LBNL-XXXXX

ERNEST ORLANDO LAWRENCE
BERKELEY NATIONAL LABORATORY

A Survey of the U.S. ESCO Industry: Market Growth and Development from 2008 to 2011

Andrew Satchwell*, Charles Goldman*, Peter Larsen*, Donald Gilligan**, and Terry Singer**

*Lawrence Berkeley National Laboratory, **National Association of Energy Service Companies

Environmental Energy Technologies Division

June 2010

The work described in this report was funded by the Office of Energy Efficiency and Renewable Energy, Weatherization and Intergovernmental Program of the U.S. Department of Energy under Contract No. DE-AC02-05CH11231.

Disclaimer

Acknowledgments

The work described in this report was funded by the Office of Energy Efficiency and Renewable Energy, Weatherization and Intergovernmental Program of the U.S. Department of Energy under Contract No. DE-AC02-05CH11231. The authors are solely responsible for any omissions or errors contained herein.

The authors would like to thank Mark Bailey (DOE Energy Efficiency and Renewable Energy) for supporting this project, and Dave Birr (Synchronous Energy Solutions), Patti Donahue (Donahue & Associates), Phil Coleman (LBNL), Joe Eto (LBNL), Steve Morgan and David Dayton (Clean Energy Solutions), and Douglas Mourer (Honeywell) for providing comments on a draft of this report. We would also like to thank Katie Behrend (LBNL) for administrative support of the project. Finally, this study would not have been possible without the support and input from representatives of individual ESCOs.

LBNL-XXXXX

A Survey of the U.S. ESCO Industry: Market Growth and Development from 2008 to 2011

Principal Authors

Andrew Satchwell, Charles Goldman, Peter Larsen
Lawrence Berkeley National Laboratory
Donald Gilligan, Terry Singer
National Association of Energy Service Companies

June 2010

The work described in this report was funded by the Office of Energy Efficiency and Renewable Energy, Weatherization and Intergovernmental Program of the U.S. Department of Energy under Contract No. DE-AC02-05CH11231.

Table of Contents

List of Figures and Tables

Executive Summary

In this study, LBNL analyzes the current size of the ESCO industry, industry growth projections to 2011, and market trends in order to provide policymakers with a more in-depth understanding of energy efficiency activity among private sector firms. We draw heavily on information from interviews with ESCOs conducted from October 2009 to February 2010 and from our review of publicly available financial information regarding individual ESCOs.

The ESCO industry continues to grow with estimated revenues of $4.1 billion in 2008 despite a general downturn in the broader economy.

Despite the onset of a severe economic recession, the U.S. ESCO industry managed to grow at about 7% per year between 2006 and 2008. We estimate that ESCO industry revenues are about $4.1 billion in 2008. While ESCO industry growth was slower than anticipated, the industry continued to deliver energy efficiency services to many market sectors even when facing higher financing costs.

The ESCO industry's growth rate is expected to increase through 2011.

Based on individual ESCO projections of revenue growth rates, we estimate that the ESCO industry in aggregate will have annual revenues of $7.1–7.3 billion in 2011. This represents an average annual growth rate of 26% per year between 2009 and 2011. Key drivers for ESCO market growth include the large infusion of federal ARRA dollars to support state and local government energy efficiency programs, increased spending in ratepayer-funded energy efficiency programs, and increased customer interest in strategies that mitigate higher utility bills and/or address environmental concerns.

We highlight several factors that may account for the gap between ESCO industry revenues in 2008 and projections of future revenues from the previous industry study conducted by LBNL and NAESCO in 2006.

First, the general and unexpected downturn in the economy has resulted in negative or flat economic growth among many market sectors targeted by ESCOs since the original projections were provided by ESCOs in the 2007 LBNL study. Consequently, many public and private entities may have been deferring large capital investments since 2007 including retrofits of existing building space.[1] Second, there has been a temporary tightening of credit markets for customers looking to secure third-party financing; some financial institutions have also shortened the contract terms that they are willing to finance, which has the effect of reducing overall project investment size. Third, the ESCO industry has undergone significant consolidation in recent years through buyouts and mergers, which may have temporarily affected prospects for industry growth as companies reconfigure their business strategies and absorb companies with different business models.

[1] During the economic recession, negative or flat economic growth in the private sector translated into reduced revenues from taxes for public sector institutions, leading to significant budgetary constraints.

Public and institutional markets – federal, state and local governments, K-12 schools, universities and colleges – account for about 84% of ESCO industry revenues in 2008 ($3.4 billion).

The so-called "MUSH" markets—municipal and state governments, universities and colleges, K-12 schools, and hospitals—have historically hosted the largest share of U.S. ESCO projects. The MUSH market's share of total ESCO revenues accounts for about 69% of ESCO industry revenues, an increase of over 10% since 2006. It appears that "lead by example" programs established by state and local governments, the infusion of federal stimulus dollars, and the continued support for performance contracting programs will continue to support ESCO market growth in the public/institutional sector. ESCO activity in the federal market appears to account for a somewhat lower share of total industry revenues in 2008 compared to 2006 (22% vs. 15%).

