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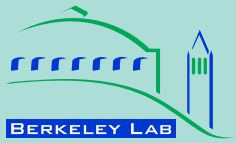

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U.S. Energy Service Company (ESCO) Industry: Recent Market Trends

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Prepared for the
Office of Energy Efficiency and Renewable Energy
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Acronyms and Abbreviations

ARRA	American Reinvestment and Recovery Act
Btu	British thermal unit
MMBtu	Million British thermal unit
C&I	commercial and industrial (private sector)
CBECS	Commercial Building Energy Consumption Survey
DOE	U.S. Department of Energy
ECM	energy conservation measure
EERE	(DOE Office of) Energy Efficiency and Renewable Energy
EIA	Energy Information Administration
ESC	Energy Services Coalition
ESCO	energy services company
ESPC	energy savings performance contract
FEMP	U.S. Department of Energy Federal Energy Management Program
HUD	U.S. Department of Housing and Urban Development
HVAC	heating, ventilation and air conditioning
IDIQ	DOE's Indefinite Infinite Quantity (IDIQ) Super ESPC contract
LBNL	Lawrence Berkeley National Laboratory
MUSH	Municipal and state governments, universities and colleges, K–12 schools, and healthcare markets
NAESCO	National Association of Energy Service Companies
NEBs	Non-energy benefits
O&M	operations and maintenance
OE	(DOE Office of) Electricity Delivery and Energy Reliability
OWIP	(DOE Office of) Weatherization and Intergovernmental Programs
PACE	Property Assessed Clean Energy
PPA	Power Purchase Agreement
QECB	qualified energy conservation bond
UESC	utility energy savings contract

Executive Summary

This study presents an analysis of the market size, growth projections and industry trends of the U.S. Energy Service Company (ESCO) industry, drawing on information provided by ESCO executives in late 2015. We define ESCOs as energy service companies for whom performance-based contracting is a core business offering. We identified forty-seven firms that met our definition of an ESCO.[1] Forty-three of these companies responded to our requests for information, representing a 91% response rate.[2]

We also report 2014 ESCO industry revenues by market segment, region and business activity type, and for new versus existing customers. Finally, we report on use of tax incentives and financing tools, and incorporation of non-energy benefits into performance-based project economics.

We summarize key findings below.

ESCO Industry Revenue and Growth Trends

Key finding: ***After more than two decades of year-over-year growth, ESCO industry revenues appeared to flatten between 2011 and 2014.***

ESCOs reported 2014 industry revenue of approximately $5.3 billion, which represents no increase over the 2011 ESCO industry revenue of $5.3 billion (nominal $) reported by Stuart et al. (2013) (see Figure ES - 1). In an earlier Lawrence Berkeley National Laboratory (LBNL) study (Stuart et al 2013), ESCOs projected annual revenues of ~$7.5 billion in 2014, which was about 44% ($2.3 billion) higher than actual ESCO-reported revenues.

Key finding: ***ESCOs expect total annual industry revenues to be approximately $7.6 billion in 2017, which equates to an average annual growth rate of ~13% from 2015-2017.***

[1] For purposes of defining the scope of the ESCO industry, we define ESCOs as firms that provide energy efficiency-related and other value-added services and for which performance contracting makes up 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 linked in some fashion to the performance of the project. We exclude companies such as engineering and architectural firms; HVAC, lighting, windows or insulation contractors; companies whose primary business is utility energy efficiency program implementation; and consultants that offer energy efficiency services, but typically do not enter into long-term contracts that link compensation to project energy savings and/or performance. We also exclude companies that only provide on-site generation or renewable energy systems without also deploying energy efficiency measures.

[2] The four non-respondent ESCOs were small companies in terms of revenue, which we estimate accounted for about 2% of total industry revenues

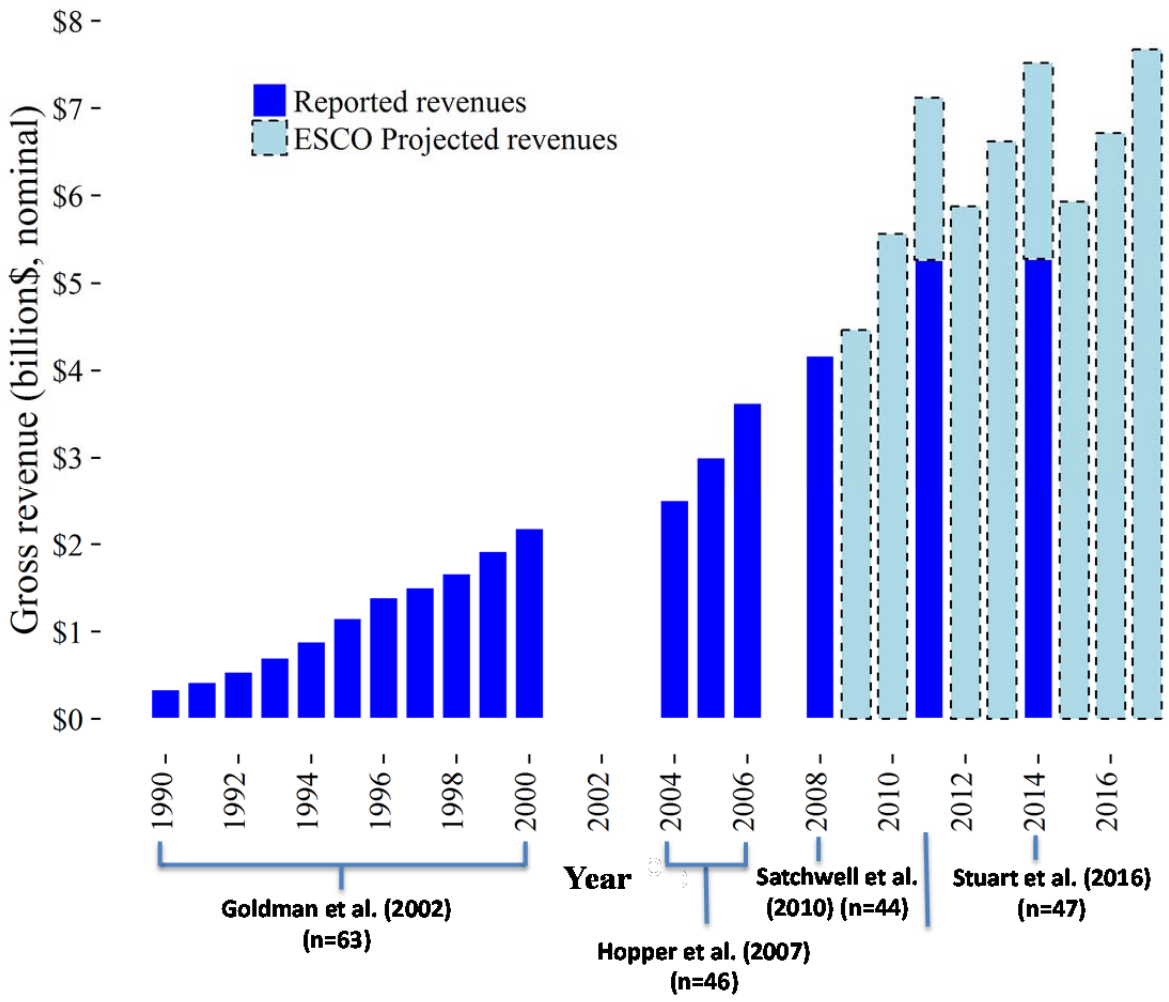

Figure ES - 1. Reported and projected ESCO industry revenues (nominal $): 1990-2017

Key finding: ***Public and institutional market sectors accounted for 85% of industry revenue in 2014, which is consistent with previous results.***

The share of revenue generated by the federal sector was ~21% in 2014, the same as in 2011. The share of revenue from state and local projects remained nearly the same between 2011 (24%) and 2014 (25%). However, the percentage of revenue from K–12 schools increased between 2011 and 2014 (from 19% to 23%), while revenue share from the university/college sector declined in the same period (from 14% to 10%). The share of industry revenue from the healthcare sector remained consistent between 2011 and 2014, at 6%.

Key finding: ***Performance contracting generated 74% ($3.7 billion) of the industry revenue in 2014, which was somewhat higher than the 69% share from performance contracting in 2011 and 2008.***

Design-build projects contributed the next largest portion of revenue in 2014 (16% or about $800 million), followed distantly by consulting services (5%), onsite generation power purchase agreements (PPA) (3%) and other activities (2%).

Key finding: Large ESCOs' share of total industry revenue decreased somewhat between 2011 and 2014, while medium and small ESCOs' share increased slightly in 2014.

We analyzed share of industry revenue by size of ESCO over time and found that the share of total industry revenues garnered by large ESCOs (annual revenue of $300M or greater) decreased from 56% in 2011 to 51% in 2014. Medium-sized ESCOs (annual revenues between $100M and $299M) increased market share from 29% in 2011 to 33% in 2014. Small ESCOs (annual revenue <$100M) increased their share of total industry revenue from 15% in 2011 to 16% in 2014.

Key finding: Share of revenue by ESCO size varies for different market segments.

Large ESCOs as a group accounted for 66% of 2014 industry revenues in the federal market, which is higher than their overall market share (51%). However, small ESCOs captured 25% of the K–12 schools market and 29% of the private commercial market, both significantly higher proportions than small ESCOs' overall share of industry revenue (16%).

Key finding: Share of revenue by ESCO size varies in different regions across the United States.

For the first time, ESCOs estimated the distribution of their 2014 revenues from various U.S. Census sub-regions. Disaggregating the results by size of ESCO, we found that large ESCOs accounted for ~60-80% of industry revenues in the West North Central, Middle Atlantic and New England regions. However, in the East North Central region, small ESCOs garnered nearly as much of the total market revenue as large ESCOs while in the West and South Central regions, medium and large ESCOs had nearly equal share of revenue (~40% and 45% respectively).

Key finding: New customers accounted for the majority of performance-based revenue during 2012-2014.

ESCOs also estimated the percentage of revenue from performance-based projects generated from new and existing customers in various market sectors. For performance-based projects implemented during the years 2012–2014, new customers[3] accounted for approximately 60% of K–12 schools revenue and 85% of public housing revenue. In the federal, university/college and healthcare market sectors, new customers generated about 50% of revenue while 57% of state/local government market revenues were generated by new customers.

[3] We defined a new customer as a facility or site the ESCO had not previously provided with energy efficiency or other energy services.

Incorporation of Non-energy Benefits in Performance-based Projects

Key finding: ***ESCOs reported incorporating at least one type of non-energy benefit in performance-based projects across all markets.***

Thirty-eight of thirty-nine respondent ESCOs reported that they incorporated at least one of six types of non-energy benefits (NEBs) in performance-based projects implemented between 2012 and 2014 for at least one market segment.[4] Nearly all of the ESCOs indicated that three types of non-energy benefits—avoided O&M, avoided capital costs and water conservation— are incorporated across all market sectors [see Figure ES - 2].

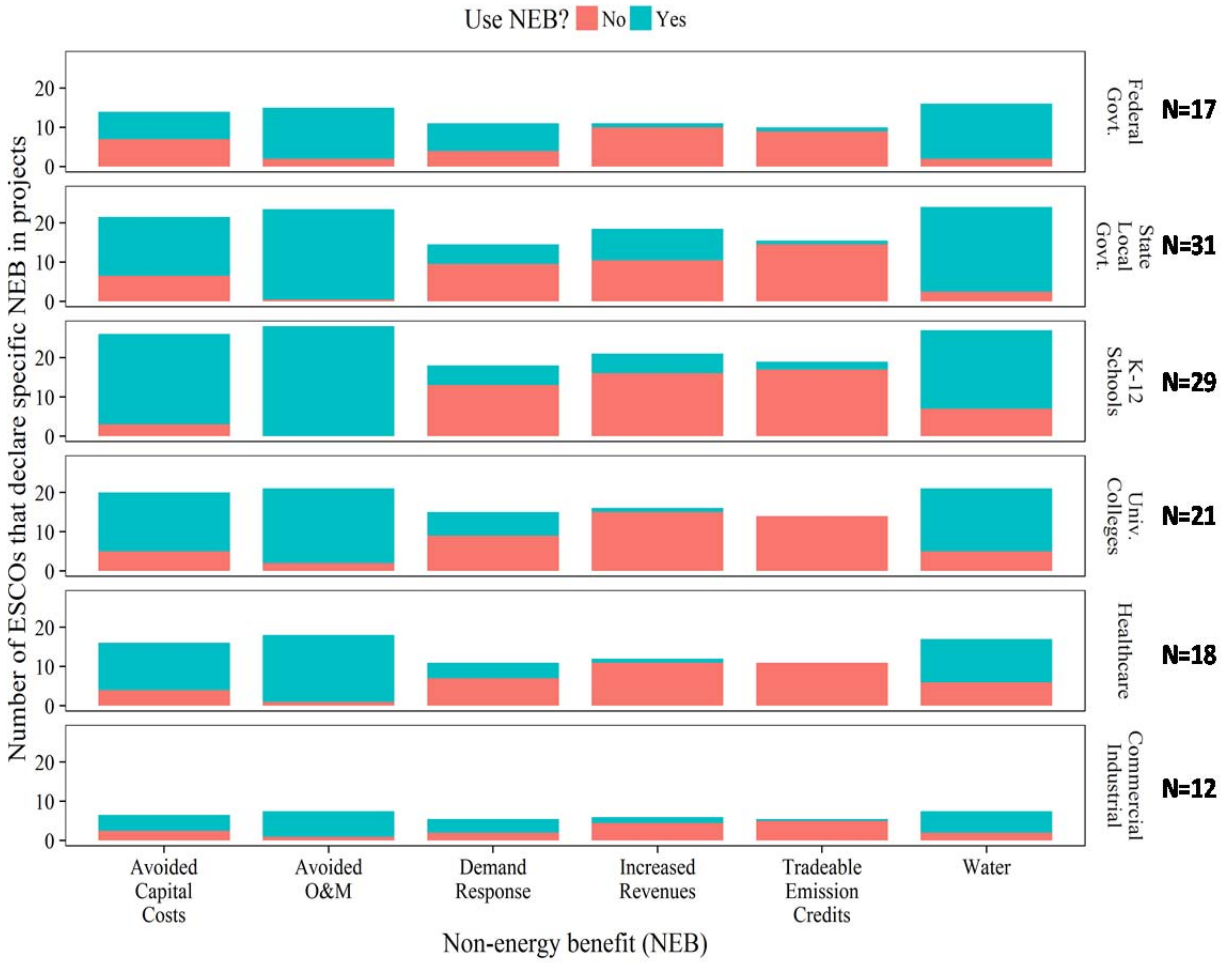

Figure ES - 2. Use of non-energy benefits in performance-based projects (2012-2014)

[4] Incorporation of non-energy benefits (NEBs) into a performance contract involves estimating dollar values for the NEBs and accounting for them in the project economics and guaranteed or stipulated savings.

Tax Benefits and Financing Approaches

Key finding: ***More than half of the ESCOs that serve each market reported using local, state, or federal tax benefits.***

Thirty ESCOs estimated the percentage of their projects implemented during 2012–2014 that used local, state, or federal tax benefits (e.g., Section 179d Investment Tax Credit [ITC], or the Production Tax Credit [PTC]). Across all market sectors, more than 50% of the ESCOs that serve each market reported using tax benefits. Of the ESCOs that responded for the state/local market, nearly 50% (eleven of twenty-four) reported that a high percentage (>66%) of state/local projects used tax benefits. Of the ESCOs serving the K–12 market, 50% (twelve of twenty-four) reported that a high percentage of K–12 projects leveraged tax benefits. In the federal sector, 30% (five of fifteen) ESCOs reported that a high percentage of projects used tax benefits.

Key finding: ***ESCOs reported use of various financing approaches for projects that were partially or 100% financed, by market.***

We also asked ESCOs to estimate the share of performance-based projects (100% financed or a combination of cash and financing) that closed financing during the 2012-2014 period, that used each of the following sources of funds, by market sector: (1) bond; (2) lease; (3) term loan; and (4) other (see right axis of Figure ES - 3). ESCOs reported that most federal projects were financed using term loans. Financed projects in the MUSH[5] and private commercial markets made extensive use of leases and term loans. Bonds were mostly used for state/local and K–12 schools projects.

[5] MUSH includes municipal and state governments, universities and colleges, K-12 schools, and healthcare markets.

