841

Chapter 2. What is Energy Savings Performance Contracting?

This chapter explains the basics of ESPC: its origins, structure, processes, and means for evaluating savings. The following sections provide best practices as well as pitfalls to avoid when implementing a contract. Appendix B includes examples of successful past project concepts, as well as tools and resources for school districts.

The Emergence of Energy Savings Performance Contracting

In the past, a school might pursue energy efficiency upgrades via a *shared savings agreement*, under which a third-party expert and a school district would join forces to reduce energy consumption.[24] The expert consultant would help the school implement behavioral and technological changes to save energy, and would receive as much as 50 percent of the generated energy savings as payment. These agreements still exist today, but the industry standard has shifted toward schools keeping all of the savings, minus a set fee paid for the consultant's services. Today the general expectation is that savings will pay off the financing cost of retrofits, thereby providing a return on investment (ROI).

Shared savings agreements evolved into *performance guarantee* contracts, in which a consultant promises to achieve a pre-defined savings amount and assumes the risk of generating savings on behalf of the school. If the specified savings amount do not materialize, the consultant must compensate the school for the difference. This framework, built around maintenance, energy, and operational savings, enables schools to save money while incurring less risk.

Financiers entered the picture in order to address the challenge of providing capital for more costly upgrades. Schools began using bonds, loan, and lease structures with a low borrowing cost covered by the energy savings generated by the project. From the idea of the performance guarantee and the concept of using energy savings to finance projects comes the modern ESPC.

Size of the Market

According to Lawrence Berkeley National Laboratory (LBNL) and the Energy Information Administration (EIA), more than 5 billion of the 6.6 billion square feet of school facility floor area remains untouched by energy efficiency upgrades, representing an opportunity for 41.5 to 59.3 trillion kBtu in potential energy savings that could be achieved through ESPC.[26,27] In dollar terms, this equates to between $15.8 and $29.4 billion in unrealized market potential.[28]

How Does ESPC Work?

Performance Contracting, also referred to as Energy Savings Performance Contracting, is a contracting and financing method that enables schools to pay for facility energy efficiency upgrades today by using the energy and maintenance savings generated by the upgrades over time. This framework equips schools to pay for the upgrades without diverting funds from the capital budget or other school programs. The company performing the upgrades often designs and installs the project, and measures, tracks, and guarantees the savings. Figure 8 demonstrates the typical cash flow scenario associated with a school's energy costs and potential savings throughout the life of a traditional ESPC.

> *"ESPCs are…ideal for building owners with scarce capital and limited in-house energy management expertise, as well as those with aging facilities that suffer from deferred maintenance."* [25]

[24] Hahs, Dale L. (Undated). "The Fundamentals of Energy Savings Performance Contracting." Energy Services Coalition. http://www.energyservicescoalition.org/Data/Sites/1/documents/resources/The_Fundamentals_of_ESPC.pdf

[25] Quote from Tetreault and Regenthal (2011).

[26] Stuart, E.; Larsen, P.H.; Goldman, C.A.; and Gilligan, D. (2013). "Current Size and Remaining Market Potential of the US Energy Service Company Industry." Lawrence Berkeley National Laboratory and National Association of Energy Service Companies, for US Department of Energy. LBNL-6300E. September 2013. Page A-4. http://emp.lbl.gov/publications/current-size-and-remaining-market-potential-us-energy-service-company-industry

[27] Ibid, page A-6.

[28] Ibid, page A-5.

In the United States, ESCO customers typically receive any savings that exceed the guaranteed amount. In most cases, ESCOs meet or exceed the guaranteed savings level, and their customer schools receive additional savings beyond the contract during the repayment period.

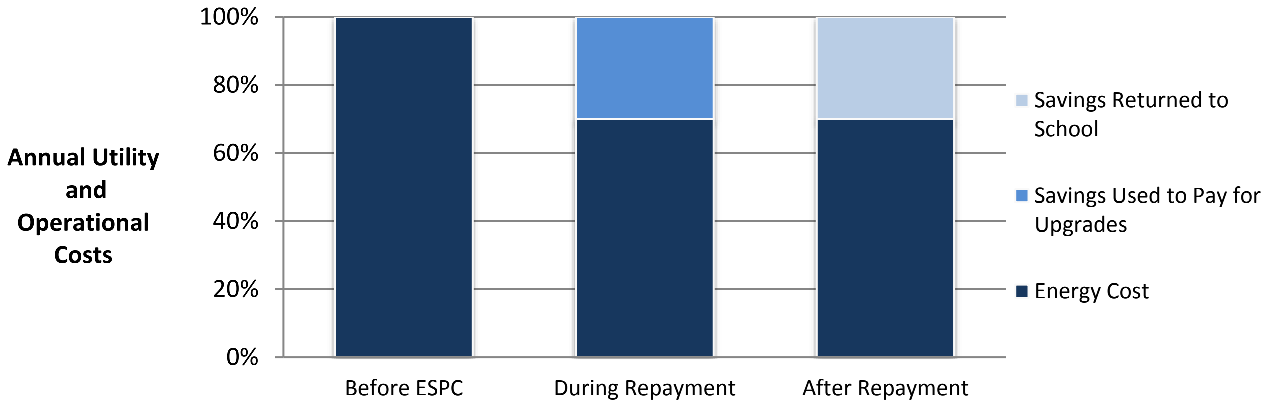


Figure 8: Traditional ESPC Cash Flow Diagram

In 2000 the *Annual Review of Energy & the Environment* published an article by Fisk that provides a thorough explanation of energy savings performance contracts:

> *"Energy Savings Performance Contracts (ESPCs) are an alternative finance mechanism in which an Energy Service Company (ESCO) installs, maintains, and finances Energy Conservation Measures (ECMs) on behalf of the customer and guarantees the resultant energy and energy-related savings that are used to pay back the ESCO over time for its investment. After the initial investment is repaid, the benefits then accrue to the customer. ESPCs are a way for schools to upgrade energy-using and water-using equipment or to obtain renewable energy sources in its facilities with no upfront capital investment or appropriations. ESPCs result in increased building occupant comfort, reduced energy loads and reduced energy consumption, increased operational efficiency, and greater employee productivity."*[29]

This definition provides a good basis from which to delve further by employing a description by Tetreault and Regenthal (2011) that also provides an excellent overview and explanation of the general ESPC process.

> *"Energy savings performance contracting is a method for making capital improvements to existing facilities by using guaranteed energy and operational savings to pay for the upgrades. Savings can come from reducing the consumption of electricity, heating fuels (e.g., natural gas, propane, fuel oil, etc.), water and/or wastewater. An energy savings performance contract (ESPC) is an agreement between an energy services company (ESCO) and a building owner, whereby the ESCO performs a detailed assessment of the facility and identifies a list of energy and water conservation measures (ECMs), and the building owner selects the best combination of ECMs to implement that meets his/her operational needs."*[30]

---

[29] Fisk, W. (2000). "Health and Productivity Gains from Better Indoor Environments and Their Relationship With Building Energy Efficiency." *Annual Review of Energy & the Environment* 25(1), 537.

[30] Tetreault, T. and Regenthal, S., *ESPC Overview: Cash Flows, Scenarios, and Associated Diagrams for Energy Savings Performance Contracts*, National Renewable Energy Laboratory. 2011. http://www.nrel.gov/docs/fy11osti/51398.pdf.

Figure 9 shows the cash flow of ESPC over time as a portion of the rising utility costs that schools and other facilities would otherwise incur.

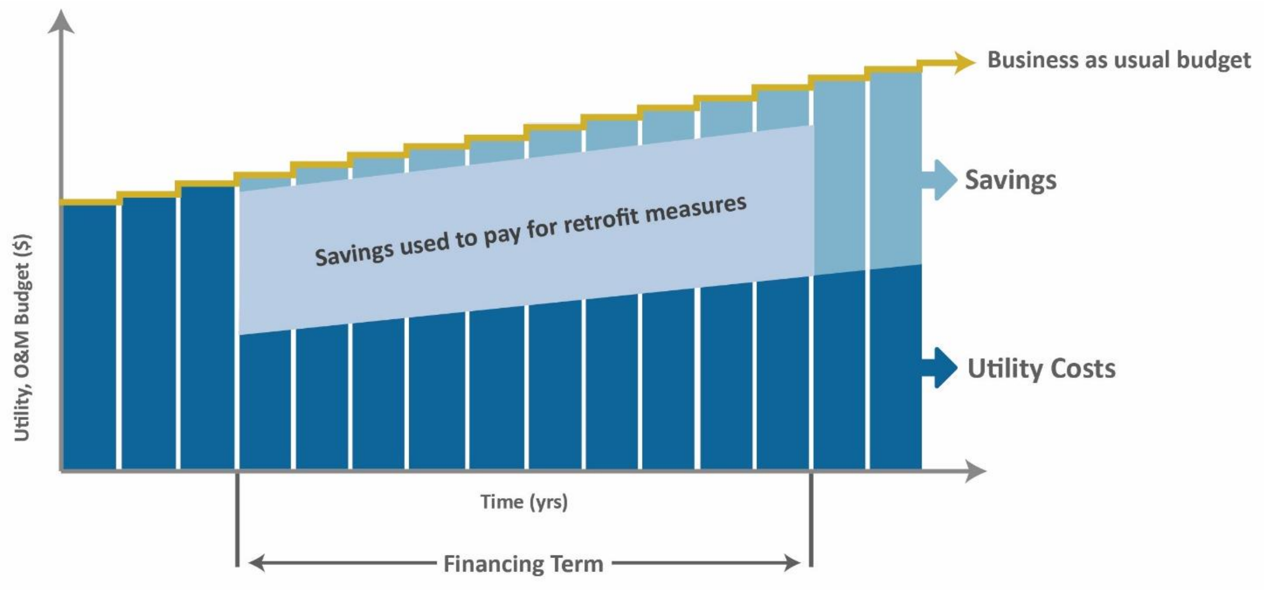


Figure 9: ESPC Cash Flow[31]

Contract Structure

The main parties involved in a typical ESPC are:

- **ESCO –** The energy service company is the heart of an ESPC and is responsible for working with the school to determine the right ECMs for installation, overseeing construction, guaranteeing and providing verification of post-installation savings. Often the ESCO will help arrange financing for the project.
- **School –** The school owns the building in which the ECMs are installed. Before the upgrade, the school makes energy payments to a utility company. After the upgrade, the school makes smaller energy payments to the utility company and uses some (or all) of the utility bill savings to pay for the installed ECMs.
- **Financier –** The financier provides the loan or lease arrangement that pays for the installation of ECMs and other upgrades. A school can also issue a bond to provide its own financing where that is an option.
- **Utility –** The utility provides energy to the school before and after the installation of the energy conservation measures. Some utilities provide energy efficiency rebates or incentives, which the school or ESCO can claim to help reduce the cost of the project.

