The U.S. ESCO Industry: Recent Trends, Current Size and Remaining Market Potential

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ABSTRACT

This report analyzes recent and future trends in the energy service company (ESCO) industry including market size, project and customer characteristics, growth, and an estimate of remaining market potential. The research draws on information from interviews with ESCO executives conducted in late 2012. For the purpose of characterizing the industry, the research team defines ESCOs strictly as energy service companies for whom performance contracting is a key business activity.

Results indicate that aggregate revenue growth rates for U.S. ESCOs significantly outpaced U.S. GDP growth during the 3 years 2009 to 2011, despite the recession. Based on historical trends, the industry could more than double in size from approximately \$6 billion in 2013 to \$11–\$15 billion by 2020. Performance-based contracts made up about 70 percent of the industry's 2011 revenue. Public and institutional markets accounted for 84 percent of 2011 industry revenue. About 8 percent of 2011 industry revenue came from private commercial customers, a slight increase over the 2008 share.

ESCOs provided estimates of the total building floor area in each customer segment that had received performance-based energy efficiency retrofits since 2003. Market penetration was highest in K-12 schools (42% penetration) and lowest in the private commercial buildings sector (9% penetration). Based on the market penetration estimates, typical project investment costs from a database of more than 4,000 projects, and data on buildings typically addressed by ESCOs, the research team estimated that the remaining market potential in facilities typically addressed by ESCOs ranges from about \$70 to \$130 billion.

Introduction

A significant ramp-up in energy efficiency activities is occurring at the local, state, and federal level, driven in part by the adoption of energy efficiency or greenhouse gas reduction goals and other federal and state enabling policies. For example, in the utility sector, 15 states have adopted energy efficiency resource standards (EERS) that require program administrators at utilities or other entities to achieve minimum energy savings targets that increase in the future (e.g., 10 years). Six additional states have established statutory or regulatory requirements that utilities acquire "all cost effective" energy efficiency (Barbose et al. 2013). In response to a 2011 presidential memorandum (Obama 2011), the U.S. Department of Energy (DOE) is tasked with implementing \$2 billion in new energy savings performance contracts (ESPCs) and utility energy savings contracts (UESCs) in 2012 and 2013. If successfully implemented, this authorization represents a significant increase in federal market activity compared to previous years.[1]

[1] For example, the total dollar energy efficiency investment allocated through the Federal Energy Management Program's Super ESPC Program--since its inception fifteen years ago--totals \$2.7 billion (FEMP 2013a).

The energy service company (ESCO) industry has a well-established track record of delivering substantial energy and economic savings in the public and institutional buildings sector, typically through energy saving performance contracts (ESPC) (Larsen et al. 2012; Goldman et al. 2005; Hopper et al. 2007).

Larsen et al. (2012) formally 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.*[2]

This work builds on previous Lawrence Berkeley National Laboratory (LBNL) U.S. ESCO industry research that includes analysis of information from a database of over 4,000 completed ESPC projects (Larsen et al. 2012) and previous market reports drawing upon interviews with ESCO executives (Satchwell et al. 2010; Hopper et al. 2007). We analyze the market size, recent growth trends and market characteristics of the U.S. ESCO industry and provide a preliminary estimate of the remaining ESCO industry market potential (expressed in terms of investment opportunity and projections of potential blended energy savings) using a methodology we developed to accommodate data limitations.

Data Sources and Approach

In estimating the size and market potential of the ESCO industry, we include only those companies that meet our definition of an ESCO: firms for which performance contracting is a core part of their energy-efficiency services business. We do not include companies such as engineering and architectural firms; HVAC, lighting, windows or insulation contractors; companies whose primary business is utility energy efficiency program implementation; and companies that offer energy efficiency services, but typically do not enter into long-term contracts that link compensation to the project's 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.

ESCO Industry Interviews

A primary source of information for this study was a set of interviews conducted with U.S. ESCO executives in the summer and fall of 2012. ESCO executives were asked to provide information about their company's 2011 revenue from energy services (performance contracts, energy efficiency and/or onsite generation, design/build projects, engineer/procure/construct projects, and energy efficiency-related consulting), past and projected revenue growth rates and revenue by market segment, contract type and technology type. ESCOs also provided market penetration estimates of performance-based energy saving projects for each customer market segment for their service area.

We identified an initial list of 144 companies that provide energy efficiency services, potentially including performance contracting, using various information sources including

[2] This definition aligns with the European Commission Directive (2006/32/EC) on Energy End-use Efficiency and Energy Services standard definition of an ESCO, in particular the delivery of energy services and that some degree of performance-based financial risk is held by the ESCO (Soroye and Nilsson 2010; Marino et al. 2010).