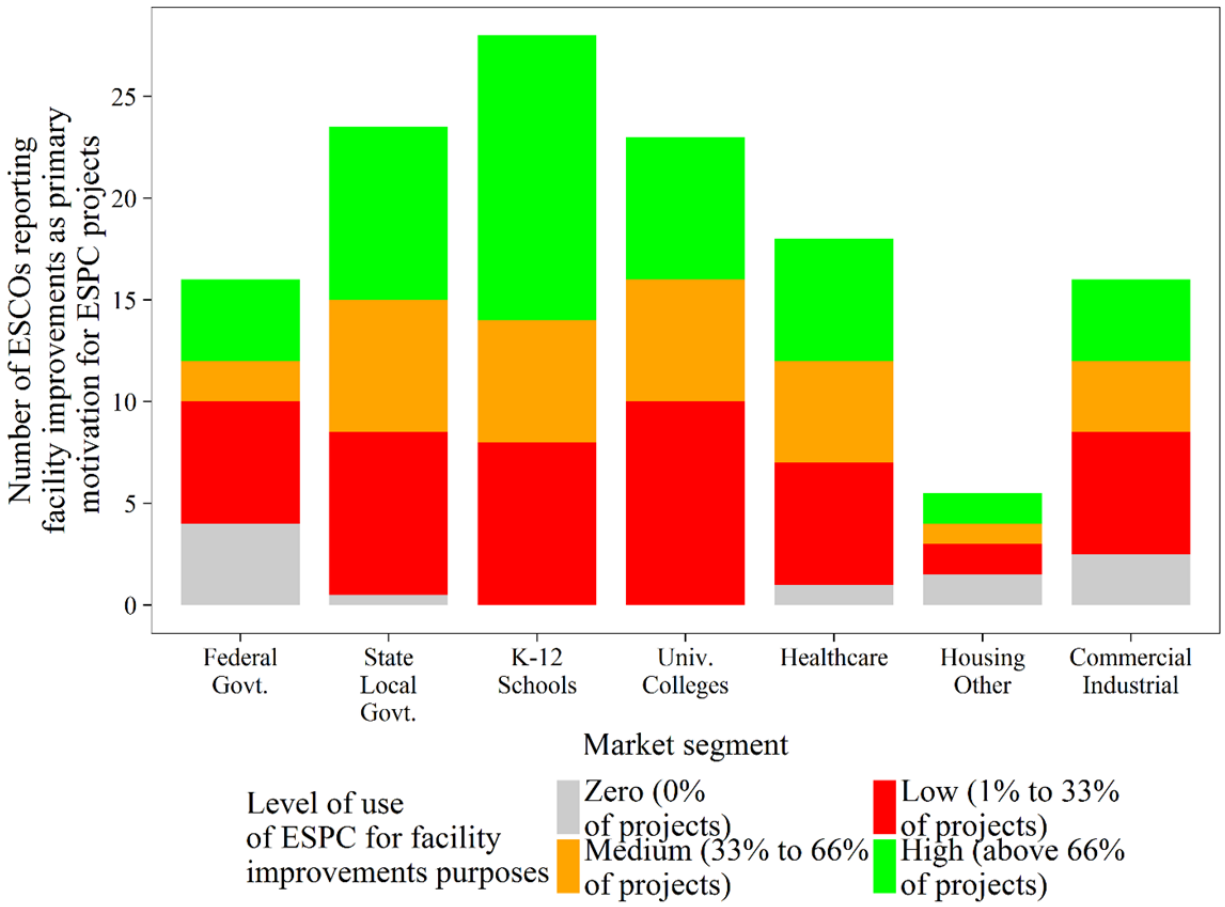

Figure ES - 3. Financing Approaches by Market Segment (2012-2014)

1. Introduction

The U.S. energy services company (ESCO) industry has a well-established record of delivering substantial, cost-effective energy and economic savings in large and medium-sized facilities, primarily in the public and institutional sector (Vine et al. 1999, Goldman et al., 2005, Hopper et al. 2007, Satchwell et al. 2010, Larsen et al. 2012, Stuart et al. 2014). The industry achieves significant incremental energy savings each year. In 2012, ESCO-implemented projects in the United States that were still in the contract performance period delivered a total of about 34 TWh of electricity savings. Energy savings from all sources totaled approximately 224 million MMBtu or about 1% of total annual energy consumption in U.S. commercial buildings (Carvallo et al. 2015).

ESCOs deliver most of these energy and cost savings through an energy savings performance contract (ESPC) model. ESPCs are long-term contracts between ESCOs and customers that enable customers to finance energy efficiency, onsite generation and other types of energy projects without the need for significant up-front capital. The ESCO typically guarantees that the project will generate a specified annual level of energy savings sufficient to pay back the project installation and financing costs.

This report builds on previous studies of the U.S. ESCO industry conducted by Lawrence Berkeley National Laboratory (LBNL) and presents policy-relevant findings on recent U.S. ESCO industry growth and market trends. We draw on interviews conducted with ESCO industry executives in late 2015. To define the boundaries of the ESCO industry for purposes of reporting industry trends and market activity, we use the definition of an ESCO established by Larsen et al. (2012):

> *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 contract.*

In 2011, ESCOs reported aggregate industry revenues of about $5.3 billion, with expectations of growing to about $7 billion by the end of 2014 (Stuart et al. 2014). About 80-85% of industry revenue has come from the "MUSH" market (municipalities, universities, colleges and K-12 schools, state government facilities and healthcare facilities) and federal customers. Historically, ESCO industry growth has been driven largely by enabling policies as well as capital improvement needs of customers. Examples of such policies include the following:

- President Obama called for a combined $4B in federal ESPC to be implemented from December of 2011 through December 2016 (The White House 2011; 2014). As of May 2016, awarded projects totaled $3B (Rockwell, 2016).
- Forty-seven states have enabling legislation that allows ESPC (ORNL 2016; NCSL 2013), which allow exemptions from standard bidding requirements, such as the requirement in many jurisdictions that K-12 and local government capital borrowings be approved by

voters, if the ESPC provides the savings guarantee.

- Many of these states offer modest to comprehensive technical support for ESPC implemented in government and educational facilities. For example, the Nevada Governor's Office of Energy administers a comprehensive ESPC program, which includes technical assistance, access to a pool of pre-qualified ESCOs, required documentation and reporting, and financial subsidies for investment grade audits. Several states are in the process of ramping up or re-establishing languishing ESPC programs. However, some previously active ESPC programs in several states have fallen dormant due to budget challenges, complex contracting processes, and staffing reductions in lead agencies that administer ESPC programs.[6]
- Energy efficiency tax benefits and tax deductions, including 179d[7], enable increased investment and savings for ESPC projects over what would have been possible without the tax benefit. 179d was recently extended through 2016; Stuart et al. (2013) reported that most ESCOs leveraged some form of tax benefits in some of their projects.
- Some states are successfully leveraging Qualified Energy Conservation Bonds (QECBs)[8] to help finance public sector (city, county, K–12, state) energy efficiency projects, including projects that include performance contracting (EPC 2016). In our interviews, some ESCOs reported that they are informing state energy offices and their local clients about the availability of QECBs.
- Commercial Property-Assessed Clean Energy (PACE) programs[9] are active in sixteen states (Pace Nation 2016). PACE enables financing of energy efficiency, renewable and water conservation measures in buildings via an assessment on the property's tax bill that can be repaid over a loan term of up to twenty years. Some ESCOs promote the use of commercial PACE to their customers.[10]

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[6] California Department of General Services (DGS) reported that the state's current three-contract ESPC requirement makes transaction costs too high for most ESCOs; a 2016 legislative proposal to streamline the ESCO is in process (Sacks 2016). The Arizona Governor's Office of Energy Policy, responsible for reviewing the state's ESPCs, was closed in late 2015 (Randazzo 2015). The Illinois FY16 budget impasse has stalled efficiency projects in K-12 schools and other facilities (Daniels 2016).

[7] 179d, the Energy Efficient Commercial Buildings Tax Deduction, is a section of the Federal Tax Code enacted under the 2005 Energy Policy Act (EPACT). This section provides a tax deduction to building owners, or to contractors (e.g., architects, design firms, ESCOs) for making energy efficiency improvements to commercial buildings. In 2008, the tax code was amended to allow government agencies to assign their 179d deduction to the implementer or designer of their buildings' efficiency projects. 179d is scheduled to expire December 31, 2016.

[8] QECBs are U.S. Treasury-subsidized bonds that enable state, tribal and local government issuers to borrow money to fund a range of energy conservation projects at very attractive borrowing rates over long contract terms. QECBs provide subsidies that cover a substantial portion of the interest the public agency issuer pays back to bond purchasers (DOE 2012a). The American Reinvestment and Recovery Act (ARRA) increased the national bond cap for QECBs by $2.4 billion to a total of $3.2 billion and provided allocations to each state proportional to population.

[9] PACE statutes authorize municipalities and counties to work with private sector lenders to provide financing for authorized energy projects (e.g., energy efficiency retrofits, onsite renewable generation) and to collect loan repayment for a term of up to 20 years through an annual assessment on the property's real estate tax bill.

[10] NORESCO (2016) promotes its experience with PACE on its website; Ameresco (2015b) and Johnson Controls (2013b) have publicized projects that leveraged PACE financing.

This report is intended for federal, state, and local policymakers, ESCO industry executives, other energy efficiency service providers and end users. The report provides an explanation of the role that ESCOs can play in securing private capital for energy efficiency investment, including current and projected investment levels, which markets ESCOs reach most effectively and where the potential for growth resides. While the evolution of the U.S. ESCO industry differs significantly from that of other countries' energy efficiency services markets, international policymakers and stakeholders may also benefit from knowledge about U.S. ESCO industry trends to inform their work to expand private-sector energy services industries in their own jurisdictions.

This paper is organized as follows. Section 2 summarizes information about our data sources and analysis approach. Section 3 provides findings on ESCO industry growth and industry characteristics. Section 4 discusses factors that influence recent ESCO industry market activity and prospects for future growth. Section 5 summarizes findings, discusses policy implications, and introduces possible extensions of this work.

2. Data Sources and Methods

In this section, we discuss data sources and methods for developing estimates of 2014 ESCO industry revenues, projected growth in ESCO revenues to 2017, and market characteristics.

For purposes of defining the industry scope and estimating industry revenue, we include only those companies that meet our definition of an ESCO: firms that provide energy efficiency-related and other value-added services for which performance contracting is a *core part*[11] of its energy efficiency services business. We exclude firms such as engineering and architectural firms; mechanical contractors that provide a range of energy efficiency equipment installation and energy management services but do not offer performance contracts; HVAC, lighting, windows or insulation contractors; companies whose primary business is utility energy efficiency program implementation; and consultants that offer energy efficiency services, but typically do not enter into long-term contracts that link compensation to project savings and/or economic performance. We also exclude companies that exclusively provide on-site generation or renewable energy systems without also installing measures to address energy efficiency. Some excluded companies serve as subcontractors to ESCOs and may even engage in performance-based work at times, but not as a core business offering. These companies contribute to the broader market for energy efficiency, clean energy and retail energy services, but are not included in our assessment of the U.S. ESCO industry.

2.1. Data Sources

We collected information from several sources including:

- Interviews with ESCO executives conducted in late 2015
- Publicly-available information on corporations' financial performance
- Company websites
- eProject Builder[12]
- The LBNL/ National Association of Energy Service Companies (NAESCO) database of projects
- A Delphi[13] process with industry experts
- Data from previous LBNL studies that analyzed ESCO industry trends and project

[11] We define companies for whom performance contracting is a core part of its energy efficiency services business as companies that self-define as an ESCO in our interviews, those that clearly indicate on their websites that they offer performance contracting, or those that announce performance contracting projects through public news releases

[12] eProject Builder (ePB) is a secure web-based ESPC data management system developed and managed on behalf of U.S. DOE by Lawrence Berkeley National Laboratory. ePB standardizes data collection and reporting for ESPC projects nationwide—across ESCOs and customers in all market sectors. As of September 20, 2016 the ePB database contained 435 projects across federal, state, local, university and K-12 markets. For more information, see eprojectbuilder.lbl.gov.

[13] A Delphi technique is a process used in business forecasting to reach a consensus via the solicitation and comparison of the views of a small group of experts (Stuart et al. 2014, Satchwell et al. 2010, Hopper et al. 2007, Linstone and Turoff 1975).

performance.[14]

The primary source of ESCO revenue data used in this report came from communication with U.S. ESCO executives conducted during the summer and fall of 2015. We asked ESCOs to provide information about their company's 2014 revenue from energy services; growth in projected revenue in the next three years; activity by market segment, business type (e.g., performance contracting, design-build, PPA), and region; and the share of new versus existing customers. We defined energy services as performance contracts, energy-efficiency design/build projects, engineering, procurement & construction projects, and energy efficiency-related consulting. For purposes of this report, the definition of energy services excludes retail commodity sales or projects built to supply power to bulk power markets.

We also asked ESCOs to provide information about several topics pertaining to performance-based projects including project financing approaches, use of tax benefits, incorporation of non-energy benefits and typical M&V practices. After reviewing the initial quantitative results, we conducted follow-up interviews with some ESCOs to gain additional insight into some of the key findings.

2.2. Method

We first developed a comprehensive list of firms that might be considered ESCOs for the purposes of this study and used the following sources to identify ESCOs active in the United States:

- NAESCO-accredited ESCOs
- U.S. DOE list of qualified energy service companies for the federal ESPC program
- Members of the Energy Services Coalition (ESC) that indicated that they provided performance contracting
- Qualified ESCOs identified through active state performance contracting programs, including Arkansas, Colorado, Delaware, North Carolina, Oregon and Washington
- Energy services companies identified in previous LBNL market surveys
- Online research to identify other companies who might be engaged in performance contracting; and
- Energy service companies that have requested accounts or training for eProject Builder

Through this process, we identified an initial list of 139 firms that appeared to provide energy efficiency services, possibly including performance contracting. Next, we undertook additional market research on this initial list of firms to determine whether firms were still in business, whether they had been acquired by other ESCOs, and whether they offered energy efficiency

[14] See Stuart et al. (2014), Larsen et al. (2012), Satchwell et al. (2010), Hopper et al. (2007), and Goldman et al. (2005).

performance contracting as a core activity.[15] Through this process, we identified forty-seven ESCOs that met our criteria and that were still actively working in the United States.[16] Forty-three of the forty-seven companies responded to our requests for information resulting in a 91% response rate, which was somewhat higher than our previous studies (see Table 1).

Table 1. ESCO response rates to requests for information

Year	Respondent ESCOs	Response Rate
Satchwell et al. (2010)	29 of 38	76%
Stuart et al. (2013)	35 of 45	78%
Stuart et al. (2016)	43 of 47	91%

We estimated total 2014 ESCO industry revenue from energy services by summing revenues reported by the forty-three respondent ESCOs and the estimated revenues for the four non-respondent companies.[17] We also developed estimates of 2014 revenues by market segment, region and contract type and for new versus existing customers by multiplying the percent of revenue each respondent ESCO reported for each of these variables by the ESCOs' reported revenue.

We also asked each ESCO to provide annual revenue growth projections for the next three years (2015 to 2017), and developed an aggregate estimate of projected U.S. ESCO industry revenues for that period by applying each ESCO's growth projections to its 2014 revenues.

[15] We excluded fifteen companies included in the previous LBNL ESCO market study because they were acquired by other ESCOs, indicated that they no longer provided performance contracting, or whose websites gave no indication that they provide performance contracting and they did not respond to our requests for confirmation. Of the ninety-two companies excluded from this study, nine had been acquired or were subsidiaries of ESCOs, three appeared to be out of business, twelve responded to us that they are not an ESCO or no longer provide performance contracting, seven were just entering the performance contracting business and could not respond with 2014 or historical data, and 61 appeared to provide some level of energy efficiency services but not performance contracting.

[16] Our market research included: (1) reviewing every company's website to determine whether the company was in business and whether the website included performance contracting among its energy efficiency services; (2) where such information was unclear, contacting the company to ask whether it provides energy efficiency performance contracting; and (3) determining the company was not a subsidiary of another company in our survey. Our initial market research process may not have identified all of the small regional ESCOs or mechanical contractors in the United States that undertook an energy savings performance contract in 2014. Because revenues from energy services for regional companies tend to be modest, we believe that our results represent ~90% or more of U.S. ESCO industry revenue.

