

Incorporating Non-energy Benefits into Energy Savings Performance Contracts

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ABSTRACT

This paper evaluates the issue of non-energy benefits within the context of the U.S. energy services company (ESCO) industry—a growing industry comprised of companies that provide energy savings and other benefits to customers through the use of performance-based contracting. Recent analysis has found that ESCO projects in the public/institutional sector, especially at K-12 schools, are using performance-based contracting, at the behest of the customers, to partially -- but not fully -- offset substantial accumulated deferred maintenance needs (*e.g.*, asbestos removal, wiring) and measures that have very long paybacks (roof replacement). This trend is affecting the traditional economic measures policymakers use to evaluate success on a benefit to cost basis. Moreover, the value of non-energy benefits which can offset some or all of the cost of the non-energy measures -- including operations and maintenance (O&M) savings, avoided capital costs, and tradable pollution emissions allowances -- are not always incorporated into a formal cost-effectiveness analysis of ESCO projects. Non-energy benefits are clearly important to customers, but state and federal laws that govern the acceptance of these types of benefits for ESCO projects vary widely (*i.e.*, 0-100% of allowable savings can come from one or more non-energy categories). Clear and consistent guidance on what types of savings are recognized in Energy Savings Agreements under performance contracts is necessary, particularly where customers are searching for deep energy efficiency gains in the building sector.

Introduction

Energy efficiency building retrofits may generate significant non-energy benefits including: operations and maintenance (O&M) savings, capital cost avoidance, and avoided compliance costs associated with meeting environmental regulatory requirements. These types of project-level benefits should be important criteria when evaluating the cost-effectiveness of large-scale energy efficiency projects. Unfortunately, there are no consistent standards in place to measure, verify, monetize, and report these benefits in most public/institutional sector contracts.

This paper evaluates the issue of non-energy benefits within the context of the U.S. energy services company (ESCO) industry—a growing industry comprised of companies that provide energy savings and other benefits to customers through the use of performance-based contracting. ESCOs deliver energy-efficient technologies, onsite power generation, and other services primarily to public and institutional sector customers (e.g., K-12 schools, universities, hospitals, local/state/federal facilities, public housing). In a typical performance contract, the ESCO guarantees some level of annual savings for their customers and ESCO compensation is therefore linked in some fashion to the performance of the project (Satchwell *et al.* 2010). Early research into this industry reported that the amount of energy-related savings guaranteed by the ESCO far exceeded the upfront installation costs of the equipment (Hopper *et al.* 2005). Recent analysis has found that ESCO projects in the public/institutional sector, especially at K-12 schools, are using performance-based contracting, at the behest of the customers, to partially—but not fully—offset substantial accumulated deferred maintenance needs (e.g., asbestos removal, wiring, roof replacement) (Larsen *et al.* 2012). *Many of these non-energy measures generate little or no energy-related savings, yet these projects are highly valued by customers.* This trend is affecting the traditional economic measures policymakers use to evaluate success (e.g., benefit-cost ratios) and may lead to incorrect perceptions about the ability of this industry to generate long-term value to their customers—and society.

State and federal enabling policies that encourage the incorporation of non-energy benefits into performance contracts may simultaneously improve U.S. energy efficiency and ameliorate deteriorating infrastructure conditions at public facilities. The purpose of this paper is to: 1) provide background on the U.S. ESCO industry and typical project performance; 2) define non-energy benefits; 3) summarize the variety of ways that non-energy benefits are currently incorporated in government policies; and 4) introduce policies that advocate for transparent data collection and standardization of methods to estimate non-energy benefits.

U.S. Energy Services Company (ESCO) Industry

What is an ESCO?

Hopper *et al.* (2007) and Satchwell *et al.* (2010) define an Energy Service Company (ESCO) as:

A company that provides energy-efficiency-related and other value-added services and for which performance contracting is a core part of its energy-efficiency services business. In a performance contract, the ESCO guarantees energy and/or dollar savings for the project and ESCO compensation is therefore linked in some fashion to the performance of the project.

This definition is consistent with the European Commission Directive (2006/32/EC) on Energy Efficiency and Energy Services definition of an ESCO, in particular the definition that performance-based financial risk is held by the ESCO (Soroye and Nilsson 2010; Marino *et al.* 2010).

ESCO Customers Prefer Performance-based Energy Efficiency Contracts

Satchwell *et al.* (2010) recently conducted a survey of nearly all ESCOs that are actively operating in the United States. ESCO survey respondents reported the breakdown of their 2008 revenues into several types of contracting vehicles. Performance-based contracting types continue to be the dominant contracting platform accounting for nearly three-quarters of all revenues in 2008 (see Figure 1).