ESCOs accredited by the National Association of Energy Service Companies (NAESCO), U.S. DOE and several states' performance contracting program lists of qualified ESCOs and other publicly-available information. We then consulted with NAESCO staff, conducted a Delphi process[3] with several industry experts, and directly contacted companies to narrow down the list to 45 ESCOs that met our criteria and were actively working within the United States. We were able to interview 35 of the 45 companies; thus the response rate was about 78%.

Estimating U.S. ESCO Industry Size and Projected Growth

We estimated aggregated 2011 ESCO industry revenue from energy services by summing revenues reported by the 35 ESCOs we interviewed and revenues estimated for the 10 ESCOs that did not respond to our requests. ESCO revenues from the latter group of companies were estimated through a Delphi approach with industry experts, informed by consulting recent publicly-available information (e.g., company reports, U.S. Securities and Exchange Commission 10-K filings). The ten non-respondent ESCOs were among the smallest ESCOs in terms of revenue, ranging from $1M to $20M revenue annually. In aggregate, we estimate that the non-respondent ESCOs represented about 2% of 2011 ESCO industry revenues in the United States. For ESCOs that are part of a larger organization, the revenues reported in this study are derived exclusively from the business unit providing ESCO-related services.

We developed an aggregate estimate of projected industry revenues through 2014 by using (1) respondent ESCOs' growth projections applied to their 2011 revenues and (2) median industry-wide growth rates for the non-respondent ESCOs—applied to the their Delphi-generated revenues. We estimated projected growth rates for non-respondent ESCOs by calculating median growth rates for the respondent ESCOs across three size categories: small (2011 revenue <$100M US), medium (2011 revenue $100M-$299M) and large companies (2011 revenue >=$300M).[4] We applied these median growth rates to non-respondent ESCO revenues of the corresponding sizes to determine the 2012-2014 revenue projections. Small ESCOs projected a median annual growth rate of 15% for 2012-2014 (see Table 1).

Table 1. Median projected annual growth rates by ESCO size (2012-2014)

ESCO Market Size	Count	Median Projected Growth Rate
Small (< $100M in revenue)	32	15%
Medium ($100M - $299M)	8	10%
Large (>= $300M)	5	7%

Estimating U.S. ESCO Industry Remaining Market Potential

The *Guide for Conducting Energy Efficiency Potential Studies* (EPA 2007) notes that there are several different types of energy efficiency "potential" and provides typical definitions of several key terms including: (1) *technical* potential (the theoretical maximum amount of energy savings that could occur disregarding all non-technical constraints such as cost-effectiveness and end-user willingness to adopt measures); (2) *economic* potential (the subset of technical potential of those measures that are cost-effective when compared to the price of

[3] 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 (Hopper et al. 2007; Soroye and Nilsson 2010).
[4] All dollar amounts throughout this article are U.S. 2012 dollars unless otherwise indicated.

conventional energy supply); and *achievable* potential (the subset of economic potential that could be achieved over time under the most aggressive energy efficiency program scenario).

Our estimate of ESCO market potential is somewhat similar to an achievable potential in that we utilize typical installation costs, energy savings and dollar savings based on actual projects in the LBNL/NAESCO project database.[5] Our estimate of total floor area available in the ESCO market relies on buildings data from several sources including the U.S. Energy Information Administration (EIA); the U.S. General Services Agency (GSA); the U.S. Department of Housing and Urban Development (HUD) and the Council of Large Public Housing Authorities (CLPHA). Unfortunately, we do not have enough information to determine what percentage of that floor area is economically feasible for ESCOs (or their customers) to retrofit. Accordingly, we developed an analytical approach to accommodate these data limitations.

We define the remaining investment potential for markets typically served by ESCOs 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.[6] In other words, investment potential represents the upper-bound dollar amount that ESCOs could achieve in markets typically addressed by this industry. Our estimate excludes two factors that could result in a significantly greater potential market: (1) the impact of new technologies that are more cost effective than current technologies; and (2) another round (or two) of projects implemented in buildings whose retrofits are now beyond their expected useful life. We developed the estimate of remaining ESCO investment potential in four basic steps:

1. Estimate total floor area of ESCO-addressable buildings by market segment;
2. Determine existing market penetration of non-residential performance-based energy efficiency retrofits in ESCO markets;
3. Calculate typical investment levels and energy savings for the various market segments;
4. Estimate remaining market potential.