[17] For ESCOs that are part of a larger organization, the revenues included for purposes of this report come exclusively from the business unit providing ESCO-related energy services. As part of our QC/QA process, we compared the 2014 results with revenue estimates from the Stuart et al. (2014) study and to other public information (e.g., company reports, U.S. SEC 10-K filings). Estimates of 2014 revenue for the four non-respondent companies came from a Delphi process with industry experts. Total estimated revenue for the four non-respondent companies accounted for only about 2% of aggregate industry revenue.

3. U.S. ESCO Industry Revenue and Market Trends

3.1. Current and historic revenue

We estimate that aggregate U.S. ESCO industry revenue was approximately $5.3 billion in 2014. For comparison, Stuart et al. (2013) estimated 2011 ESCO industry revenue to be about $5.3 billion in nominal terms; thus total ESCO industry revenue appears to have been flat (in nominal terms) between 2011 and 2014 (see Figure 1).

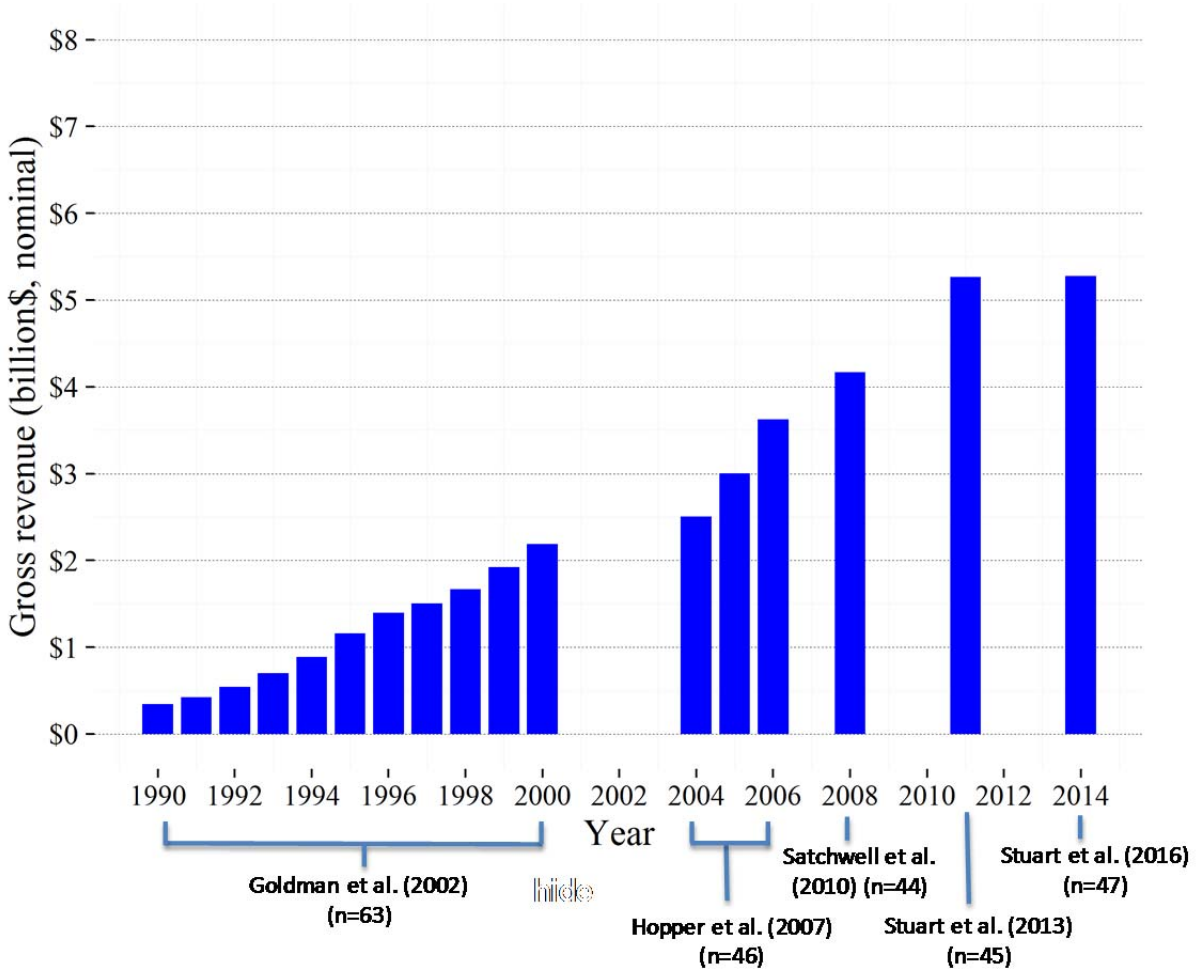

Figure 1. Aggregate ESCO industry revenue from 1990 to 2014[18]

We calculate average annual growth rates for ESCO firms of varying size as indicated by their annual revenues. For the 2012-2014 period, aggregate revenue for medium-sized ESCOs ($100M-$299 per year) grew 4% annually, while revenue for small ESCOs (<$100M per year) increased by 2.5% annually. The aggregate revenues of large ESCOs (>=$300M per year) declined by 2.8% annually during this period. In contrast, for the years 2009-2011, revenue for small ESCOs grew 12.5% annually and large ESCO revenue grew at a rate of 10.5% annually (see Table 2). Thus, flat

[18] This figure displays revenue figures only for the years for which we collected ESCO-reported data.

or declining revenues among larger ESCOs appears to be a significant contributor to the overall industry slowdown between 2012 and 2014.

Table 2. Average annual growth rates by size of ESCO

ESCO Size	Average Annual Growth Rate 2009-2011 (nominal)	Average Annual Growth Rate 2012-2014 (nominal)
Small	12.5% (n=32)	2.5% (n=31)
Medium	2.7% (n=8)	4% (n-10)
Large	10.5% (n=5)	-2.8% (n=6)

3.2. Short-term revenue projections from ESCOs

Based on ESCOs' growth projections for 2015-17, we estimate that the U.S. ESCO industry anticipates total annual revenues of approximately $7.6 billion in 2017, which equates to an average annual growth rate of ~13% over the three year time frame (see Figure 2).

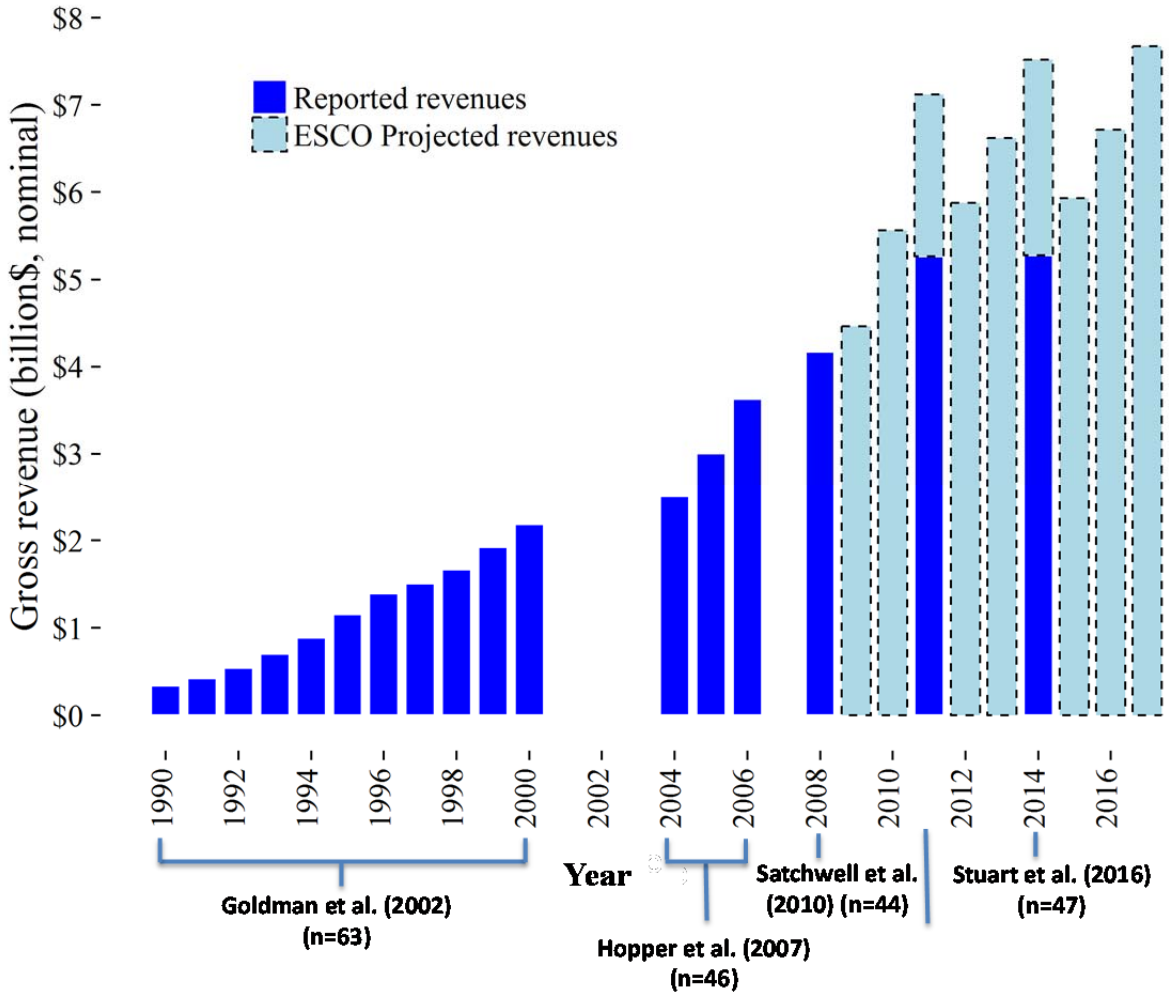

Figure 2. Reported and projected ESCO industry revenues (nominal): 1990-2017

We also compare 2014 revenue to industry projections of future revenue from a previous LBNL study (Stuart et al. 2013) in which ESCOs projected that their revenues would be ~$7.5 billion in 2014 (see orange line in Figure 2). As Figure 2 shows, this revenue projection turned out to be about $2.3 billion higher (44%) than actual ESCO-reported revenues for 2014 ($5.3 billion).

The ESCO industry's revenue growth projections for 2015-17 period (~13% annual growth rate) are similar to projections made for 2012-2014 (~12% annual growth rate) [Stuart et al. 2014] but lower than ESCOs' growth projections made for the 2009-2011 period (~25%) [Satchwell et al. 2010].

3.3. ESCO industry revenues by market segment and size of ESCO

We asked ESCOs to estimate the breakdown of their 2014 revenue among various market segments. Forty-three ESCOs provided the information which is summarized in Table 3. In 2014, about 85% of ESCO revenues came from federal, state and local government facilities, universities and colleges, K–12 schools and healthcare and hospital facilities. State/local governments, K–12 schools and federal customers accounted for 25%, 24%, and 21% of ESCO industry revenue, respectively.

Table 3. 2014 ESCO industry revenue by market segment

Market Segment	Share of Total Revenue	2014 Revenue ($ million)
State/Local	25.4%	$1,314
K–12 Schools	23.5%	$1,219
Federal	20.7%	$1,073
University/College	10.0%	$519
Healthcare	5.9%	$304
Commercial/Industrial	7.9%	$409
Public Housing/Other	6.6%	$342
SUBTOTAL (n=43)	**100.0%**	**$5,180**
Non-respondents/Delphi process (n=4)	**-**	**$95**
TOTAL		**$5,275**

Historically, the bulk of ESCO industry revenue has come from the public and institutional sectors. Figure 3 shows absolute revenue and the breakdown by market sector for 2014 compared to years reported in previous LBNL studies. In 2014, the combined "MUSH" and federal sectors made up 85% of industry revenue, up slightly from 82% in 2011. The university/college sector declined to a 10% share in 2014, down from 16% in 2008. The percentage of revenue generated by the federal sector was 21% in 2014 which is comparable to market share in 2011 and 2006 (22%). The federal market revenue share took a significant, but apparently temporary, dip in 2008, to 15% (Stuart et

al. 2013, Satchwell et al. 2010, Hopper et al. 2007).[19] The private commercial/industrial sector generated about 8% of 2014 industry revenue, the same percentage as in 2011. See Appendix A, Tables A-1 and A-2 for the market share and revenue data presented in Figure 3.

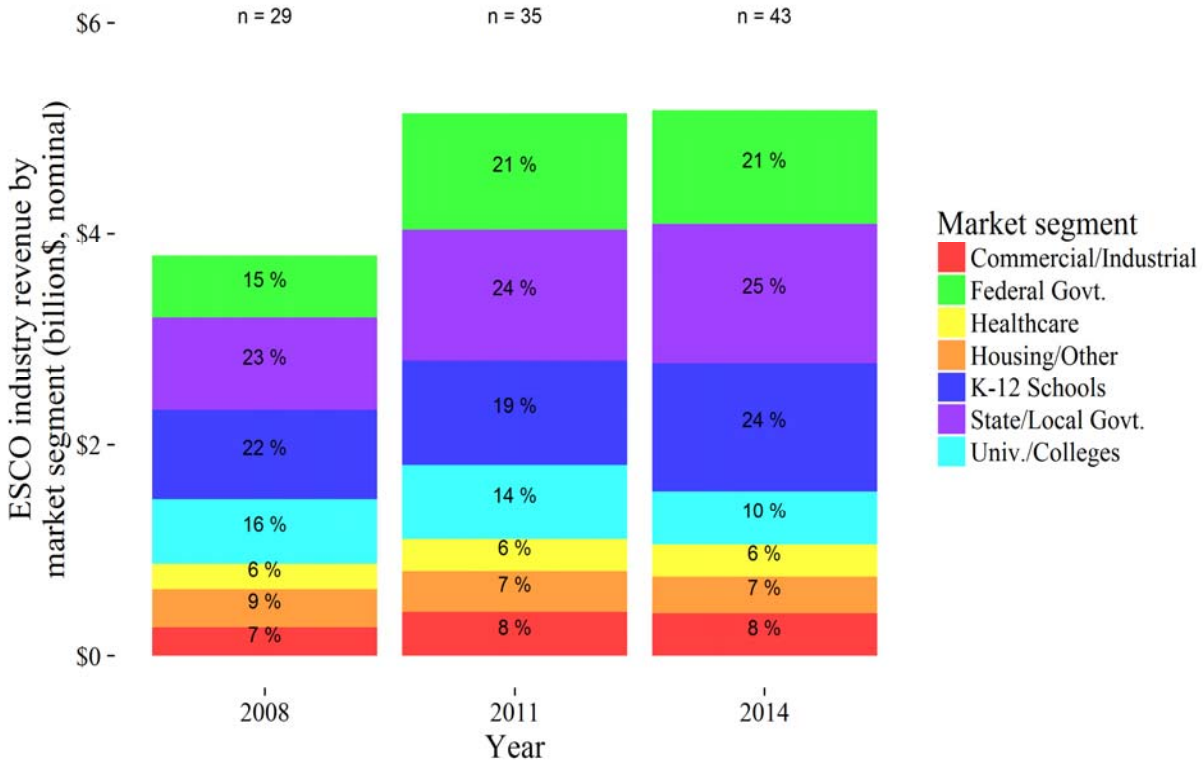

Figure 3. ESCO industry revenue share and absolute revenue by market segment

We also report market share in terms of size of ESCO firm, comparing 2014 results to revenues reported by firms in previous LBNL reports. The share of total ESCO industry revenues going to large ESCOs (annual revenue of greater than $300M) decreased from 56% in 2011 to 51% in 2014. Small ESCOs have slightly increased market share over this six year time period, from 14% in 2008 to 16% in 2014 (see Figure 4).

[19] Indefinite Delivery Indefinite Quantity (IDIQ) contracts are "blanket" contracts issued to multiple ESCOs by DOE and Army Corps of Engineers. They streamline procurement of ESPC projects by placing them under a single standardized contract (FEMP 2013). The 2007 ESPC IDIQ Continuation Plan required project proposals to kick off by April 1, 2008; projects not meeting that deadline would not be authorized to proceed under the then current DOE ESPC IDIQ contract (DOE 2012b). There was a lull in federal ESPC activity until the contract was extended.