The commercial and industrial (C&I) sector accounted for about 7% of ESCO industry revenues in 2008, declining from a 15% market share in 2006. Compared to the U.S. market, ESCOs retain a stronger presence in industrial and commercial markets in Asian and European markets. Several ESCOs have increased their activities in the residential market, mainly through managing and/or implementing utility residential energy efficiency programs, reflected in the 6% share of total ESCO revenues in 2008 (compared to 3% of revenues in 2006).

ESCOs reported that energy efficiency technologies represent a major share of industry activity, accounting for 75% of ESCO industry revenues or about $3.0 billion per year in 2008.

The share of ESCO revenues from energy efficiency has increased slightly since 2006 (75% vs. 73% reported by Hopper et al. in 2007). Onsite renewable generation accounts for 14% of ESCO industry revenues in 2008 ($570 million), compared to 10% of ESCO industry revenues in 2006 ($360 million) Hopper et al. (2007). Factors that may contribute to the increased deployment of renewable energy and onsite generation technologies are that ESCOs are leveraging publicly-funded incentives and government tax credits for renewable energy projects and are increasingly bundling renewable technologies with energy efficiency improvements to help customers meet various goals including energy independence and greenhouse gas emissions reductions.

Three-quarters of ESCO projects are performance based.

Non-performance-based agreements, such as design/build and "engineering, procurement and construction services" (EPCS) projects, accounted for about 22% of reported 2008 industry revenues and 3% of ESCO revenues were attributed to consulting services.

ESCO projects are becoming more costly to install over time primarily due to ESCO production input cost increases and customer demand for a more comprehensive mix of technologies.

ESCOs reported on trends in projects investment levels and O&M savings which were tested against the conclusions of a parallel analysis of the LBNL/NAESCO project database. The analysis focused on long-term trends and found that median project investment levels more than doubled in the last decade, even after accounting for the effects of inflation and floor area. A majority of ESCO respondents (54%) indicated that typical project installation costs have increased over the past decade even after accounting for inflation, due in part to increased labor and material costs. Many ESCOs also noted an increased demand by customers for more comprehensive and thus more capital-intensive retrofit strategies. These results suggest that as the total project investment costs increase for customers, ESCOs need to continue to demonstrate the economic case for comprehensive retrofits by delivering additional savings and value to customers through a combination of energy and O&M savings and other non-energy benefits.

1. Introduction

A significant ramp-up in energy efficiency activities is occurring at the local, state, and federal level. These activities include the establishment in ~18 states of statewide energy savings goals to be obtained from adoption of an Energy Efficiency Resource Standard (EERS), legislative or state regulatory directives to obtain all cost-effective demand-side resources (Barbose et al 2009), and a significant increase in federal funding for energy efficiency programs as part of the American Recovery and Reinvestment Act (ARRA). As part of this increased focus on energy efficiency, policymakers are evaluating the role of private sector companies, including Energy Service Companies (ESCOs), in delivering cost-effective energy savings to end-users.

The U.S. ESCO industry has long been recognized for its role in successfully delivering comprehensive energy projects in the public sector. This study analyzes the current size of the ESCO industry, industry growth projections, and market trends in order to provide policymakers with a more in-depth understanding of energy efficiency activity among private sector firms. This study may also be of interest to policymakers abroad who are exploring options to encourage development of a private-sector energy services industry in their own countries.

This study draws heavily on information from interviews with ESCOs conducted from October 2009 to February 2010 and is part of a series of ESCO industry reports prepared by Lawrence Berkeley National Laboratory (LBNL) in collaboration with the National Association of Energy Services Companies (NAESCO). The analysis builds on previous ESCO industry reports (see Goldman et al. 2005 and Hopper et al. 2007) and provides updated estimates of ESCO industry revenues and ESCO views on perceived trends in costs and savings.

The report is organized as follows:

- Section 2 presents our data sources and methods;
- Section 3 provides an overview of the ESCO industry, including our estimates of current and projected revenues for the ESCO industry;
- Section 4 discusses ESCO market activity and project characteristics; and
- Section 5 concludes with a discussion of policy implications for U.S. and international policymakers.

2. Data Sources and Methods

We conducted interviews with U.S. ESCOs between October 2009 and February 2010. ESCOs were asked to provide information on their annual revenues from energy services in 2008, projected growth in annual revenues from 2008 to 2011, activity in various market segments, types of contractual arrangements, revenues from various types of technologies (e.g., energy efficiency, renewable energy projects, onsite generation) and services, and ESCO views on trends in project costs, simple payback time, and operation and maintenance (O&M) savings.

We developed a comprehensive list of firms that were either self-identified ESCOs or were on qualified lists of energy service providers established by select public sector agencies, drawing from the following sources:

- ESCO members of NAESCO[2];
- Department of Energy (DOE) list of qualified Energy Service Performance Contractors[3]; and
- Qualified ESCOs in state performance contracting programs (Pennsylvania, Virginia, Montana, Colorado, Wisconsin and Florida).