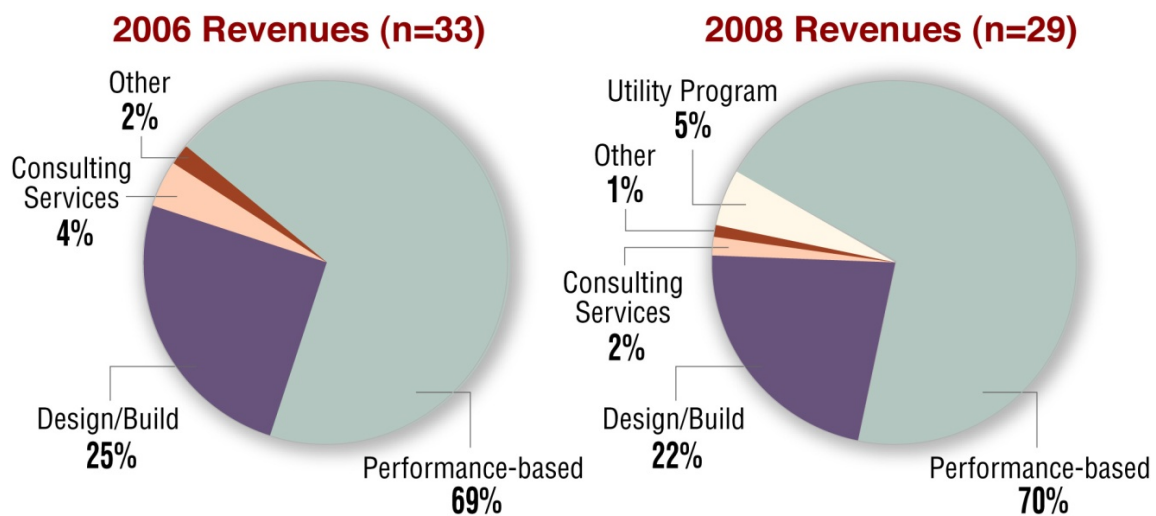


Figure 1. 2006 and 2008 ESCO industry revenues by contract type (Satchwell *et al.* 2010)

Figure 2 depicts the most common type of energy savings performance contract (ESPC)—the *guaranteed savings* contract. In a guaranteed savings contract, customers finance the project and assume the debt obligation on their balance sheet. The ESCO assumes the project performance risk by a guarantee that savings will be sufficient enough to cover the customer's annual debt obligation. Finally, the lending institution assumes the customer credit risk.

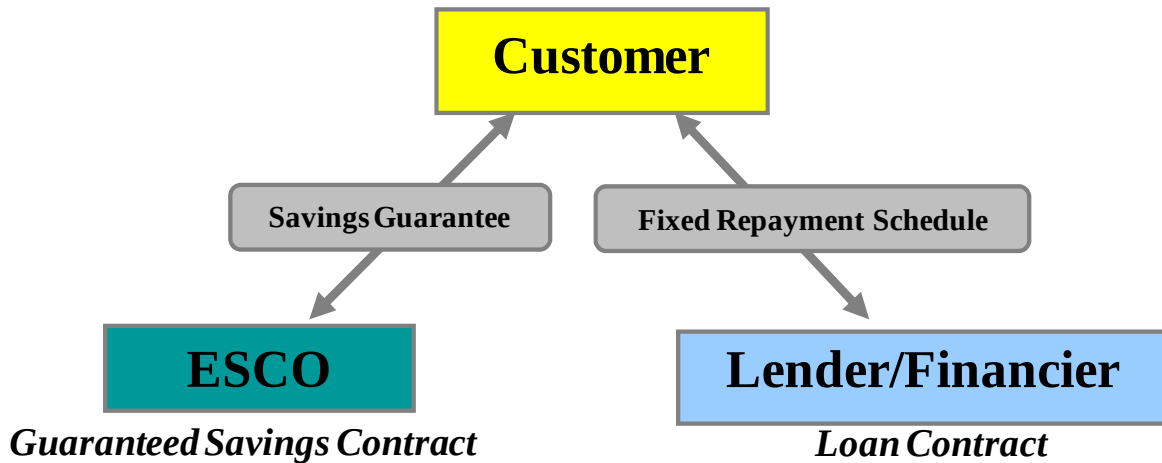


Figure 2. Guaranteed savings contracting model (adapted from Hopper *et al.* 2005)

Hopper *et al.* (2007) noted that the continued emphasis on performance contracting (*i.e.*, guaranteed savings contracts) as a core offering by ESCOs is driven by legislative or procurement requirements placed upon institutional sector customers to pursue aggressive energy demand reduction—without the concomitant increase in capital budgets—that push the customers into long-term performance contracts and/or the increased use of power purchase agreements. For example, the U.S. Congress permanently authorized ESPC in the federal market, which suggests that performance contracting is likely to remain an important component of the federal strategies to address federal building energy efficiency (EISA 2007).