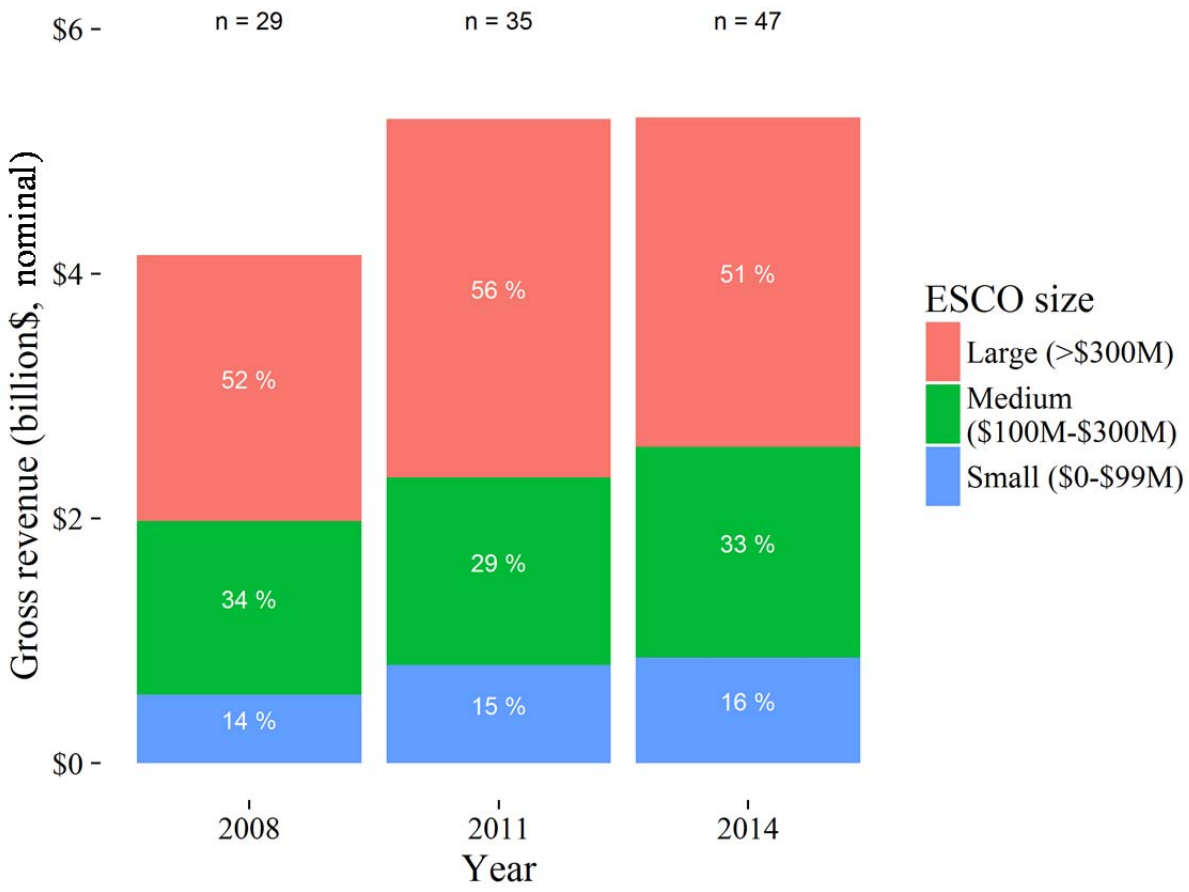

Figure 4. ESCO industry revenue share by size of ESCO

We also observe that the market share of the largest eight ESCOs has declined since 2006. In 2006, these firms accounted for 79% of total revenue whereas the top eight firms accounted for 60% of total industry revenue in 2014 (see Table 4).[20]

Table 4. Market share of total ESCO revenues received by the eight largest companies since 2006

Year	% of Total Market Revenue	Revenue ($ million)
2014	60%	$3,178
2011	70%	$3,707
2008	76%	$3,137
2006	79%	$2,867

[20] The eight largest ESCOs (by revenues) changed somewhat year-to-year and includes both large and some medium-sized ESCOs.

We also looked at the activity levels of large, medium and small ESCOs in various market segments and highlight several findings:

- Large ESCOs (>$300M) accounted for 66% of total revenues in the federal market, which is higher than their overall market share (51%);
- Medium-sized ESCOs' share of revenue in the K–12 (31%), University (35%) and state/local (36%) markets were comparable to their 33% share of total industry revenue;
- Small ESCOs (<$100M) captured a substantial portion (25%) of the K–12 schools market, which is a significantly higher proportion than their 16% share of total industry revenue; and
- Small ESCOs also do relatively well in the private commercial/industrial market where they account for 29% of the sector's business in 2014 (see Figure 5).

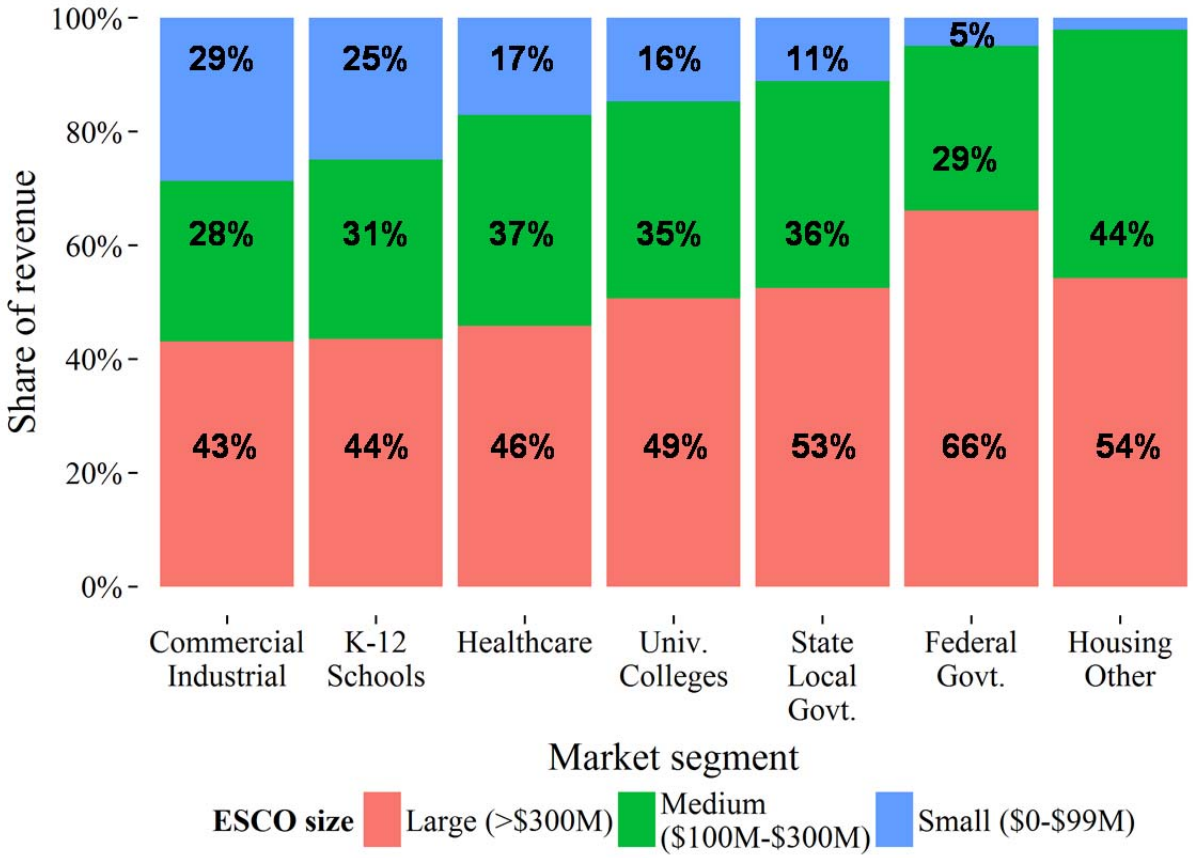

Figure 5. Share of ESCO industry revenues by market segment and size of ESCO

3.4. Revenue trends over time by type of ESCO business activity and sector

ESCOs also estimated the share of their 2014 energy services for various business activities: performance-based contracts, design-build, consulting services, onsite generation power purchase agreements (PPA), utility program implementation and other activities.[21] Figure 6 shows that the share of revenue from performance contracting in 2014 was 74% ($3.7B)—this value is somewhat higher than the share (69%) reported in 2008 and 2011. Design-build projects contributed the next largest share of revenue in 2014 (16% or about $800 million), followed by consulting (5%), onsite generation PPA (3%) and other (2%).[22]

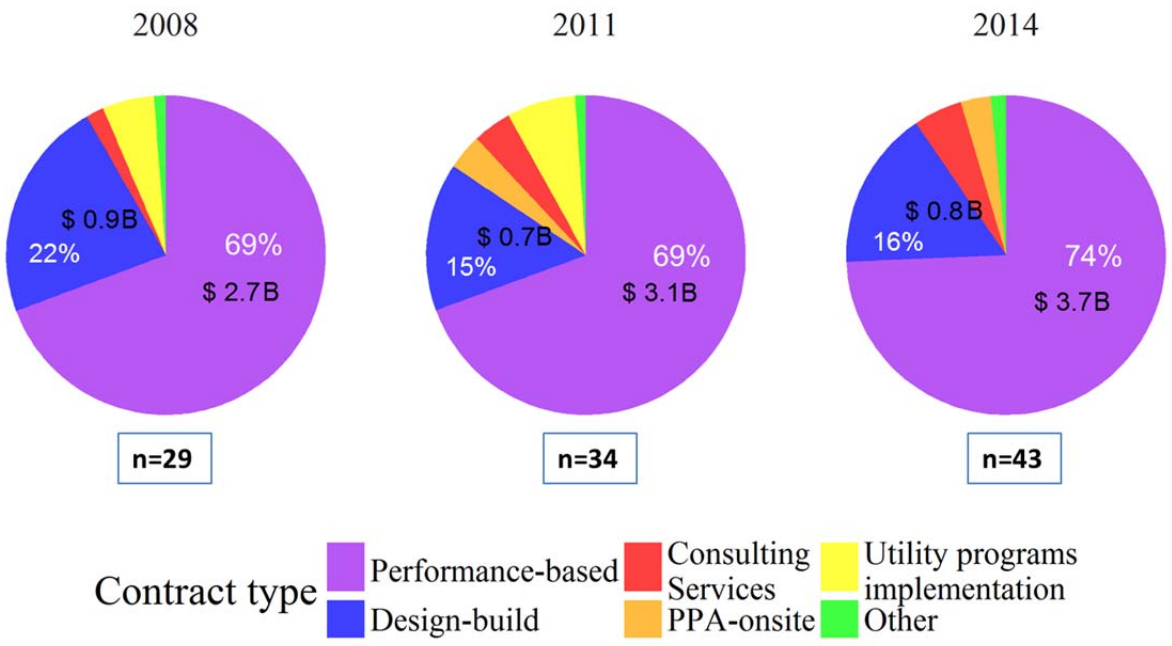

Figure 6. ESCO industry revenue by business activity over time (nominal $)

Forty-two ESCOs estimated the breakdown of their 2014 revenues from each type of business activity by market segment. Performance contracting is the overwhelming choice for government and educational customers when procuring services from an ESCO, but less prevalent in other

[21] Design- build projects involve fee-based contracts that may include such services as engineering, procurement, project installation and construction; ESCOs do not guarantee energy savings or assume long-term performance risk in these projects. Consulting contracts can include a wide range of activities including audits, engineering studies, project and subcontractor management. Some ESCOs manage or implement programs for utility energy efficiency programs, most commonly in the small commercial or commercial/industrial sector, but occasionally in the residential sector as well. Under a PPA, a third-party (e.g., ESCO) installs and operates an onsite energy generation system and sells the generated energy to the customer.

[22] In this study, we asked ESCOs to include utility program implementation services under "Other" rather than as a separate category, and thus that category does not appear in the 2014 pie in Figure 6. It is likely that some revenue from utility consulting contracts, which ESCOs included in the "Utility programs implementation" category in 2011, was reported under the "Consulting Services" category for 2014.

sectors. Performance contracting in the federal sector accounted for $900 million in 2014, or 85% of the $1 billion total revenue from these ESCOs' federal customers. Performance contracting generated about $1.1 billion in 2014 in both the state/local and K–12 schools markets, or 86% and 82% of total ESCO revenue for those markets, respectively. For healthcare facilities, ESCO revenues were split nearly evenly between performance-based and design build projects. Consulting contributed nearly 40% of $300 million ESCO revenue from public housing and other miscellaneous projects, while design-build dominates ESCO activity in private commercial/industrial facilities, accounting for about 67% of the revenue in that sector (see Figure 7).

PPA/onsite generation contracts were more prevalent in the public housing and commercial/industrial sectors than in the MUSH markets. ESCOs reported no PPA/onsite generation project revenue for 2014 in the federal sector. This was likely the result of a 2012 Office of Management and Budget (OMB) Memorandum that required the federal government to retain title to onsite energy generation equipment installed under an ESPC at the end of the contract term (OMB 2012). ESCOs may be wary that the transfer of ownership to the government will disqualify the ESCO for tax benefits generated by the project.

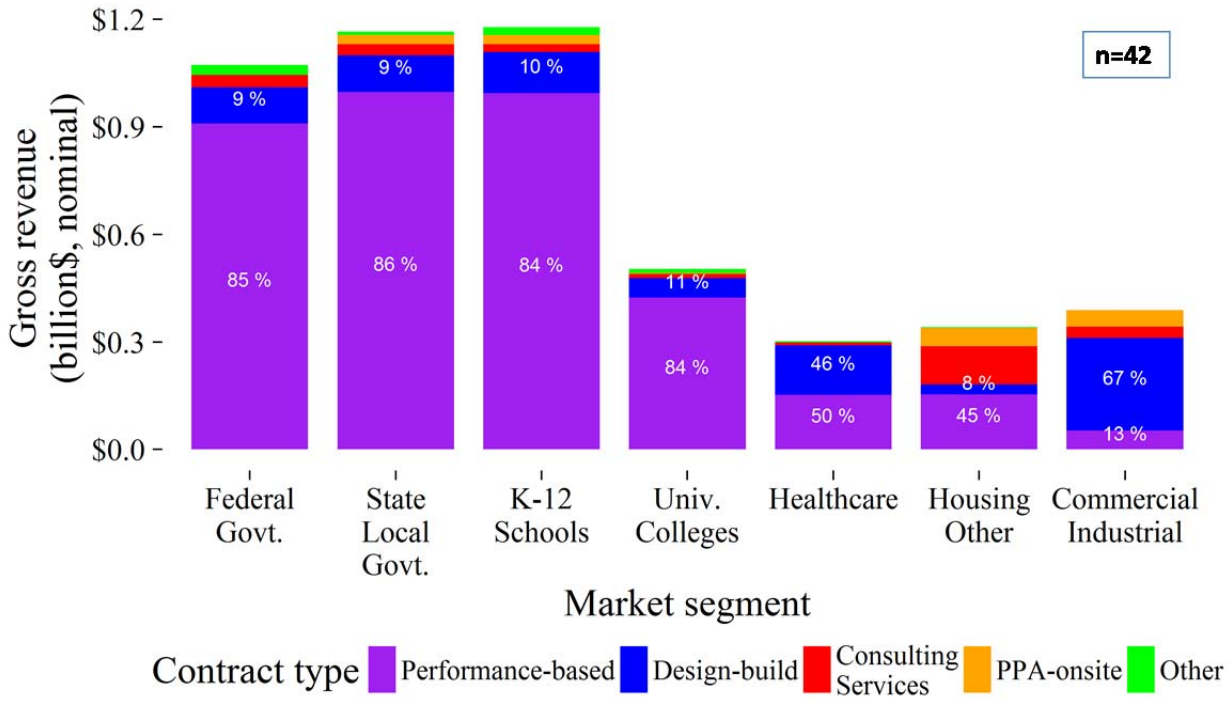

Figure 7. 2014 revenues by business activity and market segment

3.5. ESCO revenues by census region

For the first time, we asked ESCOs to estimate their distribution of revenues from various U.S. Census sub-regions. All forty-three respondent companies answered this question (see Table 5). ESCOs reported that 20% of industry revenues come from the Pacific region, followed closely by

the South Atlantic (18%) and Middle Atlantic (18%), and East North Central (16%) regions. About 7% of industry revenue comes from New England states, with 6% coming from the West South Central region and about 5% for each of the West North Central, Mountain and East South Central regions.