---

[31] Tetreault, T. and Regenthal, S., *ESPC Overview: Cash Flows, Scenarios, and Associated Diagrams for Energy Savings Performance Contracts*, National Renewable Energy Laboratory. 2011. http://www.nrel.gov/docs/fy11osti/51398.pdf.

Figure 10 depicts the typical structure of an ESPC for schools and the relationships between parties. The structure operates as follows:

(1) Following the execution of energy services and financing agreements, the project can keep the financing in an escrow account, where the ESCO takes drawdowns to fund the installation of ECMs.

(2) The ESCO or school claims any applicable utility-offered incentives in order to reduce the school's ESPC project costs.

(3) The ESCO installs the ECMs. The line for "Energy Services & Measures" represents construction and installation of ECMs and the resulting measurement and verification (M&V) of savings.

(4) If energy savings fail to meet projections, the ESCO is liable, under the energy savings guarantee, to compensate the school and will make a payment to the school for the difference.

(5) The school continues to make payments to the utility for energy, but these payments are now lower due to the installation of efficiency measures.

(6) The school uses the money saved from reduced energy payments to make payments to the financier, on the bond, or on the municipal (muni) lease until the cost of the project is paid in full.

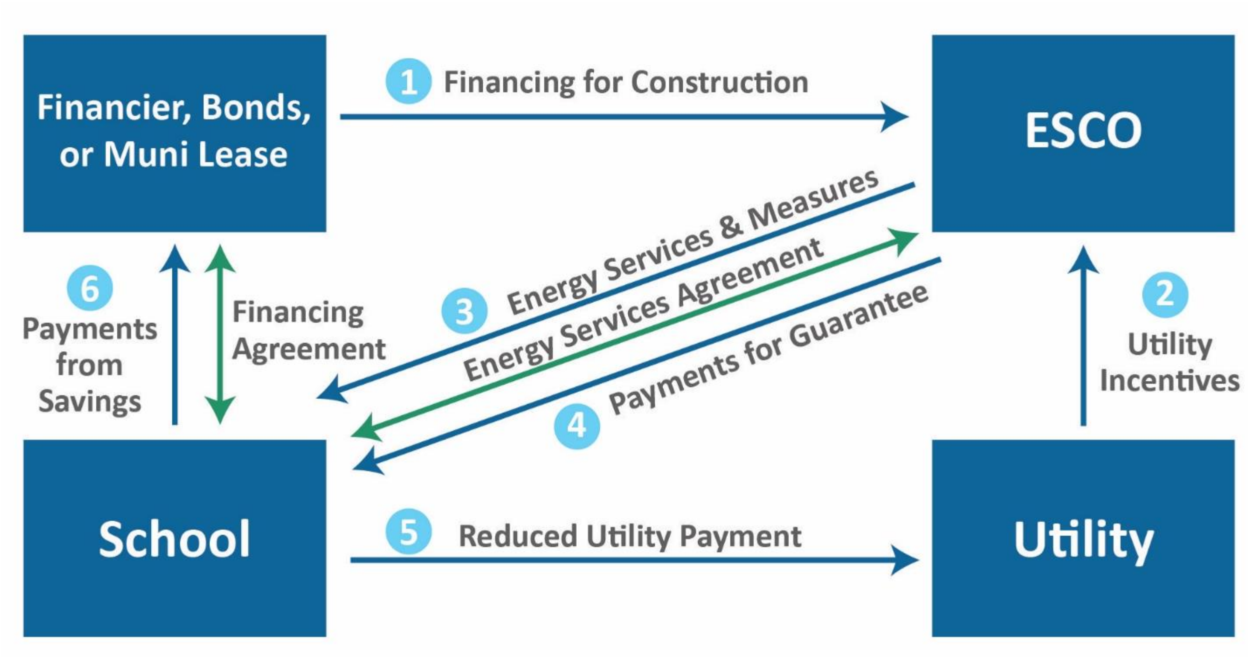


Figure 10: ESPC Structure[32]

[32] Knutson, D. (2011). "Energy Savings Performance Contracting." PowerPoint Presentation. EECBG Northeast Regional Peer Exchange, March 30, 2011. Framingham, MA. (Image adapted from image used in presentation.)

Financing (Bonds, Leasing Arrangements, Traditional Loans)

The steps to securing financing for an ESPC can vary significantly depending on local law. An ESCO can help provide financing options or a school may choose to secure its own financing through a bond issuance. Traditionally, K-12 schools have relied on a variety of sources when financing ESPC projects, including state or local bond issuances (34 percent), leasing arrangements (28 percent), and traditional loans (18 percent).[33] Brief descriptions of each of these options are below. In addition, Lawrence Berkeley National Laboratory's *Financing Energy Upgrades for K-12 School Districts*[34] serves as a starting point for understanding financing options.

Bonds

A bond is a long-term debt instrument that schools can use to fund energy efficiency projects. A single ESPC project is often not large enough to support its own bond issuance, so ESPC projects are typically bundled with other larger issuances. Special federally subsidized bonds such as Qualified Energy Conservation Bonds (QECBs) and Qualified Zone Academy Bonds (QZABs) are also available for projects that meet certain requirements.

Leasing Arrangements

A lease is an agreement that allows a school to use a piece of equipment for a specified period in exchange for a regular payment made to the owner of the equipment. Project owners often use a special lease structure known as a "tax-exempt lease-purchase agreement" to purchase equipment for ESPC projects. A tax-exempt lease-purchase allows a school to pay for an energy efficiency project with funds already allocated to its annual operating budget, in this case for utility expenditures.

Traditional Loans

A loan is a debt agreement in which a financial institution provides a school with upfront capital for a project in exchange for a series of regular payments equaling the principal amount plus interest at a predetermined rate.

The Role of the ESCO (The Performance Guarantee)

The ESCO plays the role of guarantee provider, partner, project designer, and construction contractor. With this perspective in mind, schools and ESCOs can work together to better define each party's contract role. The ESCO's role throughout the process is to recommend, design, install, and commission energy conservation measures in the schools and then measure and verify savings. More detailed descriptions of these roles appear in Chapter 3.

The Performance Guarantee

Energy performance contracts include an energy savings guarantee, monetized by the cost of energy applied to the energy savings. The guarantee is important because the projected cost of the energy saved is the mechanism used to pay for retrofits. It should be noted that an ESPC guarantee does not guarantee a *fixed unit price for energy*, but rather an amount of energy saved when compared to historical energy use. The quantity of energy saved multiplied by the unit cost of energy determines the total associated energy cost savings. An ESCO must guarantee, in addition to energy savings, that the payments in a given year will not exceed the savings. An ESCO could be liable to pay the school in the event of a shortfall in savings, depending on how the contract defines risks.

---

[33] Stuart, E.; Larsen, P.H.; Goldman, C.A.; and Gilligan, D. (2013). "Current Size and Remaining Market Potential of the US Energy Service Company Industry." Lawrence Berkeley National Laboratory and National Association of Energy Service Companies, for the US Department of Energy. LBNL-6300E. Page A-4. http://emp.lbl.gov/publications/current-size-and-remaining-market-potential-us-energy-service-company-industry

[34] Borgeson, M.G., & Zimring, M. (2013). "Financing Energy Upgrades for K-12 School Districts." Lawrence Berkeley National Laboratory. LBNL-6133E. http://emp.lbl.gov/sites/all/files/lbnl-6133e.pdf

Are Savings Real?

Determining Projected Energy Savings

In order to determine the value of the facility upgrades that can be financed under an ESPC, the ESCO must first project the energy (and thus dollar) savings that will result from the upgrades. This process involves two steps:

1. Determining the current energy use of a facility, a process often referred to as “establishing a baseline”.
2. Projecting the energy use of the facility after the upgrades.

Getting the baseline and the post-installation energy savings right is critical to the success of the project. In the real world, a number of variables like load, occupancy, operating schedule, and weather can influence energy use. Therefore, it is important to understand and define these risks clearly in the contract, including the responsible party for each risk. The following series of figures shows the effect of miscalculating either the baseline or post-installation energy use.

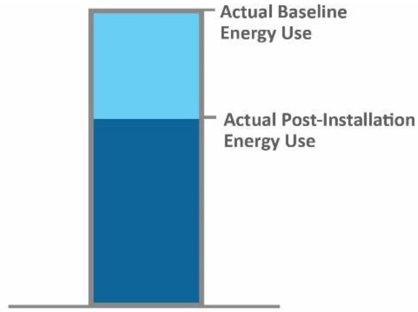


Figure 11: Energy Baseline

Figure 11 compares energy use before and after implementing retrofits, where the dark blue area represents post-retrofit energy use. The savings amount is equal to the cyan segment, which represents the difference between pre-retrofit and post-retrofit energy use. These savings can pay for an ESPC project.