Step 1: Estimate total floor area of buildings typically addressable by ESCOs. Step 1 involved compiling information on the population of U.S. buildings and total floor area (ft^2) for each market segment using data from the EIA Commercial Building Energy Consumption Survey (CBECS) (EIA 2013a) and Residential Energy Consumption Survey (RECS) (EIA 2013b), the U.S. GSA (GSA 2003), HUD (HUD 2013) and CLPHA (CLPHA 2013).[7]

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[5] LBNL, in collaboration with NAESCO, has developed and maintained a database of performance-based energy projects implemented from the late 1990s to the present. As of May 2013, the database contained more than 4,200 energy efficiency-related projects in 49 states and several foreign countries. Most of the projects in the database are self-reported submissions by individual ESCOs as part of NAESCO's voluntary accreditation process (Larsen et al. 2013). Information provided by ESCOs includes, but is not limited to: facilities information (e.g., floor area, number of buildings, location); baseline energy consumption; contract information; measures installed; market segment; project investment levels; and projected, guaranteed, and measured savings.

[6] It is important to note that this preliminary estimate is based on assumptions of (1) existing market penetration provided by the ESCOs and industry experts and (2) data on the population of U.S. commercial buildings as reported by the Energy Information Administration Commercial Building Energy Consumption Survey (CBECS), Residential Energy Consumption Survey (RECS), HUD, or GSA.

[7] The CBECS database defines a "commercial" building as any building that is neither residential (used as a dwelling for one or more households), manufacturing/industrial (used for processing or procurement of goods,

The 2003 CBECS contains 5,215 records, which represents a statistically representative sample of U.S. commercial buildings at the time of that survey.[8] Each record corresponds to a single sampled building from across the country. The survey results are then weighted to derive the entire stock of commercial buildings in the United States (i.e., population of commercial buildings). The U.S. DOE Buildings Energy Data Book provides a query tool to access CBECS micro data (DOE 2003). Table 2 presents the query parameters that we used to compile the total floor area of "ESCO-addressable" buildings by market segment.

We attempted to account for the notion that, for various reasons, not all buildings in a market segment are addressable by ESCOs. For example, we know that ESCOs often target facilities of a certain minimum size, given that there are significant transaction costs involved in performance contracting. Accordingly, we assumed public buildings larger than 50,000 ft^2 to be ESCO-addressable. We considered private commercial buildings to be ESCO-addressable if they were greater than 50,000 ft^2 *and* owner-occupied, as principal-agent issues create high barriers to completing energy efficiency upgrades in leased buildings (IEA 2007).

Table 2. CBECS data query parameters used to compile addressable floor area for market segments (excluding public housing and federal government sectors)

Mkt Segment	Query Parameters (Buildings >=50,001 ft^{2})	
	Ownership	Building Type
State/Local	State + Local	Office, Public Assembly, Religious Worship, Food Sales, Non-refrigerated Warehouse, Food Service, Lodging–Hotel, Lodging–Motel, Retail Other Than Mall, Service, Public Order & Safety
K-12 Schools	(No selection)	Elementary, High School, Preschool
University/ College	(No selection)	Education– College, Lodging– Dormitory
Healthcare/ Hospital	(No selection)	Outpatient Health Care, Hospital
Private Commercial[9]	Property Management Company, Other Corporation, Religious Organization, Other Non-profit Organization, Individual Owner, Other Non-government Owner	Office, Public Assembly, Religious Worship, Food Sales, Non-refrigerated Warehouse, Food Service, Lodging–Hotel, Lodging–Motel, Retail Other Than Mall, Strip Mall Shopping, Service, Public Order and Safety, Nursing Home, Enclosed Mall

We estimated the total floor area of public housing likely to be addressable by ESCOs by compiling information from two sources and making several assumptions about this population

merchandise, raw materials or food), nor agricultural (used for the production, processing, sale, storage, or housing of agricultural products, including livestock).

[8] Due to data availability limitations, our approach assumes that the existing population of addressable buildings has not changed since CBECS 2003. However the authors acknowledge that there will have been new buildings constructed and some percentage of buildings retired since then. Thus we view this first estimate of the remaining market potential for ESCOs as a preliminary estimate that could be refined with more complete and recent data.

[9] The CBECS query tool does not delineate owner-occupied versus leased buildings, so we used the source microdata to identify the population of owner-occupied commercial buildings >= 50,001 ft^2.

of buildings. We used project-level information from the LBNL/NAESCO database to estimate median public housing unit investment levels of \$5.44/ ft^2. Next, we compiled information on public housing development size and unit counts from the Council of Large Public Housing Authorities (CLPHA) and the EIA's Residential Energy Consumption Survey (RECS). We found that there were a total of about 1,165,000 public housing units in 2000 (CLPHA 2013). We multiplied the number of units by the per-unit average square footage (~900 ft^2) for public housing units from the RECS (EIA 2013b). This resulted in an estimate of ~1.05 billion ft^2 of ESCO-addressable public housing living space.