Table 5. 2014 ESCO industry absolute revenue by U.S. Census sub-region and ESCO size

U.S. Census Sub-region	States	Total Revenue ($M)	Large ESCOs Revenue ($M) (% Share for Region)	Medium ESCOs Revenue ($M) (% Share for Region)	Small ESCOs Revenue ($M) (% Share for Region)
New England	CT, MA, ME, NH, RI, VT	$371	$257 (69%)	$79 (21%)	$35 (9%)
Middle Atlantic	CT, PA, NJ, NY	$899	$487 (54%)	$326 (36%)	$86 (10%)
South Atlantic	DE, DC, GA, FL, MD, NC, SC, VA, WV	$985	$542 (55%)	$388 (39%)	$55 (6%)
East South Central	AL, KY, MS, TN	$256	$109 (42%)	$79 (31%)	$68 (26%)
West South Central	AR, LA, OK, TX	$302	$157 (52%)	$130 (43%)	$15 (5%)
East North Central	IL, IN, MI, OH, WI	$825	$375 (45%)	$178 (22%)	$272 (33%)
West North Central	IA, KS, MN, MO, ND, NE, SD	$226	$181 (80%)	$30 (14%)	$15 (6%)
Mountain	AZ, CO, ID, MT, NV, NM, UT, WY	$286	$172 (60%)	$91 (32%)	$23 (8%)
Pacific	AK, CA, HI, OR, WA	$1,031	$410 (40%)	$422 (41%)	$199 (19%)
Total – All Regions		**$5,181**	**$2,690 (52%)**	**$1,724 (33%)**	**$768 (15%)**

We disaggregate reported revenue by size of ESCO and find that—in the West North Central, Middle Atlantic and New England regions (see Table 5 for states included in each region)—large ESCOs account for ~60-80% of revenue share in each of those regions. However, in the East North Central region, small ESCOs have nearly as much of the total market as large ESCOs. In the West and South Central regions, medium and large ESCOs have nearly equal share (~40% and 45% respectively) [see Figure 8].

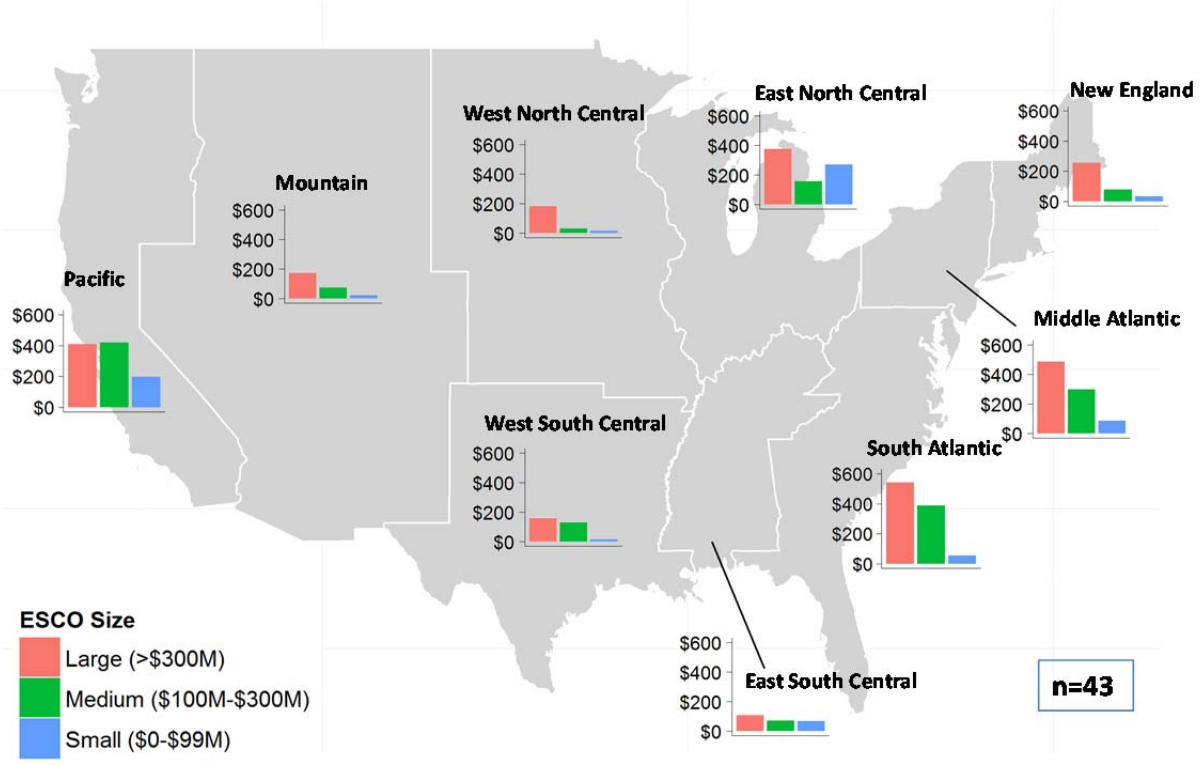

Figure 8. 2014 ESCO revenues by census sub-region, disaggregated by size of ESCO

3.6. ESCO performance contracting revenues from new and existing customers

We also asked ESCOs to report estimated share of 2014 performance contracting revenue that came from new and existing customers in various market sectors for the past three years (2012–2014). We defined a new customer as *"a facility or site that your company had not previously provided with energy efficiency or other energy services*." ESCO projects for existing customers typically involve additional project phases or modifications that increase project scope (e.g., retrofit additional buildings at a campus) or install additional measures.

Forty of the forty-three respondent ESCOs provided information on this question. Approximately 60% of ESCO revenues from K–12 schools and 85% of public housing revenue came from new customers between 2012 and 2014. In the federal, university/college and healthcare market sectors, new customers generated about 50% of ESPC revenue while 57% of revenues in the state/local government market were generated by new customers. ESCOs indicated that less than 40% of their revenues in the private commercial/industrial sector came from new customers (see Figure 9).

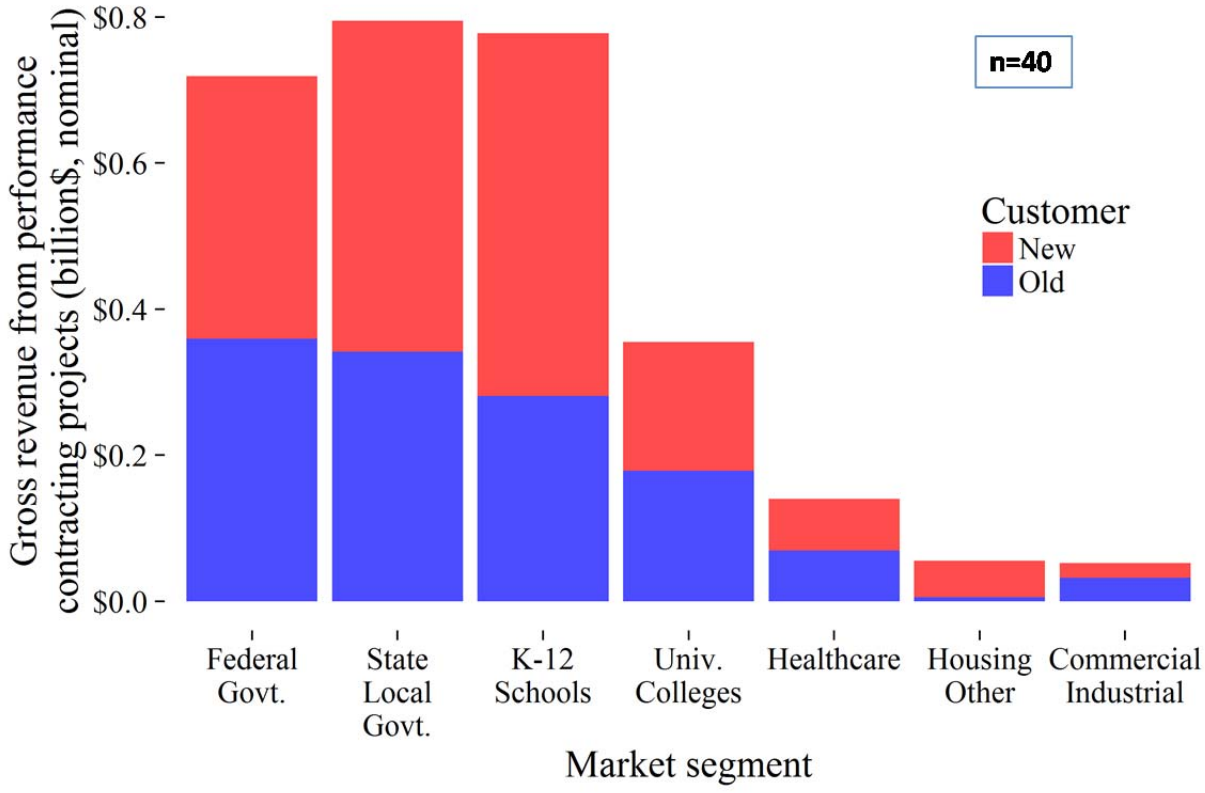

Figure 9. Contribution to ESCO performance contracting revenues from new and existing customers (2012-2014)

3.7. Incorporation of non-energy benefits in ESPC

We asked ESCOs to estimate the percentage of performance-based projects implemented during the past three years (2012–2014) in each market segment that incorporated some type of non-energy benefit (NEB) in the project economics. For this study, we asked about six types of NEBs that are often accepted either in states that authorize inclusion of NEBs, or in federal government ESPC projects: (1) avoided capital costs; (2) avoided operations and maintenance (O&M) costs; (3) benefits from demand response; (4) increased revenues; (5) tradeable emissions credits; and (6) water conservation.[23] 38 of the 39 ESCOs that responded to this question reported including at least one type of NEB in at least one market segment. Table 6 shows the number of ESCOs that indicated that they serve each market sector compared to the number of ESCOs that report quantifying non-energy benefits in that sector.

[23] Avoided capital costs (1) are planned future capital expenditures made unnecessary by the efficiency upgrades. (2) Avoided O&M costs (2) typically include decreased maintenance costs and staffing reductions related to installation of new energy conservation measures. Implementing demand response (DR) measures (3) may not result in overall energy use reductions but DR can reduce a facility's monthly electric demand charges. Increased revenues (4) can accrue if the project includes measures that increase the facility's cash flow (e.g., replacing/upgrading broken parking meters; installing sub-metering that allows the agency to charge utilities to its tenants). In some states, efficiency measures can qualify for air pollution reduction credits (5) monetized through a market-based auction. Water conservation measures (6) can reduce water utility, sewage and other costs.

Table 6. Number of ESCOs incorporating non-energy benefits in performance-based projects (2012-2014)

Market Sector	# of Respondent ESCOs that Serve the Market Sector	# of ESCOs that Report quantifying NEBs in the Market Sector (% of Respondents)
Federal government	17	13 (76%)
State/Local government	31	31 (100%)
K–12 schools	29	28 (97%)
Univ./College	21	21 (100%)
Healthcare	18	18 (100%)
Commercial/Industrial	12	11 (92%)

Nearly all ESCOs indicated that three types of non-energy benefits—avoided O&M, avoided capital costs and water conservation— are incorporated across all market sectors (see blue bars in Figure 10). Demand response benefits were also incorporated across all markets, but to a much lesser degree. A modest number of ESCOs reported that state/local and K–12 projects implemented measures that resulted in increased revenue (e.g., sub-metering that enables agencies to charge utilities to building tenants). A few ESCOs reported incorporating tradeable emissions credits in K–12 projects; emissions credits were rarely or not used in other market sectors (see Figure 10).

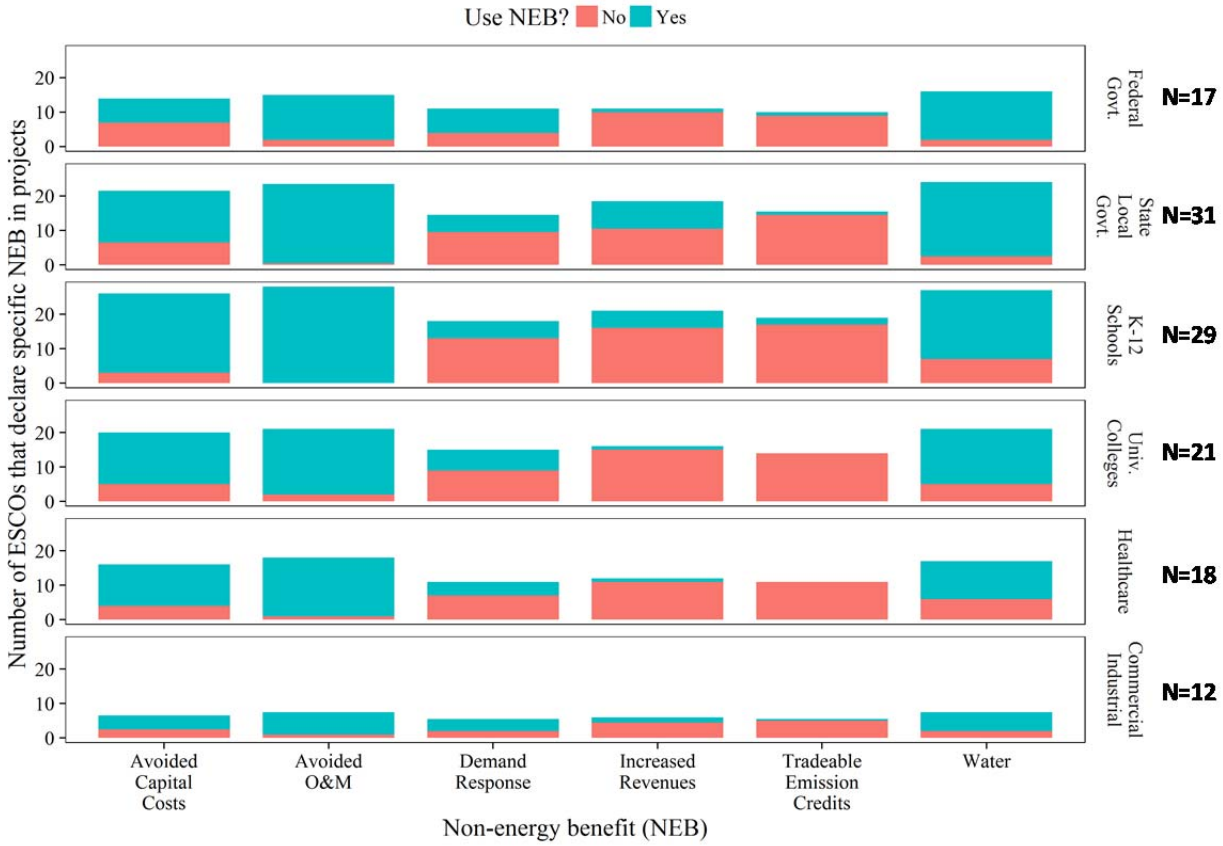

Figure 10. Use of non-energy benefits in performance-based projects (2012-2014)

Figure 11 and Figure 12 show the number of ESCOs that reported low (1%-33% of projects), moderate (34-66% of projects) and high (>66% of projects) incorporation of NEBs in projects implemented from 2012-2014 for each market segment. ESCOs reported that operations and maintenance (O&M) savings was the most prevalent NEB, captured in at least some projects across all market segments. All ESCOs that serve the K-12 market that responded to this question (27) reported that between 15% and 100% of their K–12 projects incorporated O&M savings. Avoided capital costs were not uncommon in the MUSH markets, but were not incorporated at all in the federal or private commercial sectors. The Federal Energy Management Program (FEMP) currently permits three types of NEBs in federal ESPC projects: (1) savings due to decreased water and sewer usage; (2) reduced O&M expenditures; and (3) savings due to reduced repair and replacement expenditures (e.g., less frequent replacement of lighting)[FEMP 2015]. Very few projects across sectors incorporated tradeable emissions credits; a few ESCOs reported emissions credits in state/local, K–12 and commercial projects.