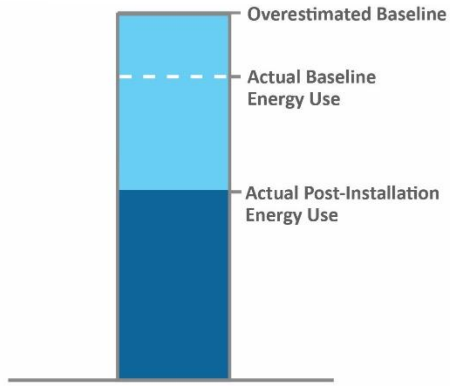


Figure 12: Overestimating Baselines

Figure 12 shows a potential exaggeration of savings due to a miscalculation of the baseline. If the baseline energy use is incorrectly determined, the final savings amount will appear greater than it actually is. In the figure, the cyan area above the dotted line represents the effect of an inflated baseline. An inflated baseline might lead a school to undertake a larger project (with larger payments) than would otherwise make sense; and not have enough actual savings to repay the cost.

Contracts can also miscalculate post-retrofit savings if they use a predetermined savings rate instead of measuring actual energy use after installation (see next section on measurement and verification). Stipulated savings base savings on a predetermined estimate. Figure 13 shows the worst-case scenario of both an inflated baseline (cyan section above the upper dotted line) *and* a purely stipulated savings amount unverified by M&V (cyan section below the lower dotted line). Since the area between the two dotted lines represents actual savings, one can see how a school could end up committing to payments in excess of actual savings.

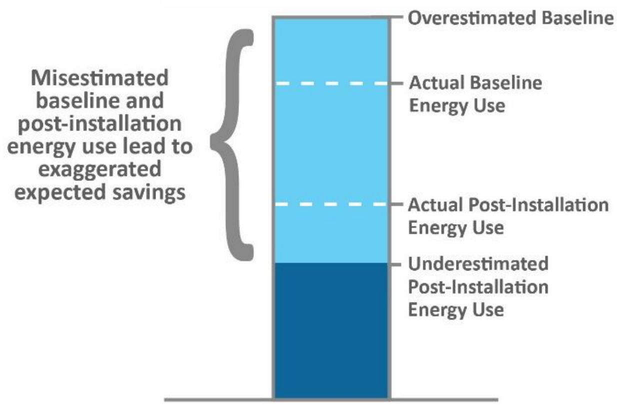


Figure 13: Stipulating Savings and Overestimated Baseline

In addition to determining baseline and projecting energy use, a school and the ESCO must agree on the per-unit cost of energy to use in savings calculations. Since the price of energy tends to increase over time, agreements often use escalation factors to estimate energy costs in future years. The best escalation rate estimate is an *accurate* escalation rate, determined by reviewing utility bills, contacting the utility about projections for rate increases, and examining other historical and local data. Chapter 3: Getting Started with ESPC covers escalation rates and associated risks in more detail.

Operational Savings

Operational savings consist of reductions in maintenance requirements, which often include labor savings as well as reduced equipment replacements costs, e.g. when long-lived CFL or LED lights replace conventional lights. Operational savings are usually stipulated, meaning that they are pre-determined based on estimates, not actual post-retrofit savings. Schools should carefully consider whether the proposed changes will truly result in operational reductions before including them in savings projections, otherwise the savings might not materialize to cover the monthly cost of the new equipment.

Measurement and Verification

Measurement and verification (M&V) is the process used to measure actual facility energy use, confirm that the energy savings estimated at the beginning of the project are materializing, and ensure that equipment continues to function optimally by identifying problems early. M&V helps assure the client organization that the guaranteed savings are real. Determining actual savings requires comparing energy use before and after the retrofit using tools that measure energy usage or computer models. Several M&V options have emerged for isolating and verifying the actual savings generated by various retrofit types. The International Performance Measurement and Verification Protocols (IPMVP) provide a detailed explanation of M&V methodology appropriate for each individual retrofit. These protocols appear online at http://www.evo-world.org/.

Summary of M&V Options

The M&V Guidelines are an application of the International Performance Measurement and Verification Protocols (IPMVP). The guidelines group M&V methodologies into four general categories, which include different options for measuring energy use.

Learn more: Appendix B provides a table indicating when each of the four options should be used. Refer to IPMVP for a more detailed explanation of M&V methodology and how to determine the most appropriate retrofit model for the project: http://www.evo-world.org/.

When discussing M&V options with an ESCO, be sure to clarify the type of M&V included in the contract, who pays for it, the number of years to carry it out, and whether it comes with additional maintenance services or training. Many ESCOs are willing to train local staff or assist in equipment maintenance to ensure that energy savings meet expectations.

Chapter 3. Getting Started with ESPC

This chapter describes the performance contracting process and provides guidance to readers with varying levels of ESPC familiarity. The following pages discuss some of the critical considerations for planning, procuring, and implementing an ESPC. The appendices include supporting resources for Chapter 3, offering useful guidance for protecting the best interests of schools and ensuring a mutually beneficial project. This chapter presents a general overview of the ESPC process, but it is important to note that ESPC practices and legal requirements vary by state. Each school should research and understand applicable state and local laws regarding ESPC and tailor the approaches provided in this chapter to meet local requirements.

RESOURCE: DOE's *Advanced Energy Retrofit Guide for K-12 Schools*

This guide presents a practical roadmap for effectively planning and implementing performance improvements in K-12 schools, and detailed descriptions and financial payback metrics for the most relevant energy efficiency measures.

Download the Guide: https://buildingdata.energy.gov/cbrd/resource/17

- State Legislation on ESPC
  In 2013 DOE developed this document, which provides quick links to statutes in each state. (http://www1.eere.energy.gov/wip/solutioncenter/performance_contracting.html)

Process Overview

The ESPC process begins with an evaluation phase during which school stakeholders learn about performance contracting and assess whether it is right for the current potential project. Following evaluation is the planning phase, which includes gathering internal support, assembling a project team, and setting project goals. The procurement phase involves constructing and issuing a request for proposals (RFP) or request for qualifications (RFQ) and selecting a contractor from the pool of bidders. Once the school selects a contractor, the implementation phase begins, which includes project development and implementation. The longest period—"life after contract"—refers to the time after installation that includes ongoing performance and maintenance.

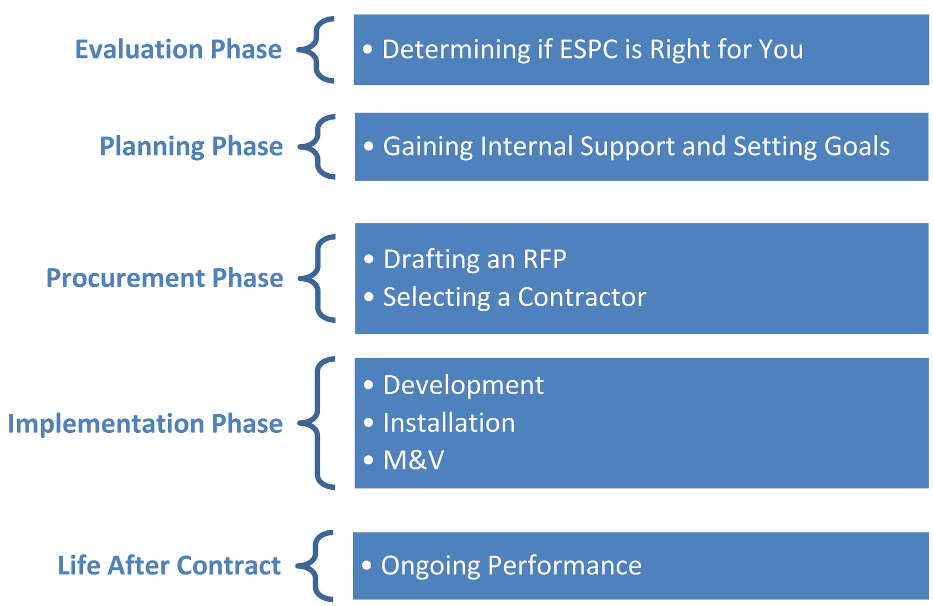


Figure 14: The Phases of an ESPC Project

Evaluation Phase

Determining if ESPC is Right for You

During the evaluation phase, school engineering staff, a consultant, or an ESCO can help a school or district determine if ESPC is the right fit by considering whether metering is in place in all buildings, and conducting an energy audit walkthrough of all school buildings. This walkthrough examines the efficiency of the school's existing equipment and building systems to determine if installation of energy conservation measures would result in sufficient savings to fund a project. The person performing the audit may also evaluate utility bills, energy rates, and other factors in the initial determination. If an expected energy savings of 10–30 percent appears feasible and if the associated reduction in utility costs would provide enough cash flow to support a project, a school should consider proceeding to the planning phase.

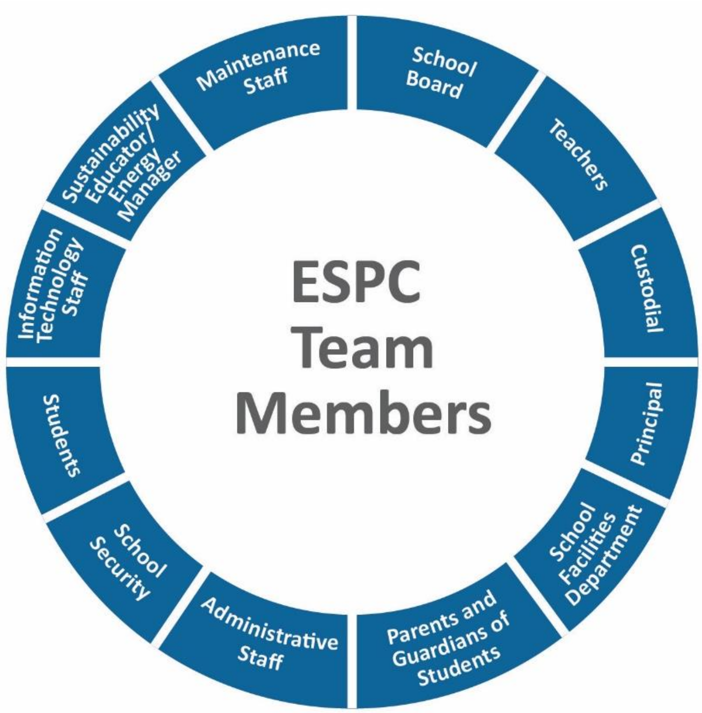
Planning Phase

The planning phase begins with stakeholder involvement, setting goals, and building a team. Once these pieces are in place, schools need to determine what level of help they need. They may also want to seek out process models developed and/or used by similar districts, and adapt them to the school's needs in order to streamline the project and avoid pitfalls.