Estimated Size of U.S. ESCO industry

Satchwell *et al.* (201) asked survey respondents to report their revenues from energy services in 2008, average annual growth rates since 2007, and projected growth in revenues. Aggregate revenues for the ESCO industry are estimated at about \$4.1 billion in 2008 and were expected to exceed \$7 billion in 2011.

Past Performance of ESCO Projects

In addition to conducting biennial surveys of the ESCO industry (*e.g.*, Satchwell *et al.* 2010), Lawrence Berkeley National Laboratory (LBNL) has collected information about performance-based ESCO projects from various sources (*i.e.*, ESCOs, state and federal energy offices) for more than fifteen years (*e.g.*, see Goldman *et al.* 2000).

LBNL Database of ESCO Projects

The LBNL database of ESCO project currently contains about 3,300 projects (representing over \$8B in project investment) including information on installed EE and electricity generation measures, project installation costs and savings, project incentives, baseline energy and location (see Table 1)². LBNL estimates that the ESCO project database contains about 20% of all U.S. ESCO market activity from 1990-2008.

Table 1. Key project data fields and ESCO response rate

² Note that ESCOs do not always collect or provide all relevant project information on customer projects.

Category	Details	Percent of ESCO projects that provided information for data field (n=3265)
Project Location	City, state, zipcode, country	> 99%
Customer Contact	Name, phone, email	> 99%
Project Characteristics	Date of completion, floor area, number of buildings, market segment, facility type	72-99%
Project Economics	Project cost (including or excluding financing charges), project agreement type, contract term, Utility incentive program participation and amount (if applicable)	20-98%
Baseline Annual Energy	Baseline metric	65%
Consumption	Baseline consumption by fuel/energy source	59%
Annual Energy Savings	Predicted, guaranteed, actual savings	62-79%
Other Benefits	Operations and maintenance and other non-energy savings over the project lifetime	37%
Measures Installed	Selected from a categorized list	93%

Project-level Trends

A major focus of recent research by LBNL involves analyzing ESCO project trends over time. LBNL's analysis of project data strongly suggests that ESCO customers are demanding fewer lighting-only retrofits and are increasingly focused on installing more comprehensive and capital-intensive measures (see Figure 3). Note that the share of non-energy retrofits³ installed at publicly-funded projects has increased from 3% in 1990-1997 to 24% in 2005-2008.

³ Non-energy retrofits include roof or ceiling replacement, asbestos abatement (i.e., measures that are not installed primarily for their energy savings), and may include other efficiency measures (e.g., lighting or HVAC upgrades).

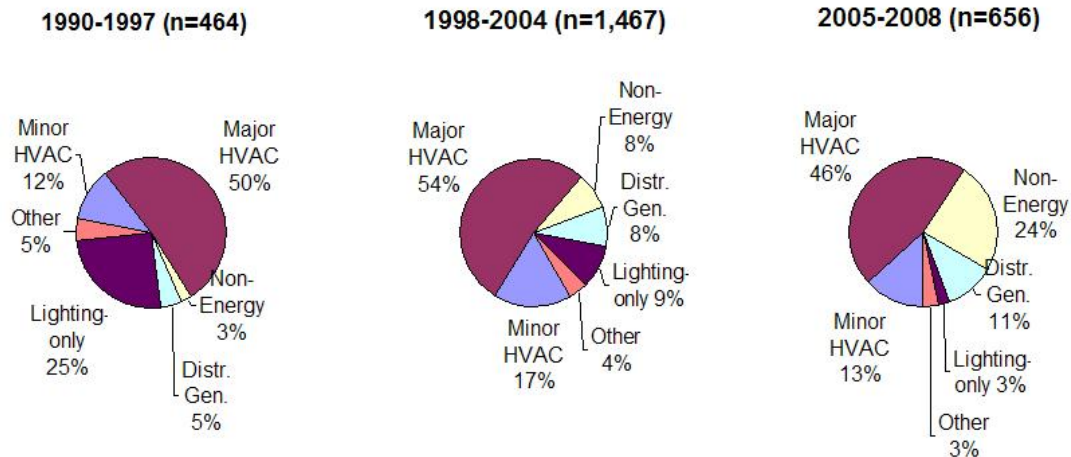


Figure 3. Types of retrofit strategies utilized by ESCOs in public sector projects: 1990-2008⁴ (Satchwell *et al.* 2011)

K-12 Schools Install Non-energy Measures

K-12 schools projects installed the greatest share of “non-energy improvements” (*e.g.*, asbestos, wiring, building envelope) and miscellaneous equipment systems” (*e.g.*, exit signs, alarm systems). LBNL recently found that ~40% of all K-12 schools projects installed non-energy related retrofits between 2005 and 2008. Over the same period, less than 15% of projects from other public and private market segments reported undertaking non-energy retrofits (Larsen *et al.* 2012). Non-energy retrofits at K-12 schools typically cost more to install per square foot relative to other retrofit strategies and at other types of public and private projects (see Figure 4).