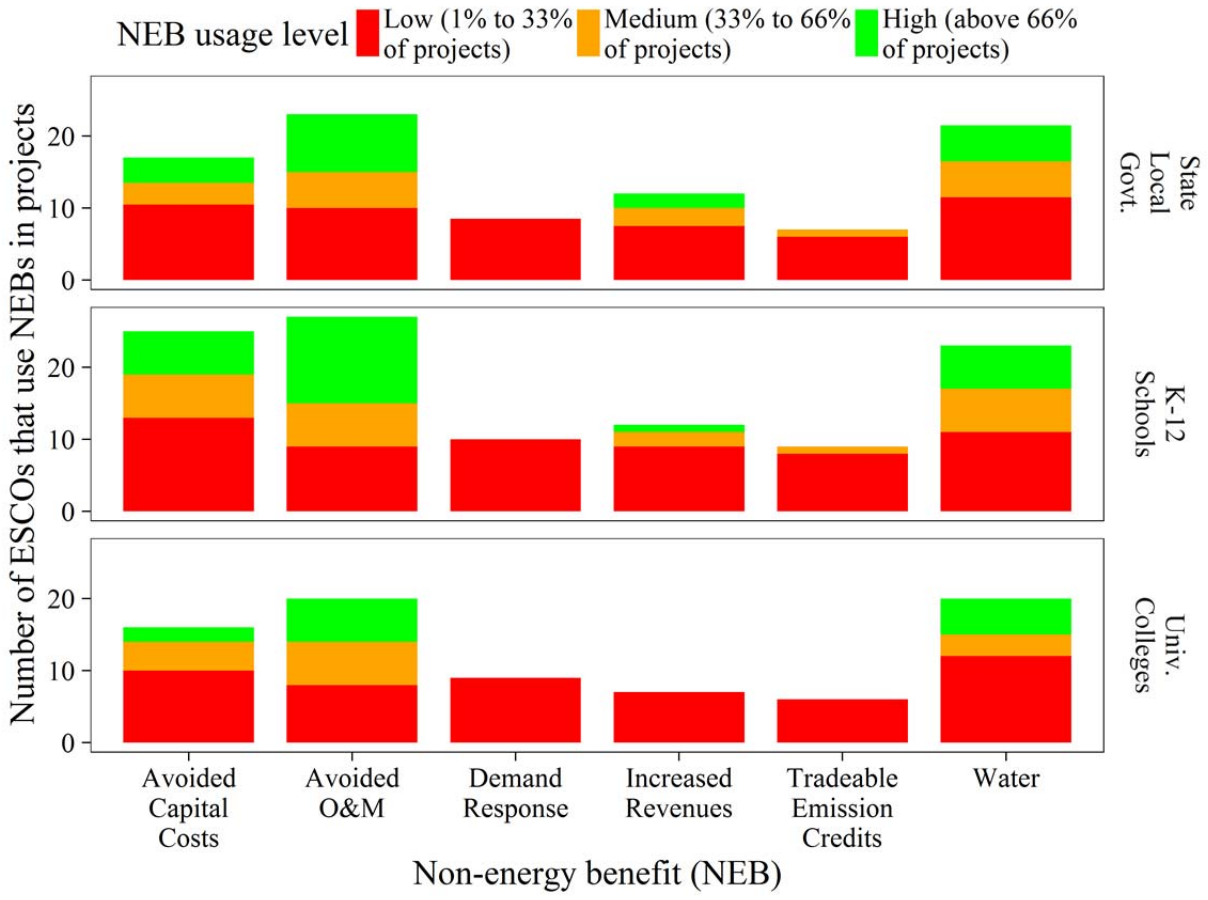

Figure 11. Incorporation of non-energy benefits in State/Local Government, K–12 schools, and University/College markets

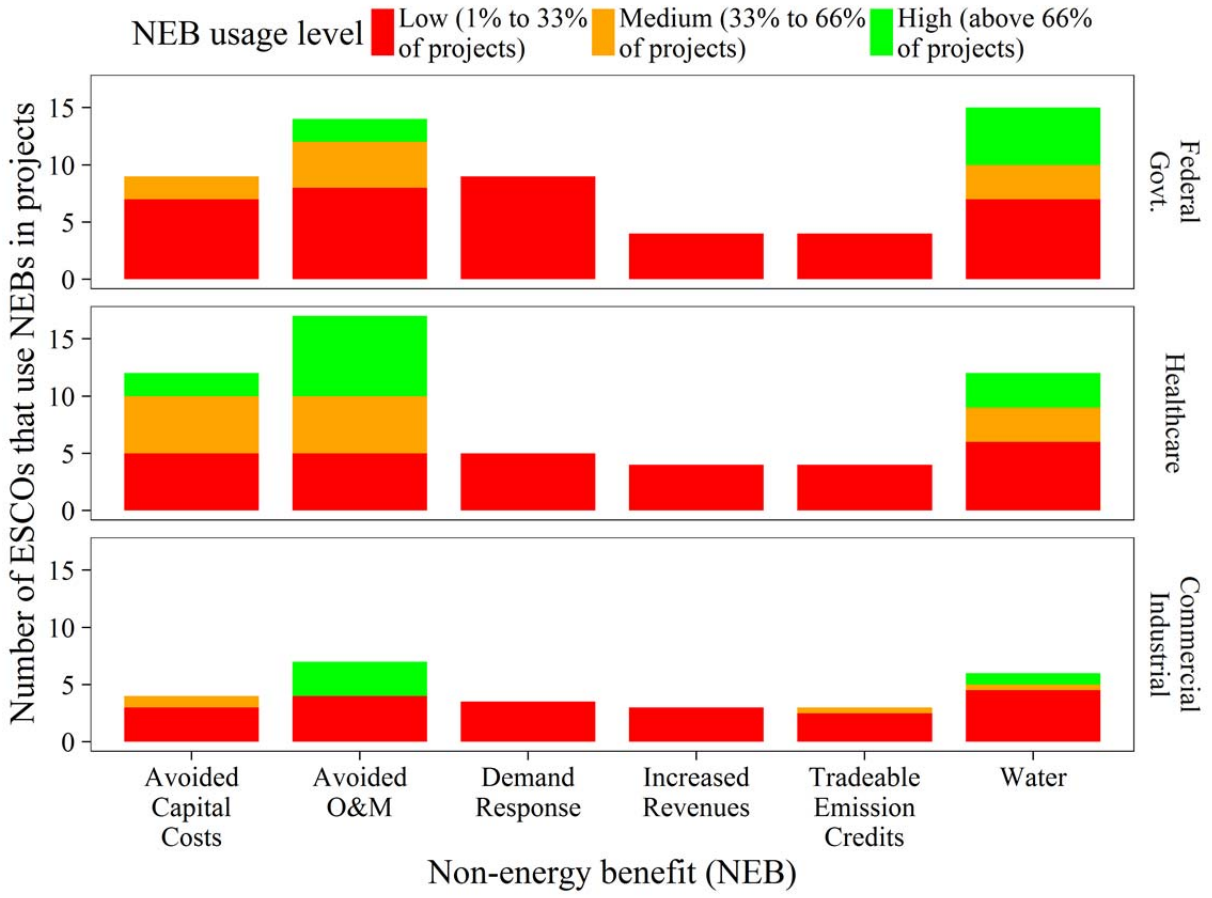

Figure 12. Incorporation of non-energy benefits in Federal government, Healthcare, and C/I markets

We also asked ESCOs to estimate the number of performance-based projects that were implemented primarily for facility improvement purposes versus those based on purely financial reasons (energy and other cost savings). Fifty percent of the 28 respondent ESCOs reported that a high percentage of K–12 projects were implemented primarily for facility improvement purposes. Several of these ESCOs reported that 80%-100% of their K–12 projects were completed to address facility upgrade needs. In the state/local government, university/college and healthcare sectors, about one-third of ESCOs reported that a high percentage of those projects were implemented for facility improvement reasons (see Figure 13).

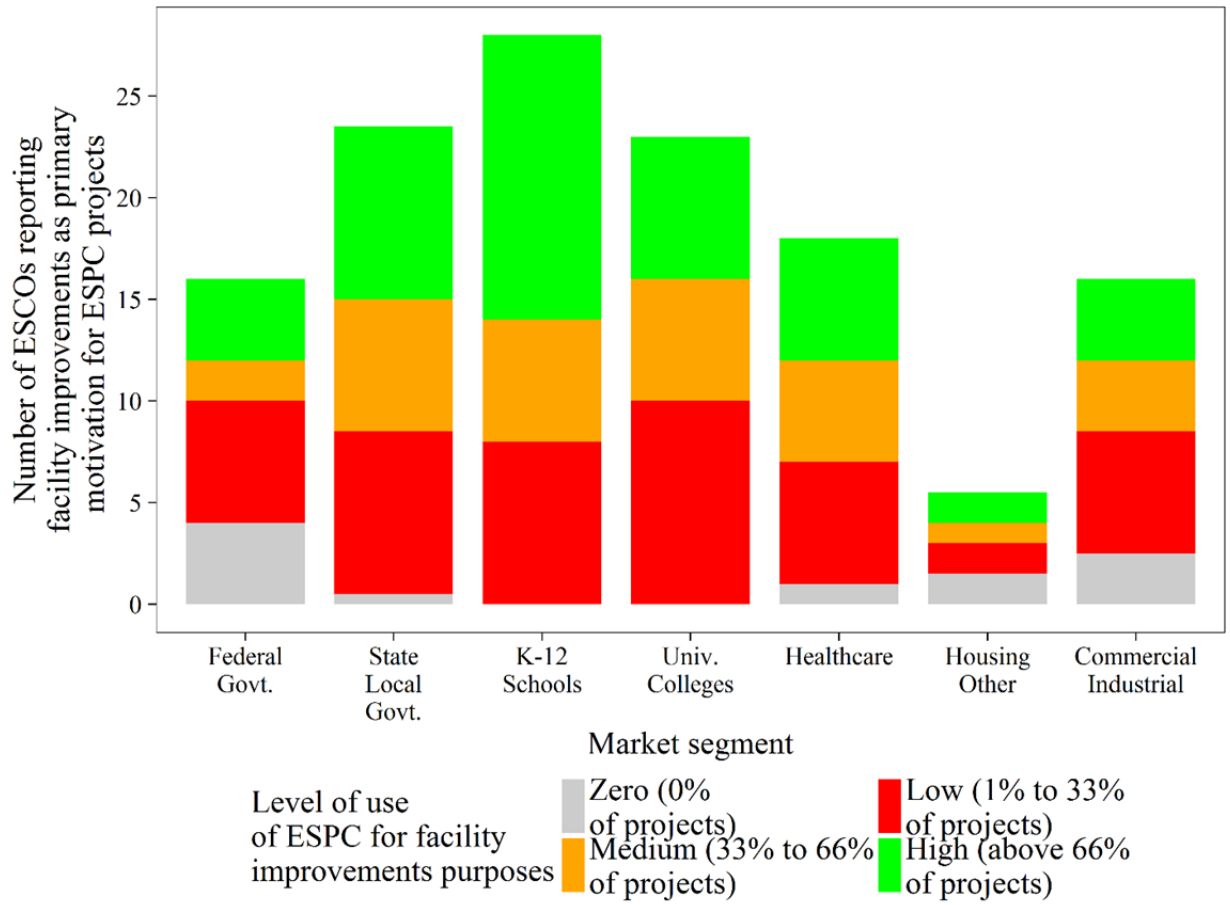

Figure 13. Use of ESPC strictly for facility improvement purposes

3.8. Financing tools and incentives

We asked ESCOs to estimate the percentage of their projects implemented during 2012–2014 that used local, state, or federal tax benefits (e.g., Section 179d,[24] Investment Tax Credit (ITC), or the Production Tax Credit (PTC)). Thirty ESCOs responded to this question. Across all market sectors, more than half of the ESCOs serving each market reported use of tax benefits. More than 85% of the respondent ESCOs in the state/local, K–12 and university/college sectors report using tax benefits (see Table 7).

[24] 179d allows a public agency to assign the tax credit deduction to the project implementer.

Table 7. Number of ESCOs reporting incorporation of tax benefits in projects implemented 2012-2014

Market Sector	# of Respondent ESCOs that Serve the Market Sector	# of ESCOs Reporting Use of Tax Benefits
Federal	15	11
State/Local	22	19
K–12	24	22
Univ./College	16	14
Healthcare	17	12
Commercial/Industrial	16	11
Public Housing/Other	8	5

Figure 14 shows the number of ESCOs that reported zero percent (0%), low (1%-33% of projects), moderate (34-66% of projects) and high (>66% of projects) use of tax benefits in projects implemented from 2012–2014 for each market segment. Of the 24 ESCOs that responded for the state/local market, nearly half (11) reported that a high percentage of state/local projects used tax benefits (see green bar in Figure 14). For the K–12 market, half (12) of the ESCOs reported that a high percentage of K–12 projects leveraged tax benefits. In the federal sector, five of fifteen ESCOs reported that a high percentage of projects used tax benefits.

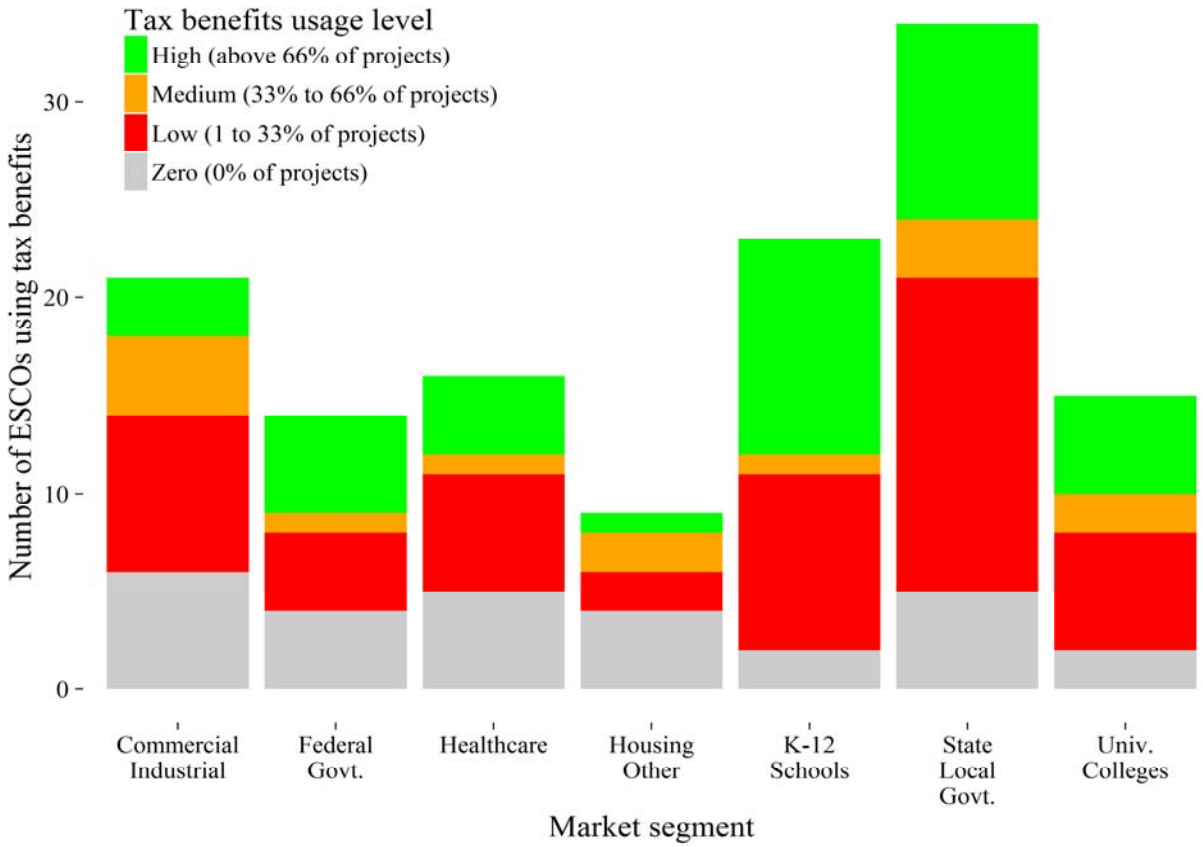

Figure 14. Utilization of local, state or federal tax benefits in projects developed by ESCOs during 2012-2014

We asked ESCOs to estimate the percentage of their performance-based projects that closed financing during the 2012-2014 period in each market segment that used the following types of funding approaches: 100% financed; a balance of cash and financing; and 100% cash. Forty-one ESCOs provided information for this question. Figure 15 shows the number of ESCOs that reported zero (0%), low (1-33% of projects), moderate (34-66% of projects), and high (>66% of projects) usage of each funding approach in various market segments. 100% cash funding is most prevalent in the commercial/industrial sector with 44% of ESCOs serving that sector (eleven of twenty-five companies) reporting high usage of cash. Projects in the federal, state/local, K–12, university/college and healthcare sectors had a high prevalence of financing 100% of project costs; more than 50% of ESCOs serving each of those markets indicated high usage of 100% financing (see Figure 15).