Gaining Internal Support & Setting Goals

A successful ESPC project requires a team of school staff members and stakeholders with a diverse set of skills. It should include representatives from school administration and finance departments, facilities and custodial staff members, teachers, students, and third-party consultants or advisors. Figure 15 indicates some of the team members that may be necessary for an ESPC.

Figure 15: ESPC Team Members



The Role of the Champion

Strategic alignment begins with the identification of a champion inside the organization who will shepherd the ESPC from inception to completion and on through long-term routine monitoring and maintenance. The champion will need to gain a thorough understanding of the process and be able to communicate the value proposition to both internal and external stakeholders in appropriate terms.

Energy savings performance contracting is not a project with a defined beginning and end, but rather a cycle that will have lasting impact on school facilities and processes. The ideal champion is one who understands the value and importance of creating lasting change. Without this perspective and motivation, the champion may falter or give up during difficult or challenging times.

Strategic Alignment

Internal alignment is critical for the success of an ESPC project. In a strategically aligned energy savings performance contract, the project team— ideally led by a champion—has a common understanding of the ESPC process, its risks, costs, challenges, and benefits. The team has made a consensus-based decision to proceed with ESPC, and key decision-makers and influencers lend their support to promote success.

Goal Setting

The last act of the project team before beginning procurement should be to discuss goals for the ESPC. The team should consider how to determine whether the project is successful. Such factors might include:

- Project cost
- Implementation speed
- Size of reduction in utility bills
- Improved environment for the school
- Minimal disruption for students and staff
- Opportunities to apply savings to improve educational tools and services

Once goals are set, the next phase is procurement.

Procurement Phase

The ESPC procurement phase consists of drafting and issuing a request for proposal (RFP), evaluating proposals, and selecting a contractor. This section discusses important steps in "Drafting an RFP." If your school is new to ESPC, see also Chapter 4: Technical Assistance.

Drafting an RFP

When planning an ESPC project, the school should consider the issues listed below, along with specific site information. Appendix C includes a link to a sample RFP developed in collaboration between the public and private sectors.

Things to Consider when Planning an RFP:

- **Scope:** What areas or facilities may be included in the delivery order?
- **Capability of contractors:** Do the evaluation criteria specifically include experience or accreditation through a national body?
- **Future use of the facilities:** Has the RFP considered the site master plan in the ESPC process?
- **Condition of existing equipment:** Is the equipment old and/or unreliable? Will equipment require replacement or major repairs soon?
- **Energy conservation measures (ECMs):** What ECMs would the school consider for a project? How could the school bundle them for a better project?
- **Utility budget and energy-related equipment and O&M budget:** Is the annual utility budget large enough to attract an ESPC proposal, and is it stable or increasing in size? Are there any existing energy upgrade projects or service contracts transferable to the ESPC?
- **Potential savings in both energy units and dollars:** Are the estimated savings sufficient for the school to achieve an acceptable payback period?
- **Needs and desires of facility occupants:** Are there facility problems, such as problems in achieving an optimal temperature range, or problems meeting environmental requirements?

After assembling and issuing an RFP, the next step is contractor selection.

Contractor Selection

The best selection of a contractor, consultant, non-profit, ESCO, or other qualified solutions provider relies on responses to an RFP using a rating system that combines both *quantitative and qualitative elements*. Using a quantitative point-based

system, without clear qualitative descriptions of point allocation, or ranking credentials on a purely qualitative basis, without a quantitatively defined weighting structure, can lead to ambiguity and poor decision-making. A good framework for evaluation includes specific point values assigned to scoring criteria, and effective qualitative descriptions of what leads to a particular point value. This balanced approach helps provide clarity to respondents and guards against competing interpretations. The Sample Contractor or Team Evaluation Form in Appendix C provides a framework for evaluation incorporating both quantitative and qualitative elements.

It is worth noting that the contractor selection process should be relational rather than transactional in nature. Unlike RFPs for pre-defined services or the purchase of goods, an energy savings performance contract is most successful when the relationship lasts for several years and where there is shared goal development and responsibility.

Implementation Phase

Figure 16 shows the typical phases in an ESPC, with the activities associated with each phase listed below. Schools that are new to the process should seek help from an energy consultant to help navigate any unfamiliar territory along the way.

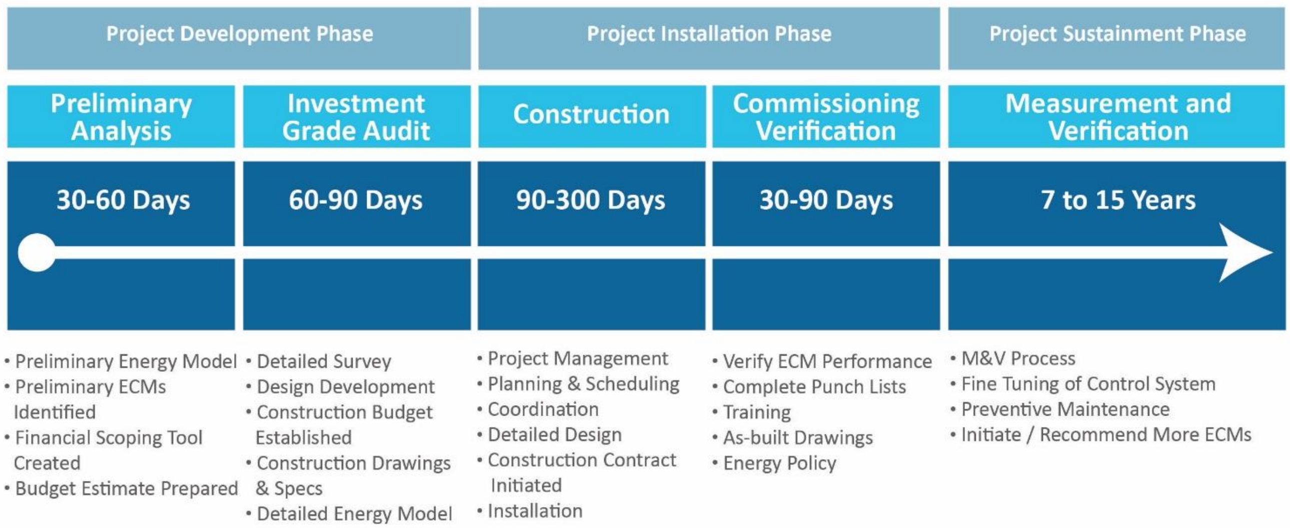


Figure 16: ESPC Implementation Process and Timeline

Project Development Phase

In the project development phase, the school should work with its ESCO to conduct a preliminary analysis of the facilities. This analysis should include detailed facility walkthroughs, investment-grade audits of existing equipment, identification of potential retrofits, analysis of financial estimates, and necessary budgets. The development phase also includes design work by engineers and architects for new systems, and preparation of construction budgets, drawings, specifications, and detailed energy models where necessary. This phase may take up to six months, depending on the size and number of facilities, and other scheduling factors. The ESCO largely leads the development phase, while schools provide the necessary data and access to facilities.

Project Installation Phase

The installation phase of an ESPC involves construction similar to other construction projects a school may have experienced in the past. During this phase, activity occurs in project management, planning and scheduling, and coordination. Detailed design work and retrofit installation begin. To minimize disruptions to school operations, installation typically occurs during periods when school is out of session and during hours when students are not in the school buildings.

This phase also includes verification that equipment is working as designed —also known as commissioning—and the completion of punch lists, review of as-built drawings, and delivery of training on the operation and maintenance of new equipment and systems. The ESCO may provide training manuals and record training sessions for staff members who will be maintaining equipment, if applicable. If the ESCO will be providing maintenance services, the parties may develop schedules at this time.

Project Sustainment Phase

During the M&V stage in the first year following contract acceptance, once all equipment is installed and approved, the ESCO should take steps to measure and verify savings being generated by the equipment and systems. The measurement and verification findings may prompt fine-tuning of control systems, calibrations and adjustments, preventive maintenance, and recommendations for refinements to maximize savings. The project should follow the M&V options

according to the M&V plan in the contract, and a school representative should witness the M&V activity to ensure accuracy, as the M&V results determine whether the ESCO is meeting its performance guarantee. In some cases, a third party may conduct M&V upon agreement between the school and the ESCO.

To maintain peak performance for the life of the contract, it is advisable to document all the necessary information to help the facilities managers or ESCO personnel, or in the event of personnel turnover, to maintain efficient operations and continue progress tracking. It is important to designate a responsible party to maintain and update the information. Consider scheduling regular ESCO visits to keep the focus on maintaining performance and maximizing savings.

During this period, the school and the ESCO have another opportunity to develop programs that involve students, increase awareness, and create opportunities for additional savings through behavioral changes.

Life after the Contract

Savings and contract benefits accrue in the "life after the contract" phase. This benefit phase may last up to 15 years, or longer in some cases, depending on the contract length, technology advances and facility usage patterns. During this life after the contract phase, maintaining long-term building operational performance is critical to realizing continued savings.