We used two sources of information to estimate the total floor area of federal facilities in 2003. It appears that the CBECS survey may have under-estimated the floor area of federal facilities. We believe that GSA estimates of floor area for federal facilities are more accurate, because GSA provides a comprehensive inventory of federal facility information (GSA 2003). Unfortunately, the overall share of facilities with a floor area greater than 50,000 ft^2 was not specified. In this case, we used the share of federal floor area greater than 50,000 ft^2 from CBECS and multiplied this value by the aggregate floor area reported by GSA to determine the total floor area of federal facilities larger than 50,000 ft^2. Table 3 presents our results for total floor area of ESCO-addressable buildings, incorporating results from the CBECS database query and our calculations of federal and public housing floor area.

Table 3. Estimated total floor area of ESCO-addressable buildings by market segment in 2003

Market Segment	CBECS Sample Size	Number of Buildings (Units)	Average Floor Area (ft^2) per Building (Unit)	Total 2003 Floor Area (million ft^2)	% of Total 2003 Floor Area
Private Commercial	331	48,500	153,000	7,421	34%
K-12 Schools	236	48,800	105,000	5,124	23%
Federal	N/A	N/A	N/A	2,500	11%
State/Local	113	18,500	125,000	2,313	11%
Health and Hospital	254	11,500	195,000	2,243	10%
Universities/Colleges	70	11,200	120,000	1,344	6%
Public Housing	N/A	1,165,000	900	1,049	5%
Total				21,992	100.0%

Step 2: Estimate ESCO market penetration. Step two relies on ESCO industry respondents' estimates of market penetration and the judgment of our ESCO industry experts. We asked ESCO executives to estimate the percentage of the market in the ESCOs' service area, for each market segment, that has received energy efficiency services provided by any ESCO or other type of service provider at least once since 2003. For the purposes of this report, we estimated the remaining market potential for performance-based contracting, and thus only include ESCO market penetration estimates for performance-based projects. Twenty-one ESCOs provided market penetration estimates. The respondent ESCOs represented approximately 50% of the ESCO market in terms of industry revenues and included both small and large companies.[10] We applied each ESCO's market penetration estimates across each of the U.S. Census regions

[10] We analyzed market penetration responses by size of ESCO and detected no observable difference between the responses of the smaller and larger ESCOs.

included in that ESCO's service area. We then calculated the median of all ESCO responses that occurred for each market segment and each U.S. Census region (see Table 4).

Table 4. Median ESCO market penetration estimates: % of total market floor area for each market segment that has been addressed by performance-based contracts since 2003

Market Segment	U.S. Census Region				
	Northeast	Midwest	South	West	U.S.
K-12 Schools	45%	40%	42%	30%	42%
State/Local	39%	30%	30%	45%	30%
Federal	27%	28%	25%	27%	28%
Universities/Colleges	25%	25%	23%	30%	25%
Public Housing	20%	15%	18%	18%	18%
Health/Hospitals	10%	10%	15%	15%	10%
Private Commercial	10%	6%	8%	9%	9%

We multiplied the market penetration estimates by the aggregate floor area of each market segment to convert market penetration estimates to floor area that has received a performance contracting retrofit since 2003. We then summed the results to arrive at a total floor area for all market segments. Table 5 shows the total estimated floor area of ESCO-addressable buildings that have received performance-based retrofits since 2003, and indicates the percentage of the total floor area addressed by performance-based retrofits that is attributable to each market segment.

Table 5. Estimated total floor area (million ft^2) of buildings that have received performance-contracting retrofit projects since 2003

Market Segment	Floor Area Retrofitted: 2003-2012 (million ft^2)	% of Total Floor Area Retrofitted: 2003-2012
K-12 Schools	2,148	43%
Federal	699	14%
State/Local	698	14%
Private Commercial	665	13%
Universities/Colleges	338	7%
Health/Hospitals	224	5%
Public Housing	190	4%
Total	4,962	100%

Step 3: Typical ESCO project investment and savings levels. Step three involved analyzing ESCO project information for installations completed from 2003 to 2012 using data from the LBNL/NAESCO database (Larsen et al 2012a). We calculated median and average (i.e., "typical") dollar investment level per square foot and annual energy savings per square foot—disaggregated by the seven market segments.

ESCO projects, across all market segments, tend to be bifurcated into two distinct groupings: (1) projects that have low-to-medium installation costs per square foot and (2) projects that have extremely high installation costs per square foot (often because these projects install onsite generation or renewable energy systems or install expensive measures (e.g., new roof) that augment installation of energy-related measure. This bifurcation leads to significant differences between the median and average values calculated for projects in the LBNL/NAESCO database. Therefore, we report the market potential results as a range between a low estimate (median value from database of projects) and high estimate (average value from database) for the typical range or project investment levels (see Table 6).