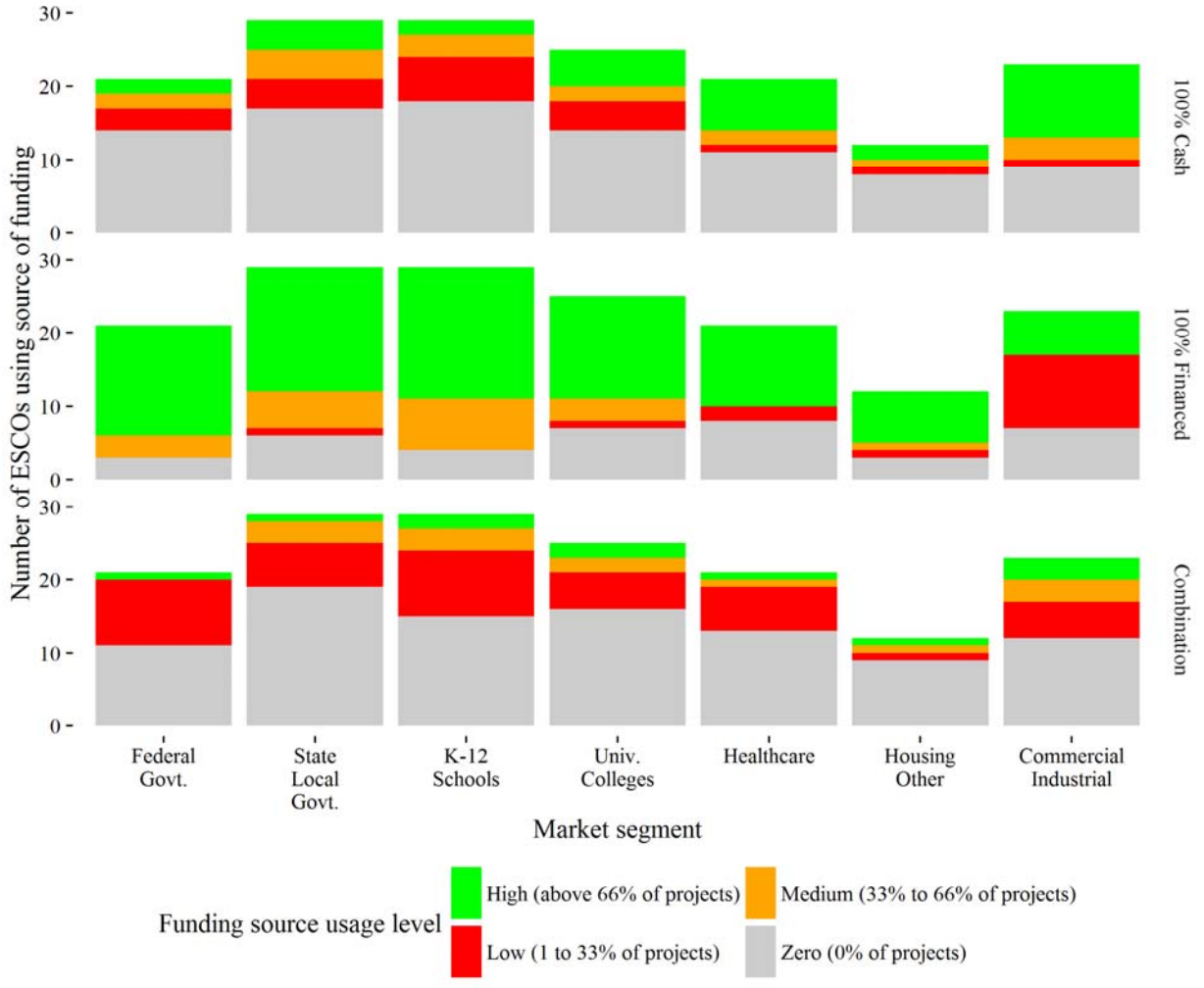

Figure 15. Project funding sources for performance-based projects by market segment

We then asked ESCOs to estimate the share of financed performance-based projects (partial or 100% financing) that used each of the following sources of funds, by market sector: (1) bond financing; (2) lease; (3) term loan; and (4) other. Thirty-six ESCOs responded. In the state/local market, term loans are the most commonly used approach with 59% of ESCOs (thirteen of twenty-two) reporting that a high percentage (>66%) of state/local projects used term loans. Customers in the state and local market sectors also make regular use of leases and bonds. Nine of twenty-two ESCOs reported a high percentage of state/local projects using leases, and 35% of ESCOs reported a high percentage of state/local projects using bonds. Most federal projects were financed using term loans. Financed projects in the commercial/industrial sector largely relied on leases or term loans (see Figure 16).

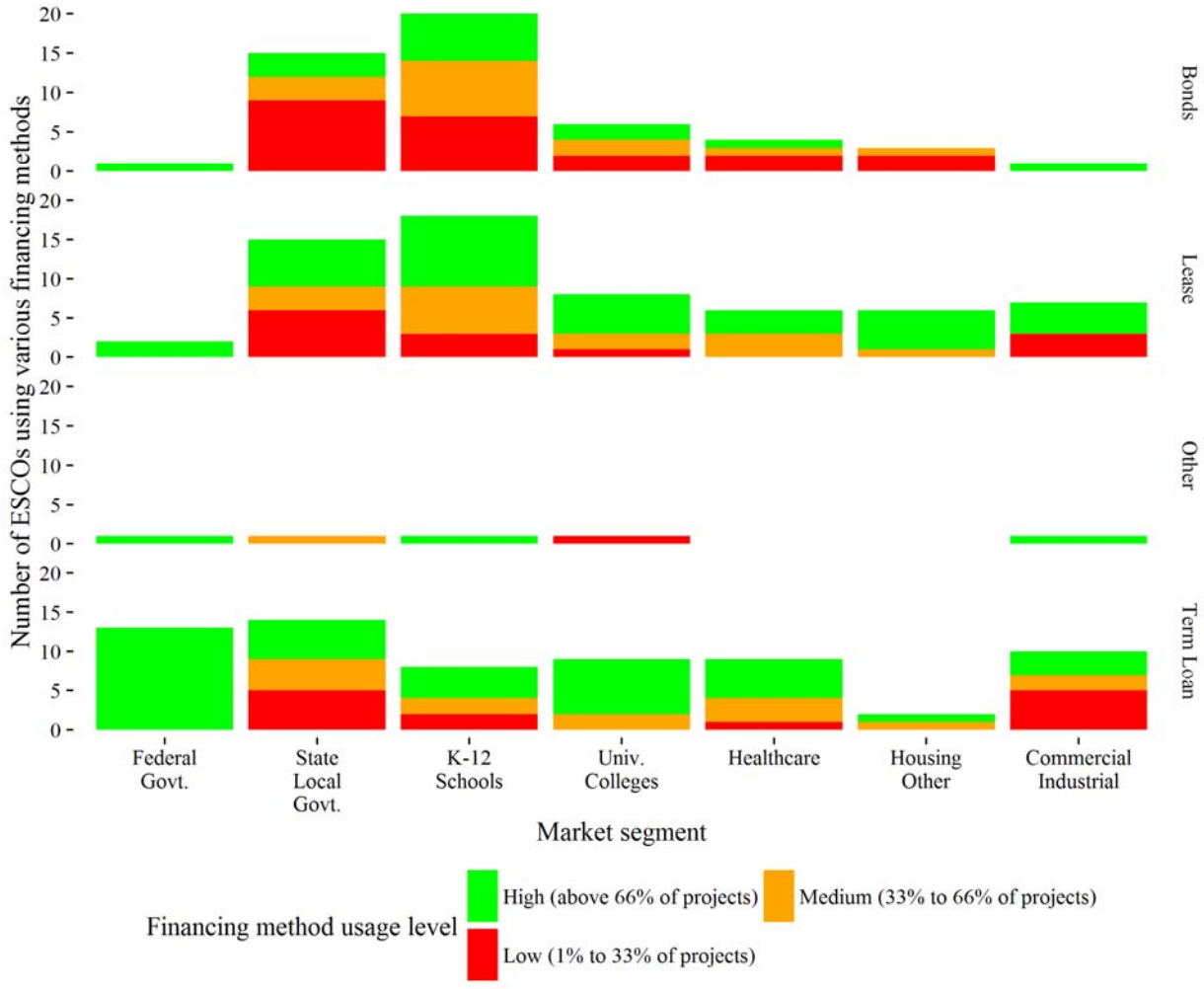

Figure 16. Project financing approaches by market segment

4. Discussion

4.1. ESCO industry revenue estimates

ESCO industry revenues appeared to be flat between 2011 and 2014, and revenue growth projected by ESCOs in 2011 did not occur. Given this result, we undertook additional analysis to review 2014 revenues reported by individual ESCOs and conducted additional interviews with ESCOs and other industry experts to assess factors that may have contributed to this phenomenon. For example, we learned that a few ESCOs that are subsidiaries of large vertically integrated firms had reorganized business units since 2011. Importantly, they indicated that some revenue categories that were included in their responses in our 2011 study[25] were not included in their reporting of 2014 revenues. In aggregate, revenues included in the 2011 total, but not in the 2014 figure due to the reorganizations totaled more than $300 million. Had these reporting changes not occurred, ESCO industry revenues for 2014 would have been somewhat higher than 2011 revenues (in nominal dollars).

The ESCO industry grew steadily from 1990 to 2000, then growth nearly flattened between 2000 and 2004, and resumed again from 2005 to 2011. Several factors contributed to the industry slowdown from 2000 to 2004, including stalled utility retail competition under electric industry restructuring, which led many utilities to divest their unregulated ESCO businesses; fallout from the Enron bankruptcy raising concerns about energy project accounting methods; and, a sunset of enabling federal ESPC legislation in 2003 (Hopper et al. 2007). Similarly we found evidence that a confluence of factors may have contributed to the industry growth slowdown between 2011 and 2014.

4.2. Factors influencing recent ESCO industry market activity

Factor #1: Increased competition from companies that do not meet our definition of an ESCO

LBNL presented preliminary study results to the NAESCO Board of Directors (composed of senior officers of all NAESCO member ESCOs). Based on feedback from some ESCOs, we learned that the industry revenue results likely excluded some revenue from performance-based projects implemented by companies that do not meet LBNL's definition of an ESCO, typically mechanical contractors. We then reached out to ESCO executives on the NAESCO Board of directors and asked two questions:

(1) To what extent are non-ESCO companies winning competitive solicitations for performance contracting projects?

(2) What are the names of these non-ESCO companies that they have competed against and that have won projects?

[25] Revenue categories included in 2011 that were not included in 2014 results for these ESCOs included demand response, facility management, and renewable energy installations.

Seven ESCOs responded and each company indicated that their companies had lost competitive bids for performance contracts to firms that they would not consider to be ESCOs. The respondents estimated that non-ESCO companies are taking 10-15% of the market and provided a list of twenty-eight mechanical contracting firms that had won projects. Six of those firms met the LBNL definition of an ESCO and were included in the 2014 ESCO industry revenue results. We reviewed the websites of the other twenty-two companies and found that six listed performance contracting as a service (one of the six operates in Canada). The other sixteen companies' websites listed many of the functional components of a performance contract among their service offerings, but did not explicitly name performance contracting as a service.

We then interviewed senior managers from two of the identified mechanical contracting firms to learn more about the mechanical contracting companies that are winning bids for performance-based projects. Both of these managers had more than ten years of performance contracting experience as former employees of large ESCOs and they identified recent changes in the marketplace:

- Some mechanical contractors have become confident that they can manage the risks involved in 12–18 month ESPC project development cycles, which have historically been significant barriers to entry. Some mechanical contractors are increasingly interested in managing their own development risk rather than being subcontractors on projects to ESCOs (and subject to development risks that they believe that they cannot control).
- Some mechanical contractors are now willing to assume the performance risks associated with project measurement and verification (M&V) practices that are typically utilized for certain measures (e.g., stipulated savings or IPMVP Option A).

While this information is anecdotal, we think it suggests that there has been increased competition for energy efficiency procurements in institutional markets in recent years. This trend may also indicate that the ESCO industry has demonstrated that the most common energy efficiency retrofits in the public/institutional market (lighting, HVAC equipment and controls) are no longer perceived as technically risky by many contractors and their customers. Furthermore, an increasing number of customers appear to perceive little risk in the ESCO financing model of relying on the cash flow from projected energy savings to repay the cost of these retrofits. This gradual erosion of perceived technical risk of many high efficiency technologies can be viewed as one of the "success stories" of performance contracting, which has been enabled by federal/state policies and legislation and facilitated by federal (DOE, DOD) and state energy agencies.

A related factor may be the declining cost of emerging technologies (e.g., LEDs, PV) that are being promoted by specialty contractors.[26]

Factor #2: ESCOs may have already achieved substantial market saturation in key markets

[26] We see this as the continuation of a trend we observed in the PV market and declining ESCO revenue from PV installations (Satchwell et al. 2010, Stuart et al. 2013).

The two largest non-federal sources of ESCO revenue have consistently been the state/local government and K–12 schools markets. Though there is significant potential in the private commercial and industrial markets, ESCOs have not had much success in penetrating that market. In our previous study, ESCOs estimated ESPC market saturation of 30% in the state/local market and 42% in the K–12 schools (Stuart et al 2013). These results suggest that for those two sectors, ESCOs may have moved beyond the early adopter phase. It is possible that ESCOs have implemented projects for a substantial portion of their most willing and able customers—akin to "achievable potential."[27] The remaining state/local government and K–12 schools market may present higher barriers than the addressed market, for reasons that include the following:

- Smaller projects (<$500,000), which we hypothesize may make up a large portion of the remaining market and whose owners may be smaller local governments and school districts that historically have not been attractive to the larger ESCOs that dominate the industry.
- A portion of the remaining market is comprised of some potential projects with large technical potential in the K–12 and state/local government markets, as yet largely untapped due to complex bureaucratic hurdles (e.g., New York and Philadelphia K–12 schools, Michigan prisons, and California state government facilities).
- Some of the remaining market may consist of projects for organizations with less financial management capacity than those that have completed ESPC projects.[28]

Factor #3: Some remaining customers in the public/institutional market are uncertain about the long-term commitment of an ESPC project

Uncertainty about converting the variable expense of energy bills into the long-term fixed expense of an ESPC financing repayment has always been a significant barrier to ESPC for some customers. The current economic and fiscal environment for state/local, K–12 and public universities, with its budget constraints, uncertain future state revenues, and seemingly unpredictable future energy prices reinforces, rather than reduces, this barrier.

While the U.S. economy has improved significantly since the great recession, the recovery has not been even. Tax revenues have returned to pre-recession levels in only about half of the states. Figure 17 shows the stark difference between one state that has achieved a substantial fiscal recovery (California) and two states that have not recovered (Michigan and Ohio) (Pew Charitable Trust 2015). The experience of the recession has led some states to enlarge "rainy day" funds (to

[27] Stuart et al. (2013) defined the ESCO market investment potential as "the aggregate amount of project installation costs technically possible with a single turnover of the remaining stock of buildings not already addressed by ESCOs." The approach to calculating the market potential did not directly align with any of the most common types of energy efficiency estimates (e.g., technical, economic and achievable) due to limitations of the available data. It used a hybrid approach that may have under-estimated the amount of floor space technically addressable, but also potentially over-estimated the amount of economic or achievable market potential.

[28] Such organizations include those with financial managers and organization attorneys that are not familiar with ESPC and other types of sophisticated financing.

protect core functions in the event of a future recession).