⁴ In order to facilitate comparative analysis across projects, LBNL grouped the ~150 energy conservation and electricity generation measures reported by ESCOs into generalized primary retrofit strategies. LBNL developed a method to categorize each project by its primary retrofit strategy, which included the following categories: major HVAC, minor HVAC, onsite generation, lighting-only, non-energy, and all other strategies (*e.g.*, see Hopper *et al.* 2005; Larsen *et al.* 2012). Lighting-only projects only include various lighting efficiency measures, controls and strategies. A major HVAC retrofit strategy includes major HVAC equipment replacements (*e.g.*, boilers, chillers, cooling towers, HVAC dist. improvements) and may include other HVAC control, high-efficiency lighting, and motors measures. A minor HVAC strategy includes less-capital intensive HVAC measures and controls (and exclude major HVAC equipment replacements) and may include lighting and other measures. An onsite generation retrofit strategy includes installation of onsite generation equipment and may include other energy efficiency measures (*e.g.*, lighting, HVAC equipment and controls, motor efficiency measures).

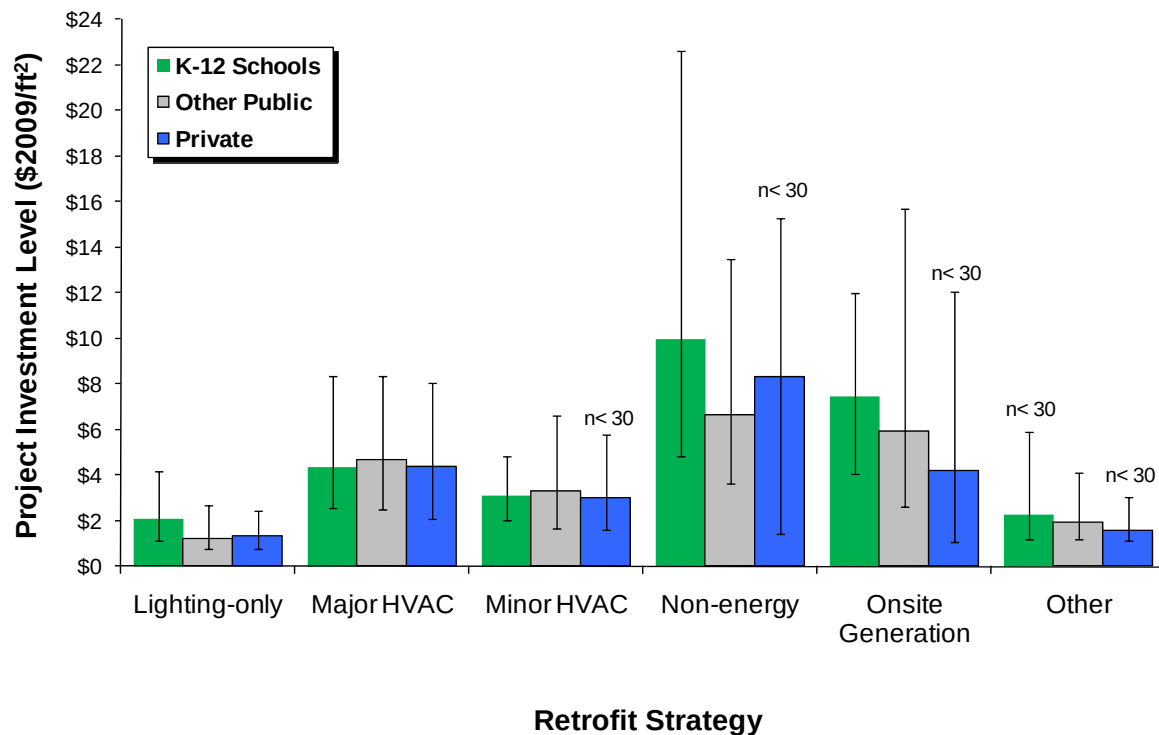


Figure 4. Normalized project investment⁵ levels for K-12 schools, other public, and private projects (Larsen *et al.* 2012)

At the same time, median annual dollar savings are lower in the typical K-12 schools project compared to other public sector and private sector projects (see Figure 5). One reason is that schools are typically open fewer hours in the year compared to other types of facilities and, in some cases, K-12 schools do not operate at full capacity during the summer months when electricity prices are typically higher. As shown in Figure 5, ESCOs report that non-energy benefits typically account for a much larger share of project benefits (28%) in K-12 schools, compared to projects in private sector and other public/institutional sector markets (23% and 13% respectively).

⁵ Project investment level is equivalent to the “turnkey” installation cost of the project (without financing charges).