Table 6. Median ("low") and average ("high") per-project investment and savings levels by market segment (2003–2012) indicating number of projects ("n") included in each query

Market Segment	Median Project Installation Cost ($/ft^2)	Average Project Installation Cost ($/ft^2)	Median Project Blended Energy Savings (MMBtu/ft^2)[11]	Average Project Blended Energy Savings (MMBtu/ft^2)
Federal Government	$2.72 (n=135)	$7.06 (n=135)	0.015 (n=96)	0.038 (n=96)
State/Local Government	$6.52 (n=231)	$9.99 (n=231)	0.024 (n=185)	0.034 (n=185)
K-12 Schools	$5.33 (n=456)	$9.90 (n=456)	0.014 (n=375)	0.020 (n=375)
Universities/ Colleges	$5.64 (n=157)	$9.67 (n=157)	0.019 (n=117)	0.029 (n=117)
Health/ Hospital	$7.45 (n=72)	$12.70 (n=72)	0.042 (n=49)	0.049 (n=49)
Public Housing	$5.44 (n=31)	$6.55 (n=31)	0.017 (n=24)	0.022 (n=24)
Commercial/ Industrial	$2.14 (n=43)	$4.99 (n=43)	0.019 (n=34)	0.028 (n=34)

Step 4: Estimate remaining investment and savings potential for markets served by ESCOs. Step four involved estimating total remaining ESCO market potential for each market segment. We multiplied total ESCO-addressable floor area (from step 1 above) by typical project cost ($/ft^2) and annual blended energy savings (MMBtu/ft^2) to determine total ESCO market size in terms of dollar value of investment opportunity and annual energy savings. Next, we multiplied total floor area that has been addressed (from step 2) by typical project cost ($/ft^2) and annual energy savings (MMBtu/ft^2) to estimate the size of the market already addressed by retrofits in terms of dollar value of investment opportunity and annual energy savings. Finally,

[11] MMBtu represents one million Btu (British thermal units).

we calculated the difference between total investment opportunity and the portion of this opportunity already addressed to arrive at our estimate of remaining market (and industry) investment potential. We report the results as a range between a *low* estimate (median installation cost or savings per square foot value from LBNL/NAESCO database of projects) and *high* estimate (average value from database).

U.S. ESCO Industry Size, Growth and Market Characteristics

Revenues and Growth Trends

We estimate that aggregate ESCO industry revenue was about $5.3 billion in 2011; energy efficiency projects accounted for about 85% of revenue. In comparison, Satchwell et al. (2010) estimated 2008 ESCO industry revenue to be about $4.1 billion (in nominal terms). Thus, we estimate that the U.S. ESCO industry grew about ~9% per year between 2009 and 2011. These results suggest that the ESCO industry has maintained relatively steady growth in recent years despite the severe economic recession which began in 2008-2009 (see Figure 1).

As discussed earlier, we developed an aggregate estimate of projected U.S. ESCO industry revenues for 2012-2014 by applying each ESCO's reported growth projections to their 2011 revenues. We found that the U.S. ESCO industry anticipates annual revenues of approximately $7.5 billion through 2014, which represents an average annual growth rate of ~12% over the three year time horizon (see Figure 1).

It is important to recognize that ESCO industry revenues grew at a significant rate between 2009 and 2011 (approximately 9% annually in nominal terms), much faster than U.S. Gross Domestic Product (GDP), which grew an average of 1.9% annually during that same period (BEA 2013).

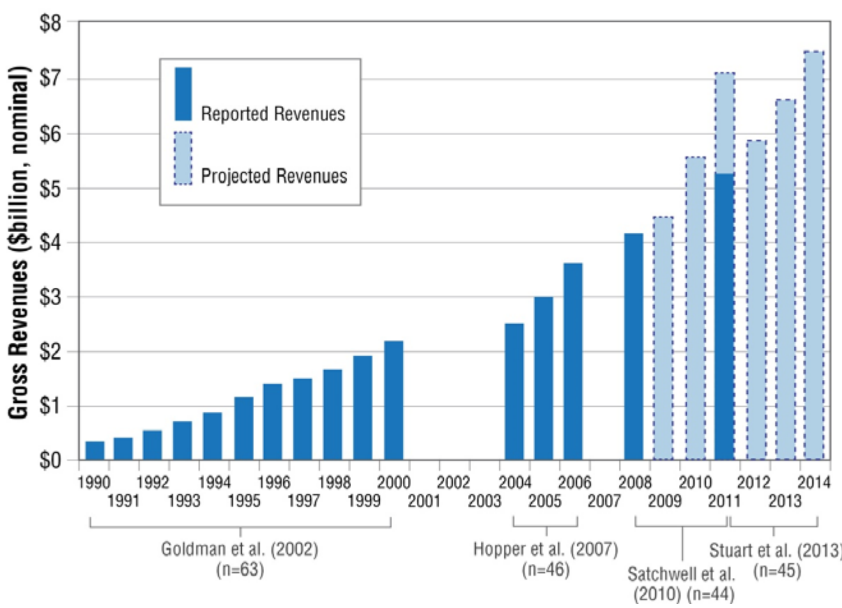

Figure 1. LBNL estimates of reported and projected ESCO industry revenues: 1990–2014[12]