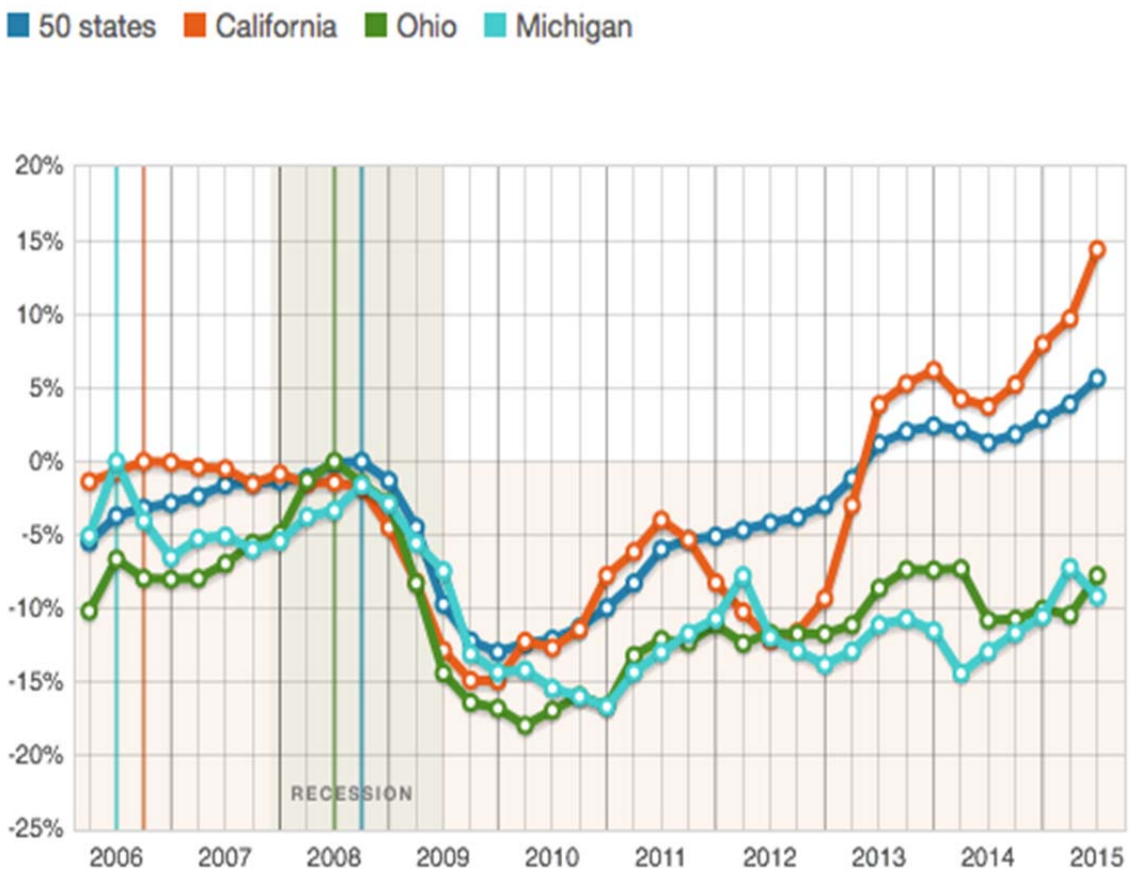

Figure 17. Change in tax revenue from example states (Pew Charitable Trust 2015)

Furthermore, while state and local government debt has stabilized, the growing burden of retirement and retiree healthcare for public sector employees, which are effectively another form of debt, makes some state and local government increasingly wary of taking on additional long-term debt, such as an ESPC project (see Figure 18).

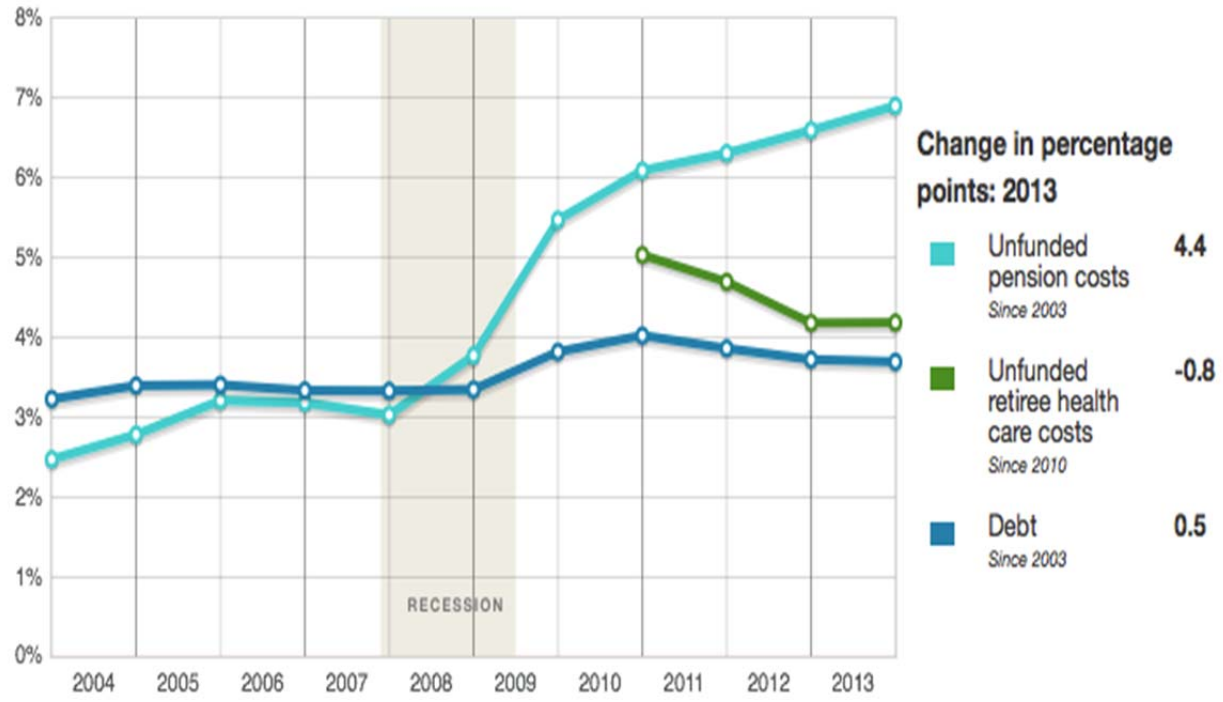

Figure 18. Debt and unfunded retirement costs as a share of state personal income (Pew Charitable Trust 2015)

Factor #4: Changing perception of future gas and electricity prices

Because government facility managers seek energy price certainty for their budgets, they have used performance contracts to, in effect, hedge a portion of their future costs, by converting a variable expense for energy bills into a long-term fixed expense (e.g., the repayment of the cost of the measures that eliminate a fraction of their energy bills). Expectations that natural gas prices will remain low, and will be significantly less volatile than they were a few years ago, may reduce this perceived benefit of performance contracts for some/many customers.

Larsen et al. (2012) and Carvallo et al. (2015) report that ESCOs have been installing increasingly comprehensive projects that have a rising share of project savings coming from fossil fuels (as opposed to electricity)—primarily natural gas. The Energy Information Administration (EIA) reports that the U.S. average natural gas retail price for commercial customers rose dramatically from about $6.50/Mcf in 2003 to over $12/Mcf in 2006, nearly doubling in three years. Retail gas prices then dropped 30% between 2008 and 2012 to about $8/Mcf, and have remained near that price and relatively less volatile since then (EIA 2016a). Note that these are the prices for gas delivered to the customer, not the widely-quoted wellhead or trading hub prices. Similarly, the average commercial retail price of electricity 2009-2012 was 10.19 cents/kWh 2009-2011; in 2012-2014 it was only about 2% higher, at 10.36 cents/kWh (EIA 2016b).

Factor #5: Experience with some legacy projects has led to the more cautious use of ESPC to finance needed capital improvements.

Larsen et al (2012) report that customers in the public/institutional market are increasingly using ESPC projects to help offset accumulated deferred maintenance needs (e.g., asbestos removal, roof replacement, wiring). Such measures are highly valued by public sector customers, but may garner little or no energy savings. If the non-energy benefits cannot be monetized, there may be an increasing gap between projected and actual cash savings during the performance term of the project. Several years ago, when trends indicated that energy prices could inexorably increase, performance contracting customers may have been more comfortable agreeing to stipulating significant energy cost escalations (e.g., 2-3% annually over the life of the contract), because these projected cost escalations translated into more savings and thus a larger project. Escalating the savings in this manner has the effect of showing increased dollar value of savings for projects.

Such cost escalations may be perceived as a barrier for some potential new customers, given that some organizations are struggling to justify the escalations in legacy contracts and to pay the financing costs in the absence of the projected energy cost savings. Minimizing escalations limits the dollar value of the energy savings over the life of new projects and thus the total project cost that can be repaid from savings. Moreover, expectations for continued low natural gas prices have made it more difficult to implement the full scope of many projects within payback or maximum contract term constraints (Young et al. 2013). Long-payback measures which may be the major driver from projects (*e.g.,* the new high school roof) are cut from the scope, making the projects smaller and reducing the motivation of the customer to implement a performance-based contract.[29]

Factor #6: ARRA "boom and bust"

The American Reinvestment and Recovery Act (ARRA) generated an unprecedented short-term burst of funding for energy efficiency investment in the public/institutional sector. Federal, state and local governments were directed to deploy the funds quickly and found opportunities to generate long term energy bill savings by targeting a backlog of "shovel-ready" projects in government facilities (Goldman et al. 2011). Some ESCO respondents indicated that because of time pressures, ARRA funds were often used to pay for short-payback building retrofit projects in public/institutional markets, rather than using ESPC. ARRA also provided funding for state and local governments to hire energy planning and energy efficiency implementation staff and consultants for a limited time. When the ARRA funding ended, many states no longer had funds to retain this staff or consultants who were helping to manage and oversee procurement projects (NASEO 2015).[30]

[29] One reaction to this experience with some legacy projects has been in North Carolina, where in 2012 the state redefined energy savings to severely restrict energy cost escalations (see State of North Carolina Performance Contracting Law, § 143 64.17.(2)).

[30] Results of the NASEO 2014 member survey indicated that the median full-time equivalent (FTE) staff at state energy offices declined from 15 in 2012 to 12 in 2014.

4.3. Prospects for near-term growth

There are a number of indications that the ESCO industry may see some growth in revenues over the next few years. A number of enabling policies could have a significant impact on future industry growth in the coming years, including:

- President Obama added an additional $2 billion to the existing $2 billion target for federal ESPC investment, bringing the total goal for federal investment in ESPC projects to $4 billion to be achieved by the end of 2016 (White House 2014). As of May 2016, awarded federal projects total $3 billion; agency commitments to award by the end of 2016 may add another ~$1 billion. (Rockwell 2016).
- Several states are ramping up ESPC activity. For example, staff from the California Department of General Services have indicated that the 2016 proposed legislation to streamline the state's ESPC contracting process is expected to pass, which may help address a large backlog of projects that may implemented within the next several years.

It is also important to highlight examples of recent revenue trends for large ESCOs:

- Ameresco, the only publicly-traded U.S. ESCO that is not a subsidiary and whose business consists solely of ESCO services, is experiencing a revenue rebound after several years of decline. The company's reported revenues were $428M in 2009 and peaked at $728M in 2011, followed by a 13% decline in 2012 ($631M) and a further 9% decline in 2013 ($574M). However, in 2014, revenues rose 3% (to $593M) and another 8% in 2015 (to $641M). The company's 2015 SEC 10-K filings indicate that the backlog of contracted and awarded projects (expected future revenues) has increased steadily since 2013 (Ameresco 2010, 2011, 2012, 2013, 2014, 2015; The Street 2011).
- Johnson Controls, Inc. is also seeing revenues rise for its Building Efficiency North American Systems and Service segment[31] after several years of declines. The segment reported revenue of $4.6B in 2011 (up 9% from 2010), followed by annual declines of 2%, 1% and 3% in 2012, 2013 and 2014, respectively. In 2015, segment revenue increased by 2% over 2014 (Johnson Controls 2010, 2011, 2012, 2013, 2014, 2015).

[31] ESCO business revenues for Johnson Controls, Inc. (JCI) account for only a portion of the total revenue for the Building Efficiency North American Systems and Service segment. JCI does not report its ESCO revenue separately from other energy services in its SEC 10-K filings.

5. Conclusion

This study builds on previous LBNL reports on ESCO industry market trends and provides updated estimates of ESCO industry revenue, including revenue by market sector, business type, U.S. Census region, and new and existing customers, as well as recent and short-term projected growth. We also report on the use of non-energy benefits, tax benefits, and financing approaches for performance-based projects.

The U.S. ESCO industry experienced year-over-year growth from 1990 through 2011 with $5.3 billion in revenues in 2011. However, in 2014, industry revenue remained flat at ~$5.3 billion. Based on our interviews, ESCO industry executives anticipate revenues of ~$7.6 billion in 2017, which represents an average annual growth rate of $13% during the years 2015-2017.

The public and institutional market segments have continued to account for the bulk of ESCO industry revenue; in 2014, these markets accounted for about 85% of industry revenues. Performance contracting continues to be the dominant business activity, bringing in ~74% ($3.7B) of 2014 revenue.

We observed that the share of market revenue going to the top eight ESCOs has declined since 2006. In 2014, in a few U.S. Census regions, small and medium ESCOs captured nearly as much of the market as large ESCOs.

New customers generated approximately 60% of ESCO revenues from K–12 schools and 85% of public housing revenue during 2012-2014. In the federal sector, and each of the remaining MUSH markets, new customers generated 50% or more of ESPC revenue for the three-year period.

ESCOs incorporate several different types of non-energy benefits (NEBs) into performance-based projects. The most commonly incorporated NEBs are O&M savings—which are incorporated in projects across all market segments. ESCOs reported that a significant number of projects, especially in the K–12 schools market, were developed primarily to improve or repair facilities rather than to achieve energy savings.

The ESCO revenue numbers for 2011 and 2014 were not easily comparable, because a few ESCOs that were subsidiaries of larger companies had undergone reorganization; some categories of revenue that were reported in 2011 were not reported in 2014. Other factors that may have contributed to flat revenues between 2011 and 2014 include:

(1) Increased competition from companies that do not meet our definition of an ESCO (e.g., mechanical contractors), which suggests that customers and contractors are less intimidated by energy efficiency technologies and the notion of financing projects with long-term borrowing that is repaid from savings has spread beyond ESCOs;

(2) Increased difficulty of developing projects, because in some markets, ESCOs may have attained a substantial portion of the achievable potential, and much of the remaining

market may consist of projects for organizations with less financial management expertise or capacity than organizations that have implemented ESPCs, and large projects for state and local governments that have historically resisted performance contracting, or smaller projects not attractive to the most of the ESCOs in our survey;

(3) Uncertainty among many potential remaining customers about committing to a long-term performance contract;

(4) More cautious use of ESPC to finance needed capital improvements by some customers; and

(5) Reduction of performance contracting's perceived benefit of hedging energy price increases and volatility, because of customer expectations that natural gas (and electricity) prices will continue to be relatively low and less volatile than in the past.

Despite these challenges, recent activity at larger ESCOs and support or expansion of enabling policies (ESPC, PACE) provides some indication that industry revenues are poised to increase in the coming years.

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Appendix A. Data Tables

Table A - 1. ESCO industry revenue (nominal $) by market segment for 2008, 2011 and 2014

Market	2008 (n=29) ($ million)	2011 (n=35) ($ million)	2014 (n=43) ($ million)
Federal Govt.	$ 583	$1,102	$1,073
State/Local Govt.	$ 872	$1,233	$1,314
K–12 Schools	$ 847	$ 995	$1,219
Univ./College	$ 614	$ 702	$ 504
Healthcare	$ 238	$ 302	$ 304
Housing/Other	$ 356	$ 385	$ 342
Commercial/Industrial	$ 277	$ 419	$ 409
TOTAL	**$3,786**	**$5,138**	**$5,165**

Table A - 2. ESCO industry revenue share by market segment for 2008, 2011 and 2014

Market	2008 (n=29)	2011 (n=35)	2014 (n=43)
Federal Govt.	15.4%	21.4%	20.7%
State/Local Govt.	23.0%	24.0%	25.4%
K–12 Schools	22.4%	19.4%	23.5%
Univ./College	16.2%	13.7%	10.0%
Healthcare	6.3%	5.9%	5.9%
Housing/Other	9.4%	7.5%	6.6%
Commercial/Industrial	7.3%	8.1%	7.9%
TOTAL	**100.0%**	**100.0%**	**100.0%**