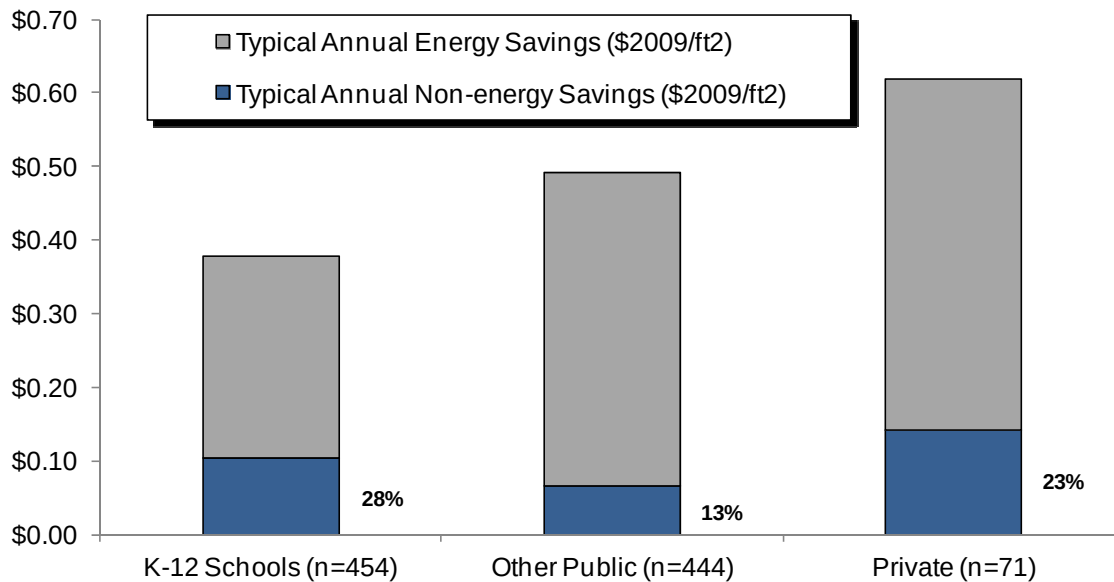


Figure 5. Median annual energy and non-energy-related annual dollar savings per square foot by project type (Larsen *et al.* 2012)

It appears that changes in the mix of capital-intensive retrofit strategies implemented over time (*e.g.*, more onsite power generation projects, greater use of complex and more expensive technologies like renewable measures with the associated longer paybacks, more projects that include non-energy measures that cannot be fully paid for through energy savings) may be adversely impacting the long-run economic performance of ESCO projects. As customers begin to burden the performance contract with the inclusion of non-energy deferred maintenance requirements, the economics of the underlying project necessarily change. This economic imbalance may be justified by customer needs but the impact of the broadening spectrum of customer requests on the economic viability of the project needs to be fully understood by all parties entering into the contractual arrangement. Table 2 shows median benefit-cost ratios for K-12 schools, all other public sector, and private sector projects disaggregated by installation time period. Not surprisingly, benefit-cost ratios were typically lowest—and in one period less than 1.0—for ESCO projects implemented in K-12 schools⁶.

⁶ This analysis excludes projects that provide onsite generation (or renewable energy systems), but do not also implement energy efficiency measures. Results assume a 3% and 8% real discount rate for public and private projects, respectively. Direct benefits – energy cost and non-energy operational savings (when reported) – are included in this analysis, but not indirect benefits, such as improved building comfort, employee productivity, avoided capital costs, and environmental benefits. Furthermore, this analysis does not attempt to quantify societal benefits (*e.g.*, reduced pollution, avoided greenhouse gases, avoided generation or transmission infrastructure costs or economic development benefits). Complete details of the economic analysis assumptions are discussed in Larsen *et al.* (2012). Net benefits for each project were estimated by subtracting the project cost without financing from the discounted gross benefits. Gross project benefits were estimated by discounting future monthly dollar savings for each year through the average measure lifetime for every project and then summing these discounted values to produce the present value of future benefits.

Table 2. Median benefit-cost ratios for ESCO projects by market segment

Market segment	Installation Period	Benefit-cost Ratio
K-12 Schools	1990-1997	1.5 (n=121)
	1998-2004	1.1 (n=536)
	2005-2008	0.9 (n=263)
Other Public	1990-1997	3.0 (n=220)
	1998-2004	1.6 (n=708)
	2005-2008	1.2 (n=339)
Private	1990-1997	4.3 (n=138)
	1998-2004	2.2 (n=185)
	2005-2008	2.7 (n=31)

Despite the fact that some ESCO projects have benefit-cost ratios that are less than one, these types of projects appear to be highly valued by customers because the projects address the customer's deferred maintenance needs and improve the customer facility with only a minimal direct capital outlay by the customer. Hopper et al. (2005) noted that non-energy measures often "piggyback" on energy savings measures, which are vital to the project. Thus, it should not be concluded that these types of projects do not save energy, but they may have relatively lower benefit-cost ratios because the savings are used to partially offset non-energy-related infrastructure upkeep.