Additional Considerations

As with any type of construction project, schools must consider risks when implementing an ESPC. Schools can minimize potential risks by addressing them individually in writing and specifying responsibilities for performance between the school and the ESCO. The following section defines several of the common ESPC **financial**, **operational**, and **performance** risks and provides clear direction on how to avoid them. A good energy savings performance contract will address risks clearly and directly. When ESPC projects properly address risks, they become win-win scenarios for both the school and the ESCO.

Financial Risks[35]

While most K-12 ESPC projects use state or local bond issuances (34%) or leasing arrangements (28 percent) as financing vehicles, other projects use traditional loans (18 percent).[36] When assessing **interest rates on loans**, a school should inquire whether it will be possible to refinance and who stands to gain from refinancing. Other important questions include whether the project as a whole will use one loan, or whether different loans will apply to different construction costs, as rates may vary. Also consider that loans secured on the school's behalf should be competitive, and language should be in place guaranteeing the use of the lowest-cost bid.

Variables in Financial Risk

- Interest rates
- Construction costs
- M&V costs/confidence
- Construction delays
- Changes in facility use
- **Unexpected variations in the cost of energy**

Clarifying design standards and the design approval process can minimize the risks associated with unexpected increases in **construction costs**, including how to review costs. Loans or escrow accounts for the construction period can allow for drawdowns as needed rather than financing the full amount all at once. The contract language should clearly address contingencies such as the discovery of asbestos during construction.

Measurement and verification (M&V) of savings can be another risk area. Selection of an inappropriate M&V option for a retrofit could lead to inaccurate savings projections and associated payments that do not reflect reality. Schools should balance the degree of precision of their M&V options against the added cost of measurement and the risk of miscalculating savings. Some stipulations are necessary but measurements should back them. It is not easy to measure savings associated with window replacements, for example, so energy models may need to be used in such cases.

35 "Measurement & Verification of Energy Efficiency Projects." EPC Watch. http://cleanefficientenergy.org/sites/default/files/Guide-MandV1.pdf

36 Stuart, E.; Larsen, P.H.; Goldman, C.A.; and Gilligan, D. (2013). "Current Size and Remaining Market Potential of the US Energy Service Company Industry." Lawrence Berkeley National Laboratory and National Association of Energy Service Companies for the US Department of Energy. LBNL-6300E. Page A-4. http://emp.lbl.gov/publications/current-size-and-remaining-market-potential-us-energy-service-company-industry

Delays in construction or in the ESPC process are also a financial risk. Planning to install retrofits during the summer months may minimize disruptions to students and construction teams.

Major changes in facility use can pose a financial risk. Performance contracts work on the assumption that school buildings will continue to operate at current levels of energy expenditure, thus justifying the investment in more efficient equipment. Dramatic reductions in building use or repurposing (such as converting a mobile unit from a classroom into a storage unit, or vice versa) will change savings and payback estimates. The school should be aware of this financial risk and plan accordingly. The ESCO contract should contain provisions for reviewing the savings estimates in the event of a change in facility use or operating schedule.

Unexpected variations in the cost of energy also affect ESPC outcomes. Energy savings guarantees and their associated monetary savings depend on two factors: 1) the projected cost of energy and 2) the expected energy use reduction. Some contracts include a projected escalation rate for the cost of energy. If the ESCO meets an energy savings guarantee (measured in BTU) and yet the escalation rate results in a different energy cost from what the utility actually charges, the cost of the monthly finance payments might begin to diverge from the monetary value of the associated energy savings. Escalation rates affect the projected payback of a project, the amount that a school might consider financing, and the guarantee. When energy escalation rates are used, schools should include contractual language that makes it clear who bears the risk associated with unanticipated escalation. Being overly liberal or conservative with escalation rates for the purposes of future payments is not in anyone's best interest. The best escalation rate estimate is an accurate one, and it should come from utility bills, contacting the utility about future projections of rate increases, and examining other historical and local data. The National Renewable Energy Lab (NREL) also provides an energy escalation-rate calculator to help create accurate estimates. This calculator is available online using the following link: http://www.nrel.gov/analysis/models_tools.html.

***Operational Risks*[37]**

Variables in Operational Risk

- Operating hours
- Loads
- Weather

Operating hours are important to consider when determining baselines for savings and calculating savings post-retrofit. If, for example, a stipulation of operating hours is used as an assumption and the school then operates on a different schedule, the school could miss potential savings. Conversely, depending on the M&V strategy used, the ESCO could miss a guarantee but not be at fault, leaving the school with the payment for the extra energy used during hours not defined in the contract. Operating hours are also important to consider when changes in school operating hours during the life of the contract may be necessary. If operating hours used for determining savings change permanently, such as may be the case if a school changes its daily class start and end times, an adjustment to the baseline of the contract and associated savings may be necessary. This adjustment can affect project financials, cash flow, return on investment, and total payback period. For accurate estimates, it is generally a good practice to monitor operating hours with light on/off meters or other equipment sub-meters before defining a baseline.

Loads are another area of operational risk. If a school increases its enrollment by 100 students, for example, the school building will require more energy to maintain a comfortable temperature. Depending on the M&V strategy used, adjustments may be needed to account for changes in loads. At a minimum, the contract should include a process for handling changes in loads such that guarantees are held true to original assumptions but not necessarily the shifts in energy use that occur through no fault of the ESCO.

[37] Measurement & Verification of Energy Efficiency Projects." EPC Watch. . http://cleanefficientenergy.org/sites/default/files/Guide-MandV1.pdf

Weather can affect savings in an ESPC. Abnormally hot or cold days may require more energy than originally anticipated. To account for weather fluctuations in a given year, energy use projections are often adjusted using heating degree-days (HDD) and cooling degree-days (CDD), which measure the outside temperature above or below the level at which a building needs no cooling or heating. Typical meteorological year (TMY) data, which aggregates selected weather data for a specific location over a long period, may also be used to calculate savings using a set of base weather assumptions. The contract should specify the details of how to handle weather. The contract should also address separately Acts of God, as defined in legal terms, such as hurricanes and other natural disasters. Schools are typically liable for repair of damages that result from Acts of God and the school's insurance policies may cover those expenses.

The Impact of Human Behavior

User behavior can cause savings to either exceed or fall short of estimates. It is best to assign responsibility to specific personnel for all required activities, such as adjusting settings, performing maintenance, or switching a system into a different mode. Determine timelines and accountability checks that the school and ESCO should maintain throughout the contract. Getting the full benefit of upgrades and maintenance conducted through an ESPC may require user participation and behavior changes.

This dirty air filter prevents effective ventilation and needs replacement.

This door has been propped open with a chair, allowing conditioned air to leak out and increasing the energy load.

If unchecked, outside air dampers may remain open when they should be closed, or vice versa.

***Performance Risks*[38]**

Equipment performance is a risk that is most often assigned to the ESCO. The ESCO should commission equipment after installation, with the school or a qualified third-party owner's representative of the school witnessing the commissioning to ensure the equipment is operating as it was designed and intended. Should equipment issues arise post-commissioning, the ESCO would correct them under the manufacturer's warranty, if appropriate, or at no cost, depending on the terms of the guarantee.

Variables in Performance Risk

- Equipment performance
- Operations & maintenance (O&M)
- Repair & replacement (R&R)
- Useful life of equipment

Operations and maintenance (O&M) responsibility can be assigned to the school or to the ESCO and should be defined in the contract. Failure to define responsibilities in this area can lead to confusion for facilities managers and possible loss of savings.

ESPC contract language should also address the risk of equipment **repair and replacement**, separately from operations and maintenance (O&M) responsibility. If the contract outlasts the **useful life of equipment**, the contract should address which party will be responsible for equipment replacement so that savings may continue to occur. If the financial schedules of the contract do not schedule this cost, the school may be left with an emergency expense ten years down the road. An escrow account may be set up at the onset of a contract specifically for the purpose of equipment repair and replacement (R&R). Annual excess savings may be allocated specifically to an R&R account or for additional energy

[38] "Measurement & Verification of Energy Efficiency Projects." EPC Watch. . http://cleanefficientenergy.org/sites/default/files/Guide-MandV1.pdf

retrofits if desired. In addition, if equipment fails for lack of maintenance or due to faulty design, the contract should stipulate the party that assumes the risk of purchasing and installing new equipment.

In summary, an expert should help evaluate and discuss the risks inherent in ESPC, and then the written contract between the school and the ESCO should record them. A third-party advisor can help craft a matrix assessing risk, responsibility, and performance to determine responsibility when drafting a contract.[39]

[39] "Risk, Responsibility, and Performance Matrix." (2007). Microsoft Word file at "Resources on Implementing Energy Savings Performance Contracts". US DOE Federal Energy Management Program (FEMP). http://www1.eere.energy.gov/femp/financing/espcs_resources.html

Chapter 4. Technical Assistance

Knowledgeable EPSC advisors and consultants are available to assist schools in setting up an ESPC under a variety of contract types and arrangements. Options include a fee for services, hourly rate structures, fees as a percentage of total contract value, fees paid from energy saved, and in some cases, subsidized assistance paid by states through their energy offices. Services may include review of critical documents, example RFPs and scoring systems, measurement and verification assistance, commissioning of equipment, assistance negotiating, and/or providing general project facilitation to guide schools through the process of working with other contractors.

Some states, like Texas, require a third-party firm to verify ESPC projects; others do not. Knowing when to seek help can ultimately be the most important step towards ensuring a successful ESPC project. It is advisable that districts seek an objective and experienced resource to serve as a guide through the process before issuing an RFQ or RFP.

When to Seek Additional Support

If your school is new to ESPC or if your school does not have experienced engineering and management staff that has dealt with ESPC before, an energy consultant might be helpful to ensure a successful outcome. ESPC is not a traditional purchasing process; it is possible to avoid many obstacles with the assistance of an experienced energy consultant.

Frequently asked questions and answers (Q&A):

Q: What kind of support exists for ESPC?