Several factors that may contribute positively to ESCO industry revenue over the longer term including the following:

- **Opening up of new markets.** Historically, ESCOs have provided energy efficiency performance contracting primarily to existing facilities. In Canada, K-12 schools are beginning to include new construction in performance contracts. If this market opens up to ESCOs in the United States, it could be an important driver of new business. The continued expansion of demand response opportunities in organized wholesale markets (e.g., capacity markets in PJM) provides another market opportunity for ESCOs to coordinate energy efficiency, demand response and onsite generation service offerings.
- **Greater penetration in existing market sectors.** The emergence of commercial property-assessed clean energy (PACE) programs and on-bill repayment programs may lead to new opportunities for ESCOs (including other new entrants that offer performance-based services) to expand their reach in the private sector commercial market. At least one PACE program (Ann Arbor, Michigan), requires performance contracts for projects over $250,000 (a2energy 2013).
- **Additional revenue from non-energy services.** Performance contracts can include non-energy services such as water conservation measures and infrastructure improvement (e.g., K-12 asbestos abatement, roof replacement). Industry experts expect that additional non-energy technologies (e.g., security measures, fiber-optic cables) may become more common, potentially increasing project investment levels in some institutional markets.
- **Policy drivers.** Enabling policies have played an important role in the development and maturation of the ESCO industry (e.g., legislation that allows long-term performance contracts in institutional markets). More recent examples include cities that have enacted building energy benchmarking and energy use disclosure policies which may help to spur energy efficiency activity in the commercial/institutional market, and state and local governments adopting energy efficiency goals.

Revenue by Customer Market Segment

ESCOs reported their 2011 revenues by customer market segment, which are summarized in Table 7 below. We found that 84% of ESCO revenues in 2011 came from the public and institutional sector, which includes the federal government. Federal, state, and local government energy use reduction goals are a driver in the use of ESPCs on large projects that are authorized to have contract terms of up to 20 years. ESCO responses indicated that the "MUSH" markets (state and local government, universities/colleges, K-12 schools, and healthcare facilities), represented about 64% of industry revenue in 2011.

[12] This figure contains revenue estimates from four sources (Goldman et al. 2002; Hopper et al. 2007; Satchwell et al. 2010; Stuart el al. 2013). Revenue projections for 2009–2011 and 2012–2014 are from Satchwell et al. (2010) and Stuart et al. (2013), respectively.

Table 7. 2011 U.S. ESCO industry revenue by market segment

Market Sector	Share of Total Revenue	2011 Revenue ($ million)
State/Local	24.0%	$1,234
Federal	21.4%	$1,102
K-12 Schools	19.4%	$995
University/College	13.7%	$702
C&I	8.1%	$419
Health/Hospital	5.9%	$302
Public Housing	4.2%	$217
Other	3.3%	$168
SUBTOTAL (n=35)	100.0%	$5,138
Non-respondents/Delphi process (n=10)	-	$125
TOTAL		$5,263

Barriers to implementing comprehensive energy projects in private commercial facilities remain high (IEA 2007) and private sector projects accounted for just over 8% of ESCO industry revenues in 2011. ESCOs report that private sector companies in the United States are generally averse to borrowing funds to finance energy efficiency work, as well as to allocating capital expenditures for energy projects that have relatively long payback times. One ESCO that primarily serves publicly held private sector customers reported that these companies typically prefer to pay cash for energy efficiency projects, rather than financing them. The ESCO reported that its private sector customers were only interested in pursuing projects with extremely short payback times (one to two years).

Revenue by Business Activity

ESCOs also reported 2011 revenues by type of business activity or project contract type. Performance-based contracting has remained a consistent and dominant contracting vehicle, accounting for 69% of 2011 revenues, or about $3 billion (see Figure 2)—which is comparable to similar market shares of 69% and 70% in 2008 and 2006, respectively (Satchwell et al. 2010; Hopper et al. 2007). Design/build projects comprise the next largest share of 2011 revenue (15% or about $660 million), followed by utility program administration (7%), consulting (3.9%) and onsite generation power purchase agreements (3.6%).[13]

[13] Design/build projects refers to 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.