In addition to the measures that may not necessarily reduce energy consumption like abating the existence of asbestos or replacing a roof, there are other types of non energy benefits that may be associated with an efficiency retrofit. These include operations and maintenance savings and avoided capital costs. At the current time, these "non-energy benefits" are not consistently reported to Lawrence Berkeley National Laboratory; however, these benefits could be standardized and incorporated into future economic analysis to more accurately reflect the true value of these projects to their customers. As currently measured and reported, the calculation of the cost to benefit ratio of the energy efficiency retrofit is probably undervalued as these non-energy benefits are not typically and certainly not consistently quantified.

What are Non-energy Benefits?

Birr and Singer (2008) cite a number of non-energy benefits for ESCO projects, *but not all of these benefits can be easily monetized and included into a typical contract (e.g., societal value of reduced GHG pollution, worker "happiness")*. For example, Birr and Singer (2008) introduce the following non-energy benefits at energy-related retrofit projects:

- Operations and maintenance savings;
- Improving worker/student productivity;
- Decreased illness from indoor air quality problems; and
- Reduced environmental pollution (GHGs, other air and water pollutants).

Similarly, Gillingham *et al.* (2006) report on the literature detailing environmental externalities and found that reducing electricity use provided societal benefits that were approximately 10% of the dollar value of the electricity savings.

Sorrell (2005) notes that an ESCO customer has a range of motivations for entering into an energy service contract, but the majority of these reasons cannot be incorporated into a cost-benefit (*i.e.*, contractual) framework. For the purposes of this paper, non-energy benefits are defined as benefits that could be *immediately* incorporated into a typical contractual framework.

Non-energy benefits are operations and maintenance (O&M) savings, avoided capital costs, and reductions in tradable pollution emissions that can be monetized, but are not consistently incorporated into a formal cost-effectiveness analysis of projects⁷.

Operations and maintenance savings typically include decreased maintenance costs and staffing reductions that are related to the installation of new energy conservation measures. Avoided capital costs are future capital expenditures that are unnecessary after a building system has been upgraded. In some states, organizations can be compensated for reducing air pollution through a market-based auction.

The LBNL project database indicates that ESCOs report O&M savings for many projects (see Table 3). However, a relatively small number of projects are reporting other types of non-energy benefits (*e.g.*, avoided capital costs). LBNL researchers suspect that other types of non-energy benefits, especially “avoided capital costs”, are being significantly under-reported or under-valued⁸ in ESCO projects.

Table 3. Percent of projects in LBNL database that report non-energy benefits

Market Segment	N	Percent of Projects Reporting....	
		O&M Savings	Any Non-energy Benefits
K-12 schools	1,081	43%	49%
All other public/institutional sector projects	1,670	28%	34%
Private projects	514	18%	20%

It is not surprising that K-12 schools represent the largest share of projects reporting non-energy benefits. Crampton and Thompson (2008), ASCE (2009), and Bello and Loftness (2010) report that U.S. public schools are the oldest buildings that typically have the largest backlogs of deferred maintenance compared to all other public facilities. Crampton and Thompson (2008)

⁷ Customers, policymakers, and other stakeholders may consider other non-energy benefits (*e.g.*, worker/student productivity gains and societal benefits from reduced pollution) when deciding on projects, but there is little or no precedent for monetizing and including these types non-energy benefits in a typical contract. Researchers and policy analysts have written about the justification for measuring productivity and societal benefits but currently there is no consensus about quantification methodologies.

⁸ ESCOs typically estimate energy savings from projects using an accepted method from the International Performance, Measurement, and Verification Protocol (IPMVP), but there are currently no international standards in place for collecting, estimating, and/or monetizing non-energy benefits (*e.g.*, avoided O&M and capital costs).

estimate that K-12 schools in the U.S. have a total backlog of infrastructure upkeep that exceeds \$250 billion⁹.

One of the challenges with conducting formal cost-benefit analysis is the difficulty inherent in monetizing the impacts of a project—especially the benefits (Boardman *et al.* 2006). GAO (2005) briefly mentions ESCO project benefits that cannot be easily quantified, “such as improved reliability of the newer equipment over the aging equipment it replaced, environmental improvements, and additional energy and financial savings once the contracts have been paid for.” Despite this acknowledgment, the federal government and states have provided inconsistent guidance to agencies (and ESCOs) on how to monetize non-energy benefits (e.g., avoided costs) through energy savings performance contracting (ESPC) legislation.