A: There are many types of third-party support for ESPC, including engineering support, technical owner's representation, commissioning and witnessing assistance, and project facilitation. A facilitator or owner's representative may be helpful throughout the whole ESPC process and can provide advice at strategic points in the process, such as proposal reviews, major negotiations, review of measurement and verification plans, and risk management strategies. Engineering firms can provide specific technical assistance on highly technical or specialized requests, confirm or comment on engineering design plans, recommend energy conservation measures, and conduct energy audits.

Q: How can I find a reputable national, regional, or local energy consultant?

A: Energy consultant resources are available at DOE's online technical assistance center at https://www3.eere.energy.gov/wip/tac/.

Q: How can I cover the associated costs?

A: It is often possible to wrap the cost of consulting fees into the cost of the overall project, financing and paying for them from the savings stream. This arrangement can be included in the RFP terms and conditions.

Q: Can the energy consultant help us with an internal stakeholder workshop prior to issuing an ESPC RFP, so that we can build a strong coalition of supporters?

A: Yes, many energy consultants either have workshop facilitation experience, or have industry contacts that can provide this service. Your facilitator can point you to a list.

Q: Where else can I go to find assistance and other guidance?

A: Your energy consultant can point you to several organizations with good advice for performance contracts. The most widely recognized include the National Association of Energy Service Companies (NAESCO), the American

How School Districts Can Partner With the US Department of Energy

In February 2011, President Obama announced the Better Buildings Initiative to make commercial and industrial buildings—including K-12 schools—20 percent more energy-efficient by 2020 and to accelerate private-sector investment in energy efficiency. This broad, multi-strategy initiative, implemented by the U.S. Department of Energy, intends to catalyze change in energy use across U.S. buildings—lowering energy bills, reducing pollution, and growing domestic jobs.

There are several ways for school districts to engage with these efforts, including the Better Buildings Challenge, Better Buildings Alliance, and the ESPC Accelerator. Through all three of these programs, DOE asks school districts to make a commitment to energy efficiency, and in return offers resources, forums for idea-sharing and problem-solving, and connections to other public and private-sector participants, including state and local governments, financial institutions, and utilities.

To learn more about these opportunities and the Better Buildings Initiative, visit: http://energy.gov/better-buildings

Society of Heating, Refrigerating & Air-Conditioning Engineers (ASHRAE), and the Energy Services Coalition (ESC). These organizations can provide help and resources in addition to other savings strategies.

Appendices

The appendices provide supporting materials mentioned or referenced throughout this document, including templates, samples, checklists, factsheets, and other documentation materials. These materials are not comprehensive but serve as a starting place for schools and school districts to find guidance and resources that they can tailor to meet their individual needs.

Appendix A: Supporting Materials for Chapter 1: Challenges Facing Schools and the Benefits of Energy Efficiency

This appendix provides a link to ESPC web-based training intended to help ESPC newcomers avoid issues before they arise. Other links access information about school districts that have successfully implemented ESPC projects.

Appendix B: Supporting Materials for Chapter 2: What is Energy Savings Performance Contracting?

Links to valuable resources for getting started and learning more about energy savings performance contracts and some specific ESPC topics and financial lessons are available here, with comments from an energy consultant's perspective.

Appendix C: Supporting Materials for Chapter 3: Getting Started with ESPC

Appendix C includes a link to a sample RFP, along with a sample firm or team evaluation form that can serve as a template for the selection of an energy service company, consultant, or team of contractors looking to implement an ESPC project. The appendix includes evaluation guidance, along with sample questions, and an example of an energy policy resolution. A school or school district can modify this template to meet their individual conditions and requirements and the template serves only as an example. These resources will help your school select an ESCO and an energy consultant.

Appendix D: Case Studies

Three recent case studies of schools that have successfully implemented ESPC are included here as on- page handouts: Mesa County Valley School District 51, Virginia Beach City Public Schools, and Uinta School District.

Appendix A: Supporting Materials for Chapter 1: Challenges Facing Schools and the Benefits of Energy Efficiency

School District Sample Resources

Examples of schools that have successfully implemented ESPCs are available on the Better Buildings Challenge website, located at: http://www4.eere.energy.gov/challenge/showcase

Energy association websites and those of individual schools or other school-focused programs include, but are not limited to, the following:

- Mesa County Valley School District 51
  - http://www.mesa.k12.co.us/
- Greening Schools Program
  - http://www.greeningschools.org/resources/view_cat_admin.cfm?id=12
- ENERGY STAR
  - http://www.energystar.gov/K-12
- Better Buildings Challenge School Examples
  - http://www4.eere.energy.gov/challenge/partners/better-buildings/mesa-county-valley-school-district-51
  - http://www4.eere.energy.gov/challenge/showcase/camas/lacamas-heights-elementary-modernization
  - http://www4.eere.energy.gov/challenge/showcase/douglas-county-school-district/gardnerville-elementary
  - http://www4.eere.energy.gov/challenge/showcase/ft-atkinson/luther-elementary-school
  - http://www4.eere.energy.gov/challenge/showcase/portland-public-schools/benson-polytechnic-high-school
  - http://www4.eere.energy.gov/challenge/showcase/poudre-school-district-poudre-county-high-school

Appendix B: Supporting Materials for Chapter 2: What is Energy Savings Performance Contracting?

External ESPC Links and Resources

Several external links provide information potentially beneficial to schools. Some of the more commonly used resources include the following:

The DOE Solution Center[40] offers resources for financing energy efficiency and renewable energy projects applicable to state and local entities including cities, counties, and their schools. For specifics, visit the Clean Energy Finance Guide for Residential and Commercial Building Improvements.[41]

The Energy Services Coalition (ESC)[42] has resources for getting started with ESPC from the perspective of traditional ESCOs, or companies that identify themselves as ESCOs. The resources available here are important in understanding the ESCO's starting place and the perspective from which an ESCO approaches conversations about a school project. Public-private partnerships developed some of ESC's resources, such as the template contract and the workshop in a box. These resources have proven valuable in the past for starting projects. It must be noted that these documents are written primarily from the ESCO's perspective. Schools should keep in mind that ESCOs want to help but must also earn a profit, which serves as an incentive to continue providing their valuable services.

The National Association of Energy Service Companies (NAESCO)[43] offers information, case studies, and resources from projects completed by NAESCO-accredited energy service companies.

---

[40] "Clean Energy Finance Guide for Residential and Commercial Building Improvements." (2012). US DOE State and Local Solution Center. , http://www4.eere.energy.gov/wip/solutioncenter/finance_guide

[41] "On-Bill Repayment Programs." (2013). US DOE State and Local Solution Center., http://www1.eere.energy.gov/wip/solutioncenter/onbillrepayment.html.

[42] The Energy Services Coalition, http://www.energyservicescoalition.org.

[43] The National Association of Energy Service Companies, http://www.naesco.org/.

Measurement & Verification Guidelines

Table 1 Overview of M&V Options A, B, C, and D[44]

M&V Option	Performance[1] and Usage[2] Factors	Savings Calculation
Option A—Retrofit Isolation with Key Parameter Measurement	This option uses a combination of measured and estimated factors when variations in factors are not expected. Measurements are *spot or short-term* and are taken at the component or system level, both in the baseline and post-installation cases. Measurements should include the key performance parameter(s) that define the energy use of the ECM. Estimated factors are supported by historical or manufacturer's data. Savings are determined by means of engineering calculations of baseline and post-installation energy use based on measured and estimated values.	Direct measurements and estimated values, engineering calculations and/or component or system models often developed through regression analysis. Adjustments to models are not typically required.
Option B—Retrofit Isolation with All Parameter Measurement	This option relies on periodic or continuous measurements of energy use taken at the component or system level when variations in factors are expected. *Energy or proxies of energy use are measured continuously*. Periodic spot or short-term measurements may suffice when variations in factors are not expected. Savings are determined from analysis of baseline and reporting period energy use or proxies of energy use.	Direct measurements, engineering calculations, and/or component or system models often developed through regression analysis. Adjustments to models may be required.
Option C – Utility Data Analysis	This option depends on long-term, continuous, whole-building utility meter, facility-level, or sub-meter energy (or water) data. Savings are determined from analysis of baseline and reporting period energy data. Typically, the purpose of regression analysis is to correlate with and adjust energy use to independent variables such as weather, but simple comparisons may also be used.	Savings based on regression analysis of utility meter data. Adjustments to models are typically required.
Option D—Calibrated Computer Simulation	Computer simulation software is used to model energy performance of a whole facility (or sub-facility). Models must calibrate with actual hourly or monthly billing data from the facility. Implementation of simulation modeling requires engineering expertise. Inputs to the model include facility characteristics; performance specifications of new and existing equipment or systems; engineering estimates, spot-, short-term, or long-term measurements of system components; and long-term, whole-building utility meter data. After calibrating the model, savings are determined by comparing a simulation of the baseline with either a simulation of the performance period or actual utility data.	Based on computer simulation model (such as eQUEST) calibrated with whole-building or end-use metered data or both. Adjustments to models are required.

1 Performance factors indicate equipment or system performance characteristics, such as kW/ton for a chiller or watts/fixture for lighting.

2 Operating factors indicate equipment or system operating characteristics such as annual cooling ton-hours for chillers or operating hours for lighting.

44 "M&V Guidelines: Measurement & Verification for Federal Energy Projects, v3.0." (2008). US DOE Federal Energy Management Program. http://www1.eere.energy.gov/femp/pdfs/mv_guidelines.pdf.