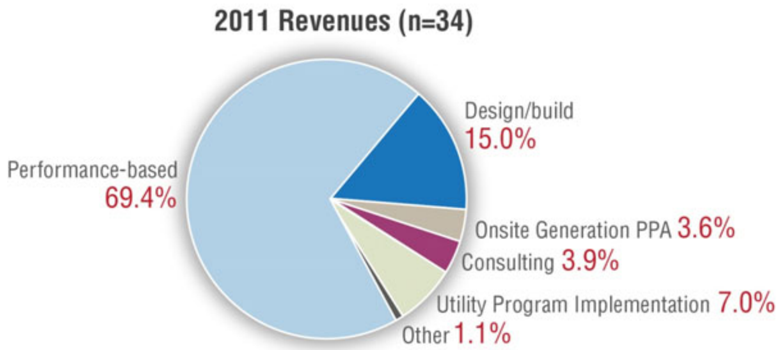

Figure 2. 2011 ESCO industry revenue by business activity.

Revenue by Technology and Project Type

Figure 3 presents reported U.S. ESCO revenues by technology/project type for 2008 and 2011. Not surprisingly, energy efficiency comprised nearly three-quarters (about $3.3 billion) of 2011 ESCO industry revenue.

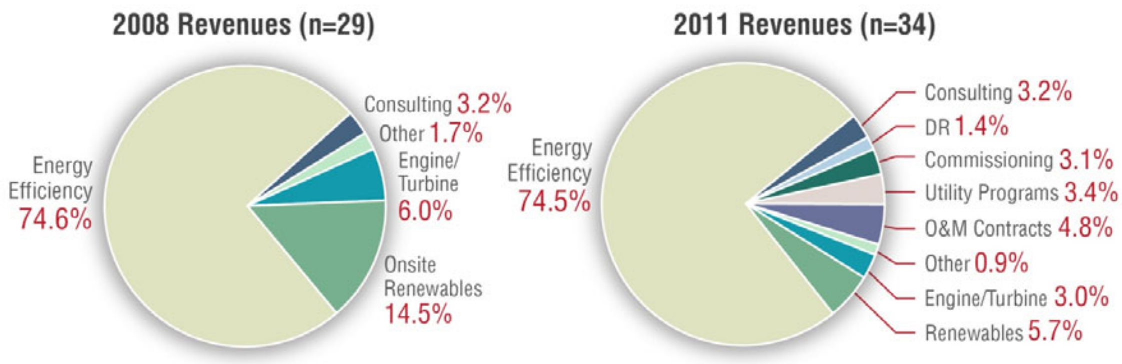

Figure 3. ESCO industry revenue in 2008 (left) and 2011 (right) by technology/project type.

Onsite generation was 3.6% of business activity (see Figure 2) because that revenue is specifically attributed to power purchase agreements (PPA). However for the share of revenue by technology or project type (Figure 3), renewable technologies (5.7%), includes revenue from PPAs as well as other types of contracts.\

Remaining ESCO Market Potential

Table 8 shows that the *remaining* market potential for the U.S. ESCO industry in terms of project investment opportunity ranges from a low estimate of about ~$71 billion to a high estimate of $133 billion. The large amount of remaining investment potential is indicative of a ~25% average market penetration rate across all U.S. market segments. This preliminary analysis found that there is still a considerable opportunity for ESCO activity in all market segments.

Table 8. Estimated remaining U.S. ESCO market potential (billions of 2012 dollars)

Market Segment	Low Estimate	High Estimate
K-12 Schools	$15.8	$29.4
Health/Hospital	$15.0	$25.6
Private Commercial	$14.4	$33.5
State/Local	$10.6	$16.3
Public Housing	$4.7	$5.7
Universities/Colleges	$5.7	$9.8
Federal	$4.9	$12.7
Total	$71.2	$133.0

Figure 4 illustrates that the private commercial building sector has the largest remaining market potential (~$14 to $34 billion). However, as discussed earlier, there have been barriers for ESCOs interested in pursuing this market (e.g., shorter payback requirements of customers).