Life-cycle Cost Assessment

At least one federal agency has provided some direction on the use of Lifecycle Cost Assessment (LCCA) for federal projects (USDOE 2005). USDOE (2005) specifically mentions that LCCA can be used to compare the costs of existing equipment against the costs over the same time period of an energy conservation measure (ECM) proposed by an energy service company. USDOE (2005) defines life-cycle costs as “...the sum of present values of investment costs, capital costs, installation costs, energy costs, operating costs, maintenance costs, and disposal costs over the life-time of the project, product, or measure.” (p. 4) The Rocky Mountain Institute (RMI) and General Services Administration (GSA) advocate the use of facility lifecycle cost assessments, because this method more accurately captures significant project costs and benefits (rebates, avoided maintenance, avoided immediate and future capital investments, etc.) leading to more comprehensive retrofits (RMI-GSA 2011). Several states, including Virginia (discussed below), requires that a lifecycle cost assessment be performed for government building retrofits.

Non-energy Benefits and Performance Contracting Legislation

Non-energy benefits can be significant and represent real value to customers, but state and federal laws that govern the acceptance of these types of benefits for ESPC projects vary widely (i.e., 0-100% of allowable savings can come from one or more non-energy categories).

Federal ESPC Legislation

ESPCs permit federal agencies to acquire energy conservation measures to meet federal energy efficiency goals and implement projects without having to request the full amount of appropriations from the federal budget (GAO 2004). The legislation authorizing agencies to enter into these contracts authorizes a contract length up to 25 years. GAO (2004) notes that the legislation provides that “a Federal agency may enter into a multiyear contract . . . and [the contractor] may be paid only from funds appropriated or otherwise made available to the agency for fiscal year 1986 or any fiscal year thereafter for the payment of energy expenses (and related operation and maintenance expenses)”¹⁰ The Government Accounting Office (GAO) indicated that agencies structure ESPCs so that financial savings cover costs and they have reported that many do (GAO 2005). RMI-GSA (2011) suggest redefining and clarifying eligible savings, particularly as it relates to O&M and avoided capital costs at ESCO projects. They note that “clear and consistent guidance from GSA on what the ESPC can include [as savings] is

⁹ Underfunding K-12 school facility upkeep is not a new issue or unique to the United States (OECD 1992).

¹⁰ 42 U.S.C. § 8287a

necessary for deep energy efficiency gains in federal facilities.”

State ESPC Legislation

Many states have enacted energy savings performance contracting legislation. Most states have a requirement that project benefits must be greater than or equal to costs. In some states (*e.g.*, Hawaii, Pennsylvania, New Jersey), projects that guarantee savings performance are given preference over other types of contracts (*i.e.*, design-build). Table 4 shows a representative sample of state-by-state legislation and information about the types of non-energy benefits recently allowed in government procurement processes.

Hawaii’s (2006) statutes give preference to performance-based contracts. Hawaii allows the inclusion of O&M savings and avoided capital costs in ESPCs, but does not allow other types of non-energy benefits.

New Mexico (2011) has specific rules on the type and amount of non-energy benefits that are allowed in contracts that address energy efficiency upgrades. New Mexico requires that the entire project cost must be guaranteed and no “future avoided capital costs, planned upgrades, engineering fee reductions, or learning environment benefits” are allowed in the contract.

Pennsylvania (1998) and New Jersey (2007) allow avoided capital costs on energy-related upgrades and they cap the percentage (15%) spent on improvements not causally related to energy savings. The rationale for this limitation is that the customer agency is able to add some non-energy measures (*e.g.*, asbestos remediation in a boiler replacement project) for convenience, but any large non-energy project has to be procured through normal public bidding procedures. Costs must be documented using “industry standards”, but it is not immediately clear what industry standards govern this process. Other building improvements are allowed if they are required to implement the energy upgrade. It is likely that the limits placed on an expanded pool of non energy benefits are a reflection of uncertainty by legislators about how these non energy benefits are calculated and how real and persistent the non-energy generated savings may be over the life of the project.

Florida (2011) statutes allow ESCO projects to utilize avoided capital costs as savings. A 2011 report for the Energy and Utilities Subcommittee of the Florida House of Representatives recommended a number of changes to the state ESCO program including reducing the maximum contract length from 20 to 10 years (Florida 2011). The Florida report provides specific guidance on how to accurately monetize the avoided costs of energy efficiency upgrades—using a lifecycle cost approach.

Virginia (2001) legislation allows for O&M savings and avoided capital costs. Virginia requires that contracts do not exceed 12 years. Unlike other states, Virginia requires that the lifecycle method should be used to estimate energy, O&M, and avoided capital costs.

Compared to the other states in this analysis, Virginia appears to have the most clear and consistent methods for quantifying and incorporating non-energy benefits into energy efficiency project decision-making. It is important to note that the 2011 audit conducted by the State of Florida recommended many of the policy designs already implemented in Virginia (*e.g.*, shorter

contract length, lifecycle cost approach to estimating savings). It is not clear that shortening the contract length of the energy savings performance contract does much to establish or enhance the credibility of non-energy benefits that legislators are presumably seeking through the imposition of a shorter contract term. It is clear, however, that the shorter contract term makes it more difficult to meet the goal to maximize energy savings and employ the full range of energy savings and renewable energy technologies with longer paybacks.