Appendix C: Supporting Materials for Chapter 3: Getting Started with ESPC

Sample School District Energy Policy

The following is the Energy Conservation Management Policy adopted by the [Entity Name] on [Date]:

WHEREAS, the [Entity Name] recognizes it is the [Entity Name]'s responsibility to conserve non-renewable energy and natural resources, to protect our precious environment by reducing energy pollution damage, and to faithfully steward the use of tax payer dollars by preventing waste of energy resources which diverts dollars away from the [Entity Name]'s educational mission; and

WHEREAS, the [Entity Name] and Superintendent wish to provide leadership in developing an energy conservation ethic among all district stakeholders by raising awareness of the growing demand for energy and increasing energy supply rates, and will support both short and long-range energy management and conservation strategies in existing facilities, and future school construction; and

WHEREAS, the [Entity Name] and the Superintendent believes that each member of our community has an important part to play in the management of energy consumption and encourages all to participate; and

NOW, THEREFORE, IT IS RESOLVED, the [Entity Name] directs the Superintendent or his/her designee to establish an on-going energy management program. The primary objective of this energy management program will be to raise awareness among all employees and students to the cost of energy associated with the use of the [Entity Name]'s facilities and acquire their active participation in efficient use of energy through continuous education and incentives; and

BE IT FURTHER RESOLVED, the efficient use of energy at each site will be the responsibility of the school's administration team and the [Title of Position Responsible].

I hereby certify that the information contained in the above resolution is accurate and was adopted by the [Entity Name] on [Date].

Example:
http://www.mesa.k12.co.us/departments/energy/documents/school%20board%20resolution.pdf

Sample RFP

A sample RFP for selecting an ESCO can be downloaded from the Energy Services Coaliton documents page at: http://www.energyservicescoalition.org/resources/model-documents

This RFP should be customized to meet the needs of your school or district.

Sample Contractor or Team Evaluation Form

Evaluator Name: ___________________
Responding Firm Evaluated_________________

Note: Responding Teams or Firms should be carefully evaluated and their capabilities and qualifications considered not only based on their overall energy performance based contracting capabilities, but more importantly on **how they relate to the specific potential scope and building infrastructure needs** for this project.

Basic Requirements & Evaluation Items:	Circle One	**(X)=Pass**
1. RESPONDING TEAM or FIRM QUALIFICATIONS AND CAPABILITY		
- Local and/or regional office location with experienced staff to support the design, construction, ongoing service, measurement, verification, commissioning, warranty and training requirements for energy savings performance contracts.	PASS FAIL	
- Has experience in providing direct services, i.e., electrical, lighting, mechanical, building controls, water conservation, Building Automation Systems (BAS)/Information Technology (IT), renewables and water conservation projects.	PASS FAIL	
- Demonstrate engineering capabilities or the team members are fully capable to provide the scope of design, construction administration, project management and related services required for this project.	PASS FAIL	
- Financial soundness & stability of firm; Bonding capacity and experienced in related projects and complexity.	PASS FAIL	
- Ability to provide a performance bond, contractor's license; can meet applicable building codes and obtain building permits that will meet or exceed the potential size of this project.	PASS FAIL	
- Attended mandatory meetings, on time response delivery, met response qualifications	PASS FAIL	
NOTES		
2.RESPONDING TEAM or FIRM's EXPERIENCE AND EXPERTISE (Team may include multiple companies/organizations)	Circle One	**(X)=Pass**
- Responding team member(s) has a clear understanding of energy guarantee administration & the development of energy conservation measures.	PASS FAIL	
- The firm's team members or individuals involved in the project have at least 150 years of combined team member experience in developing and delivering energy savings guarantee projects.	PASS FAIL	
- References: The firm's team members can provide examples of successful energy-based performance contracting, retrofit projects by experienced individuals, OR company references similar to the potential project under consideration by the client.	PASS FAIL	
- The firm's team members include a full complement of design staff members with Mechanical Engineering, Lighting/Electrical Engineering, Energy Conservation Measure (ECM) development, Commissioning, and Measurement & Verification capabilities.	PASS FAIL	
-The firm's team has a full service team of Project Management /Construction Management (PM/CM) staff members and construction staff with experience in commissioning, M&V, Equipment Service, Technicians, Parts, Training and ongoing service options.	PASS FAIL	
- The firm's team includes full M/E/P Professional Engineering capabilities and can apply renewable energy systems if potential scope requires renewables and M/E/P services.	PASS FAIL	
- Has experience in assisting and/or arranging financing, utility rebates, grants and other incentives.	PASS FAIL	
NOTES: If any answers are "FAIL", then consider disqualification or requesting more information about the deficiency and/or discontinue further evaluation.		

3.TECHNICAL APPROACH	Weighted 10 points each (Superior = 3 x 10 = 30)	
- Design/Construction (Quality of a sample Technical Audit Showing Design Capabilities)		
- Performance Contracting Delivery & Management Methods(Overall Approach)		
- Engineering analysis(Reasonableness of baseline & savings methodologies)		

NOTES: The Color Coded Criteria assists the reviewer in ranking the team/firm in order to determine points for each category. Please color-code the points given accordingly to assist in ranking points per category.

SCORE	CRITERIA/KEY
Poor	High risk of failure.
Acceptable	Moderate risk of failure.
Good	Low risk of failure.
Superior	No risk of failure.

4.PERFORMANCE CONTRACTING APPROACH	Weighted 10 points each	
- Approach: Overall approach to contracting, i.e. safety, quality, cost control, management approach, environmental responsibility		
- Flexibility: Full range of design and flexibility in application in determining best value, i.e. does the team allow pass through of subcontractors where subs are 100 percent turnkey to the prime?		
- Design Build Construction Management: (Handling of environmental liabilities, warranties, maintenance, service & training)		
- Transparency: Open and transparent guarantee with clear life cycle cost calculations, equipment replacement impacts and operating cost savings approach?		
- Local Resources: Does the firm or team provide equipment, products? Are the team's members familiar with local contracting environment, vendors, providers, etc.		

Notes:

SCORE	CRITERIA/KEY
Poor	High risk of failure.
Acceptable	Moderate risk of failure.
Good	Low risk of failure.
Superior	No risk of failure.

5.SITE SPECIFIC APPROACH & *KEY PERSONNEL (Org Chart Must be included)	Weighted 20 points each	
- Team or firm has an understanding of local conditions, systems & operations. How comfortable are we with the team members?		
- Relevance and benefits of proposed retrofits and comprehensiveness and clarity of technical approach i.e. CM and design-build approach and relevant qualifications of assigned personnel involved in auditing, design, PM & construction, regarding size, scope and building types for this project.		
- Contingency management plan described and clear description of who controls and retains contingencies.		
- *Identify Contract Administration and Project Management personnel for this project. Identify each individual(s) who will have primary responsibility for key tasks and roles.		
- *Technical and construction resource capabilities (i.e. can deliver on time and in budget with a solid scheduling, operation and maintenance approach)		

NOTES:*Must provide resumes for key personnel proposed for work.

SCORE	CRITERIA/KEY
Poor	High risk of failure.
Acceptable	Moderate risk of failure.
Good	Low risk of failure.
Superior	No risk of failure.

6.COST AND PRICING	Weighted 20 points each	
- Price & Cost Structure Clear and Concise (and is it auditable by a third party?)		
- Are markup costs multi-layered? (Are markups reasonable for the services to be provided)		
- Other costs(Audit, Fees, Engineering, PM/CM, Guarantee, M&V, Training)		
- Best Value: i.e. Does response describe life cycle cost approach and not just low first cost?		
- Open book pricing & price accountability (Are clear examples of pricing and cash flows provided)		

SCORE	CRITERIA

Poor (0 points)	Price proposal indicates that the vendor does not understand the scope of work, complexity of project, and has a price structure inappropriate for the project. The proposed price is clearly not consistent with the overall project goals. Mark-ups, fees, and services provided are distinctly low or too high based on the reader's perception. **High potential cost.**
Acceptable (1 point)	Price proposal demonstrates that the vendor understands the scope, complexity, and other critical details, and that the price is reasonable but high for the project. **Moderate potential cost.**
Good (2 points)	Price proposal provides higher returns relative to the successful accomplishment of each detail. The vendor demonstrates that they understand the scope, the complexity and other critical details. **Lower potential cost.**
Superior (3 points)	The team demonstrates that they understand the scope, the complexity, and have provided a structure to appropriately apply markups and fees according to the risks and complexity of the project keeping in mind the life cycle cost implications and other critical details. **Superior potential value to owner.**
RESPONSE/PROPOSAL TOTAL SCORE:	

FINAL RANKING SHEET & SUMMARY OF ALL EVALUATORS

EVALUATION* FOR: Proposal _____ Interview (if needed) _____ (check one)

PASS – FAIL___________

NAME:									
FIRM	**#1 & #2 PASS**	**#3 SCORE**	**#4 SCORE**	**#5 SCORE**	**#6 SCORE**	**Total SCORE**	**SUM**	**AVG**	**RANK**
#1									
#2									
#3									
#4									
#5									

*Note: Scores shown above should be weighted, not raw point totals. For example, if a firm scored Superior (a qualitative evaluation worth a pre-defined quantitative value of 3 points) in a category worth 10 points, then the weighted score for that category would be 3 x 10 = 30 points.

**Note: The value assigned to qualitative categories and the weighted value of individual line items are for purposes of example for this document and may be modified at the discretion of an evaluation committee to meet the needs of a school or school district. Additional line items may also be added to increase the comparative weight of scoring in price versus engineering/technical evaluation, etc. It is ultimately the school or school district's decision to determine how to weight factors that will align with their priorities and needs and to make a value judgment of what would determine best value.

***Note: Point values should be assigned to categories (qualitative descriptions of Superior, Good, Average, Poor) rather than left to the discretion of the evaluator, and then contractors can be evaluated for which category they fit within, in order to later determine the points by multiplication. An arbitrary score should not be given by evaluators (i.e. one scores a "4" while another gives a "6", for example, as this circumvents the evaluation system and leaves the school at risk of contractor protests

Competitive range: _________ to ___________

RFP Response Rank Ordering of Firms

1)___________________________
2)___________________________
3)___________________________

Standard Contract Agreements

Many states have standard contract agreements. The link below, from Colorado and based on an ESC document, includes examples of contract templates that can be modified by your school with the help of an energy consultant to solicit vendors for ESPC.