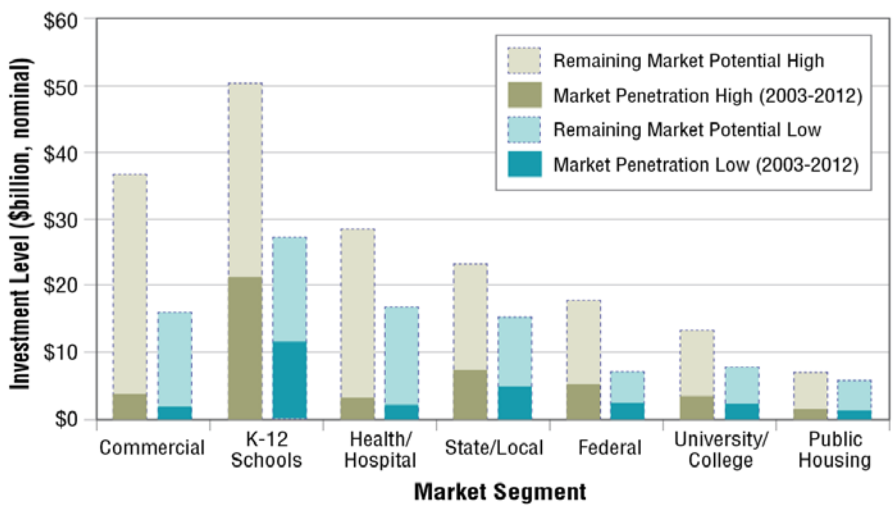

Figure 4. Range of estimated existing market penetration (2003–2012) and remaining ESCO market potential by market segment.

Table 9 shows that the remaining annual energy savings potential for the U.S. ESCO industry ranges from about ~354 trillion to ~519 trillion Btu. The private commercial sector has the largest remaining potential (128–188 trillion Btu) despite the K-12 schools segment having the largest total market size.

Table 9. Estimated remaining annual blended energy savings potential (trillion Btu)

Market Segment	Low Estimate	High Estimate
Private Commercial	127.7	188.1
Health/ Hospital	84.8	99.0
K-12 Schools	41.5	59.3
State/Local	39.1	55.4
Federal	26.9	68.3
Public Housing	14.8	19.2
Universities/Colleges	19.3	29.4
Total	354.2	518.7

Conclusion

This study provides updated estimates of ESCO industry and market segment revenues and recent growth trends, and a preliminary estimate of the remaining investment and savings potential in markets typically served by the U.S. ESCO industry. The U.S. ESCO industry continued to grow at a steady pace in recent years—despite the onset of a major recession—reporting revenues of ~$5.3 billion in 2011.

We found that public and institutional markets accounted for about 84% of ESCO industry revenue in 2011—consistent with results reported in the previous LBNL ESCO market study. ESCOs reported a significant decline in revenue from renewable and other onsite generation projects since 2008. We estimate that the remaining investment potential in facilities typically addressed by the ESCO industry is significant, ranging from ~$71 to $133 billion.

A number of factors may positively impact the ESCO industry's future growth and ability to capture a significant portion of the remaining market potential. Federal, state and local policies, (e.g., legislation and programs that facilitate or require the use of performance-based contracting in institutional markets) will continue to be an important driver of ESCO activity.

Estimating the remaining market potential of any industry is an inherently difficult undertaking with key assumptions significantly affecting the accuracy of the results. Our analysis strategy entailed: (1) avoiding an unnecessarily-complex estimation technique; (2) openly communicating our method; and (3) limiting the number of key assumptions used in the analysis. We assumed that—on average—the investment levels (i.e., project installation costs) and savings opportunities of the entire ESCO industry are comparable to the investment and savings levels achieved by ESCOs as reported in the LBNL/NAESCO database of projects for installations occurring from 2003–2012. We also assumed that the buildings already addressed by the industry have no remaining energy efficiency potential—even though we know this is not the case. The population of public and private commercial buildings is based on the most recent version of CBECS, which was released a decade ago. Our approach assumes that the existing population of addressable buildings has not changed since 2003, though it is likely that the building stock has changed significantly since then. We assumed that ESCOs' core business model is performance contracting and that many commercial and industrial customers do not want to enter into long-term ESPCs. We assumed that ESCOs will generally not pursue retrofit projects in buildings less than 50,000 ft^2. For these reasons, we view our estimates of remaining market potential for the ESCO industry as a preliminary estimate that could be refined with more complete and more recent data.

LBNL will continue to explore these and other timely issues that affect the evolution of this important industry.

A longer version of this manuscript has been submitted to *Energy – The International Journal*.

Acknowledgements

The work described in this report was funded by the U.S. Department of Energy Office of Energy Efficiency and Renewable Energy, Weatherization and Intergovernmental Programs under Contract No. DE-AC02-05CH11231. The authors would like to first and foremost thank Alice Dasek and AnnaMaria Garcia of the Department of Energy Office of Weatherization and Intergovernmental Programs (DOE-OWIP) for their ongoing support of our research into this topic. Finally, we thank Terry E. Singer (NAESCO), David Birr (Synchronous Energy Solutions), Linda Smith (9Kft Strategies in Energy) and Patricia Donahue (Donahue and Associates) for sharing their expertise on this industry.

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