Table 4. Selected state policies related to non-energy benefits in projects that incorporate energy conservation measures

State	Maximum Contract Length (years)	Operational and/or Maintenance Savings?	Avoided Capital Costs?	Other Non-energy Benefits?	Savings Measurement and Verification (M&V) Method	Notes
Virginia (2001)	12	Yes	Yes	No	Lifecycle cost approach to estimating energy, O&M, and avoided capital cost savings. Formal M&V required on energy portion of savings.	Annual reconciliation of guaranteed portion of savings; Project savings must be greater than or equal to costs; O&M savings and avoided capital costs are referred to as “maintenance savings”.
New Mexico (2011)	25 (or max. useful lifespan)	Yes (50% cap)	No	No	Not specified in legislation	Entire project cost must be guaranteed; Total project savings must be greater than or equal to costs; No future avoided capital costs, planned upgrades, engineering fee reduction, or learning environment benefits.
Hawaii (2006)	20	Yes	Yes	No	Discussion of verifying annual savings, but verification includes savings “stipulated” by customer.	Statute gives preference to performance-based contracts; Total project savings must be greater than or equal to costs.
Pennsylvania (1998); New Jersey (2007)	15	Yes	Yes	Yes	Subject to project M&V Plan. Methodology not specified in PA GESA Program Manual	Cap on improvements not causally related to energy savings (costs must be documented using “industry standards”); Law gives preference to performance-based contracts; Other improvements are allowed if they are required to implement energy upgrade.
Florida (2011)	20	Yes	Yes	No	Unknown, but Department of Management Services is required to verify cost savings.	Florida statutes allow ESCO projects to utilize avoided capital costs as savings; 2011 report for Energy and Utilities Subcommittee of Florida House of Representatives recommended a number of improvements to state ESCO program including reducing maximum contract length from 20 to 10 years.

Policy Recommendations

Support International Protocols to Quantify and Report Value of Non-energy Benefits

Most ESCOs currently follow international protocols that standardize how energy and water-related savings are computed (EVO 2010), but there are no international standards in place to collect and then monetize information about avoided O&M and capital costs specifically related to ESCO projects despite an obvious need (Birr and Singer 2008). Existing methods to quantify the value of ESCO projects to their customers were built on the assumption that nearly all of the installation costs are covered by the energy-related savings.

Given the trend to using energy retrofit projects as a basis for infrastructure upgrades that may not have a significant energy savings component and the resultant decline in project-level economics, it is clear that new methods—including a deeper analysis of the lifecycle costs of infrastructure replacement—are needed to more accurately quantify the value of ESCO projects, especially in the K-12 schools market. Successful incorporation of non-energy benefits into performance metrics will 1) increase benefit-cost ratios, 2) result in more ESCO projects moving forward, and 3) generate deeper energy savings and other non-energy benefits for schools and other agencies. Therefore, the International Performance Measurement and Verification Protocol (IPMVP) team, government agencies at all levels, and private energy service companies and contractors, should promote EM&V documentation and practices that include standards for the collection, verification, and monetization of certain types of non-energy benefits.

Research Successful Policies and Programs that Incorporate Non-energy Benefits

This paper identified a sample of state-by-state legislation and information about the types of non-energy benefits recently allowed in government procurement processes. It is important to find models for governments, ESCOs, and their customers to successfully incorporate avoided O&M, capital costs and other non-energy benefits into performance contracting programs. Researchers should evaluate whether certain policies or program designs can: 1) alleviate concerns that these types of benefits are, in fact, quantifiable; and 2) incorporate the value of these non-energy benefits in a formal cost-benefit framework.

Conclusion

Non-energy benefits -- including operations and maintenance (O&M) savings, avoided capital costs, and reductions in tradable pollution emissions -- are not always incorporated into a formal cost-effectiveness analysis of ESCO projects. Non-energy benefits are clearly real to, and valued by, customers, but state and federal laws that govern the acceptance of these types of benefits for ESCO projects vary widely (*i.e.*, 0-100% of allowable savings can come from one or more non-energy categories). Clear and consistent guidance on the type and amount of savings that are allowed in contracts is necessary for deep energy efficiency gains in the building sector.

The GSA and several states have introduced some innovative ways (“lifecycle cost assessment”) to more accurately monetize specific types of non-energy benefits. An important new area of research involves supporting benchmarking and standardization efforts to quantify non-energy (and other indirect benefits) for energy efficiency projects. EM&V protocols—including the measurement of indirect and non-energy-related benefits—need to be further developed to truly capture the intrinsic value of these projects to customers.

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