See link: http://www.colorado.gov/cs/Satellite/GovEnergyOffice/CBON/1251599983018.

Guidance on When to Seek Help in the ESPC Process

As one example of third-party assistance that could be valuable to your school, see the checklist below for when to consider contacting the state energy office throughout the process. This example is from the Colorado Energy Office. Schools should contact their states to determine if similar programs are available.

Governor's Energy Office (GEO) EPC Partner Responsibility Checklist: When to Contact GEO[45]

As a participant in the GEO Energy Performance Contracting Program, ESCOs are responsible for communicating with the GEO at key points throughout the process. Regular communication helps ensure that ESCOs deliver services to their customers in a way that helps ensure a successful project for all. ESCOs help keep the project on track by providing the input of unbiased experts for pivotal meetings and document and contract reviews. Contact the GEO Energy Performance Contracting representative working on your project for additional information on the source of this checklist and other documents that may serve as examples for your school. For more information go to: http://www.colorado.gov/cs/Satellite/GovEnergyOffice/CBON/1251599983018.

These steps coincide with the steps of GEO's Energy Performance Contracting Standards for Success.

Steps	ESCO Responsibility for Contacting GEO	Date Completed	Notes
Step 1: Technical Energy Audit (TEA)	Use *TEA & Project Proposal Contract* to develop contract with selected ESCO. (Separate documents for State/Higher Ed. and Local/K-12)		
	Invite GEO to review TEA & Project Proposal Contract prior to signing.		
	Send copy of signed TEA & Project Proposal Contract to GEO.		
	Invite GEO to audit kickoff meeting.		
	Invite GEO to preliminary audit review meeting.		
	Provide GEO with final draft TEA report for review and discussion.		
	Send electronic copy of final audit to GEO.		
Step 2: Energy Savings Performance Contract	Use *Energy Performance Contract*.		
	Use *Measurement & Verification Guidelines*.		
	Use *Commissioning Guidelines*.		
	Invite GEO to review Energy Performance Contract prior to signing.		
	Send signed electronic Energy Performance Contract to GEO.		
	For any addendums or additional phases, invite GEO to review prior to signing.		
	Send signed contract additions to GEO.		

[45] Colorado Energy Office, http://www.colorado.gov/energy/

Steps	ESCO Responsibility for Contacting GEO	Date Completed	Notes
Step 3: Monitoring & Verification	Invite GEO to review annual (or other interval) savings reports prior to accepting.		
	Send savings reports to GEO, annually (or other interval).		
Ongoing	Contact GEO for guidance at any point in the process.		

Appendix D: Case Studies

Case Study 1: Mesa County Valley School District 51, Colorado

This school district with more than 800 classrooms used performance contracts to install over $10 M in energy improvements. Mesa County Valley SD is saving $800,000+ annually and is finding additional, innovating ways to apply this tool to repair, maintain, and retrofit other buildings and facilities.

Situation:

As the 11th largest school district in the state of Colorado (out of 178 districts) with the state Finance Act allocating 90 percent of its revenues for day-to-day activities, Mesa was faced with the challenge of extreme budget cuts and was among the 11 districts at the lowest funding levels in the state. The district also faced with facilities in need of equipment retrofits, repair, and mounting maintenance in aging facilities.

Solution:

The school district worked with an ESCO to implement energy efficiency, renewable energy, and behavioral changes while leveraging utility incentives, rebates, and Recovery Act funds. The partnership successfully implemented a $10.7M performance contract with more than $800K in annual guaranteed savings and continues to implement additional phases of performance contracts to continue building upon early successes.

Third-party Help Utilized:

Mesa utilized a third-party energy consultant as an advisor to help them throughout the process.

Results:

Mesa County Valley School District 51 along with its ESCO and energy consultant partners achieved more than $10.7M in upgrades funded completely out of savings. They replaced 2,124 lighting fixtures, retrofitted 27,926 fixtures, and installed lighting controls in 1,798 areas. The lighting controls included 2,073 occupancy controls and timers in a total of 820 classrooms, 581 private and open office areas, 35 gymnasiums, 20 hallways, 25 libraries, 237 restrooms, and 30 cafeterias. They installed digital timers on 71 vending machines in 50 areas to turn off vending machines during unoccupied hours and put in place wind power for one school and photovoltaic panels for six schools. They installed skylights and implemented real-time metering solutions. They also changed team cleaning schedules and allowed for total summer building shut down.

Educational Integration:

Utility billing management was also critical to the success of Mesa's energy conservation program. Accurate, reliable billing information helps track effectiveness in reducing energy costs and use for each individual school and in aggregate for the entire school district. Staff and students have access to the district's utility billing data for educational purposes found here: http://www.mesa.k12.co.us/departments/energy/utilitybilling.cfm.

Lighting Retrofit: Before and After

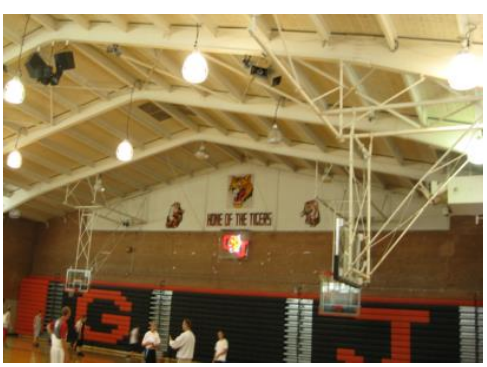



Photo Credit: Brian Stotts, http://www.MediaExcitement.com

Case Study 2: Virginia Beach City Public Schools[46]

This large school division faced significant budget and enrollment challenges. Virginia Beach City Public Schools completed an ESPC within 18 months to install comprehensive building retrofits that even included water conservation measures and ground source heat pumps, for a better classroom climate and more reliable building systems.

Situation:

With 15,750 employees and 69,365 students, Virginia Beach City Public Schools (VBCPS) is the largest school division in the southeastern Virginia region. VBCPS currently manages 56 elementary schools, 14 middle schools, 11 high schools, and 9 specialty buildings. Like other school districts across the country, Virginia Beach City Public Schools is facing budget reductions and declining enrollment. From 2005 to 2012, division enrollment declined by 5,152 students (roughly 7 percent of the student population). The division's budget has also decreased from a peak of $721 million in 2008 to $649 million in 2011.

> *"Not only are we saving money, but our schools look better as a result of this work. It's a win-win situation for our budget and more importantly, our 'clients' who work and study in these buildings."*
>
> *— Jim Morris, Assistant Director of Environmental and Energy Management*

Solution:

To help manage these challenges, VBCPS turned to energy performance contracting and an ambitious energy conservation program. The resulting district-wide energy performance contract concluded in less than 18 months, with much of the work scheduled for nights and weekends.

Results:

The energy savings performance contract resulted in the installation of new energy-efficient building equipment, including:

- LED lighting
- Portable heat pump controls
- Water conservation measures
- Computerized power control systems
- Ground source heat pumps
- Rooftop air-conditioning unit replacements

The schools also realized non-energy benefits, including:

- Improved light levels in classrooms
- Increased thermal comfort throughout schools
- More reliable building systems

Energy Saved (MMBtu / year)	Total Energy Cost Savings ($)	Total Operation and Maintenance Cost Savings ($)	Total Savings ($)	Total Project Cost ($)	Simple Payback Including Financing Cost (years)
20,005	$6,626,322 (over 10 years)	$697,670 (over 10 years)	$7,323,992 (over 10 years)	$5,849,657	10

[46] "Advanced Energy Retrofit Guide for K-12 Schools." (Undated). National Renewable Energy Laboratory. US Department of Energy. https://buildingdata.energy.gov/cbrd/resource/17

Case Study 3: Uinta School District, Wyoming[47]

This small rural school district needed upgrades in multiple buildings in the face of a severely constrained budget. Uinta School District #1 took advantage of energy savings performance contracting to install the needed measures, including major building systems and water conservation, which resulted in $190,000 annual savings.

Situation:

Uinta School District #1, a small rural school district in Evanston, Wyoming, was without funds and needed upgrades in seven different buildings, including Evanston High School, Davis Middle School, Aspen Elementary School, Clark Elementary School, North Elementary School, Uinta Meadows Elementary School, its transportation building, and its administration complex. These buildings totaled roughly 740,000 square feet. Their outdated systems were costly to repair, as they continued to fail more frequently. The obsolete systems were also very inefficient and consumed far more energy and money than necessary.

Solution:

Uinta Schools decided to implement an energy savings performance contract leveraged by $574,000 of American Recovery and Reinvestment Act (ARRA) funds.

The school district worked with an ESCO to install the following measures in its facilities:

- Lighting Retrofits
- Controls Upgrades/Retrofit
- Boiler Upgrades
- New Variable Frequency Drives
- Water Conservation Measures

Construction for this 9-year, $2.2M energy savings performance contract was completed in 2011.

Results:

Uinta saves $190,000 per year in energy costs and is now able to focus on performing preventative maintenance rather than addressing emergencies. The improvements have saved money and resources and allowed the school district to standardize equipment, controls, and O&M training procedures for ongoing savings in the future.

Below is a summary of the results in terms of electricity, gas, water, and operational savings:

Electricity Saved (kWh / year)	Electricity Demand Reduced (kW / year)	Natural Gas Saved (Therms/ year)	Water Saved (kGal/ year)	Total Energy Cost Savings ($/year)
1,006,657	4,228	10,061	1,748	$190,000

[47] "Uinta County School District #1." (Undated). Trane. http://www.trane.com/content/dam/Trane/Commercial/global/case-studies/k-12/Uinta-County-School-District--1/Uinta.pdf