Through this process, we identified a target list of 109 companies, compared to the 63 companies identified in Hopper et al. (2007). We attempted to contact senior executives at each company that would be knowledgeable about their company's revenues and market activity, and would also have the authority to release the requested information.

Initially, 29 companies responded to our request, which was primarily comprised of ESCOs that were members of NAESCO. Only 8% (n=5) of the firms on the DOE list of qualified energy service companies and state performance contracting lists that were not NAESCO members responded. This low initial response rate was potentially due to the fact that some government agencies use different criteria to qualify firms as energy service providers than our definition of an ESCO.[4] We also attempted to assess whether firms were actively offering performance contracting as a service were still in business, or had merged with another company since 2007 (see Appendix A). Through this process, we identified 56 companies from the target list of 109 companies that were either not ESCOs per our definition or were not currently offering performance contracting as a service. We eliminated these companies from the initial population of potential ESCOs; as a result, our estimated response rate was 55% among active ESCOs (29 out of 53). We then estimated annual revenues for 15 of the remaining ESCO non-

[2] Available at: http://www.naesco.org/organizations/companies.aspx?CatID=3.
[3] Available at: http://www1.eere.energy.gov/femp/pdfs/doe_ql.pdf.
[4] ESCOs, by definition, are companies that provide energy efficiency-related and other value-added services and for which performance contracting with savings guarantees is a core part of their energy efficiency services business (Hopper et al, 2007).

respondents using a Delphi approach similar to the approach reported in Hopper et al. (2007).[5]

The non-respondent companies were typically smaller ESCOs and represent only about 4% of the total ESCO market as a share of 2008 industry revenues (based on our estimates). We then examined the reasonableness of market revenues reported by ESCO respondents and the range of revenues for non-respondents through the Delphi technique. We compared estimated revenues for individual companies with historic data provided by ESCOs as part of the Hopper et al (2007) study as well as other recent public information (e.g., company websites, U.S. Securities and Exchange Commission filings, press releases). As a result of this process, we adjusted revenue estimates for a few non-respondent ESCOs. Accordingly, our estimates of aggregate revenues for the ESCO industry are based on a sample of 44 companies. We believe our combined survey and Delphi revenue estimates provide information on nearly all ESCOs that are actively operating in the United States.

2.1. Important Caveats

The following caveats should be considered when interpreting the results of this study. First, there are limitations to self-reported data (e.g. see Cuddeback et al., 2004; Heckman, 1979), although our quality assurance/quality control process allowed us to assess internal consistency in ESCO revenue estimates across time. It is also possible that there are a few local ESCOs that are not familiar to our research team and were not included in the target population, although we believe it is unlikely to have a significant impact on our final estimate of aggregate industry revenues.

[5] A Delphi technique is a process used in business forecasting of reaching a consensus by the anonymous solicitation and comparison of the views of experts (e.g., see Linstone and Turoff, 1975).

3. Overview of ESCO Industry

In this section, we discuss the role of ESCOs in the context of the broader energy efficiency, renewable energy and onsite generation markets and present updated estimates of ESCO industry revenues and projected growth. The background discussion draws upon previous LBNL reports that analyzed ESCO industry growth and trends (Hopper et al. 2007, Goldman et al. 2002), the context for the ESCO business model among public and institutional customers (Hopper et al. 2005) and the role of performance contracting in the federal (Hopper et al. 2004) and state (Bharvirkar et al. 2008) government markets. Forthcoming research by Larsen et al. (2010) explores U.S. ESCO project characteristics, energy savings and economic performance based on a database of ESCO projects.

3.1. ESCO Industry Context

We 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 (Hopper et al. 2007 and Larsen et al. 2010). *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*.[6]

In estimating the size of the ESCO industry, we do not include companies such as engineering and architectural firms, HVAC, lighting, windows or insulation contractors, and consultants 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 do not include companies that only provide onsite generation or renewable energy systems without also deploying energy efficiency measures. These companies play important roles in the broader market for energy efficiency, clean energy and retail energy services, but they are not included in our assessment of the U.S. ESCO industry.

Historically, ESCOs have primarily pursued energy efficiency improvements in existing buildings.[7] Among non-residential customers, ESCOs have had most success in public and institutional markets—federal, state and local government facilities, schools, universities/colleges and hospitals. Customers in the institutional sector tend to own their facilities, are often subject to aggressive legislative or executive energy savings mandates and see, in the absence of capital budget appropriations, long-term performance contracts

[6] See Hopper et al. (2005) for a more detailed discussion of the different types of performance contracts. Shared savings contract types are more common in other countries than in the U.S.

[7] ESCOs have not had much success getting developers or owners to enter into performance contracts in the new construction market for a variety of reasons. For example, it is more challenging to establish "baseline" energy usage levels in new construction against which to compare savings and harder to establish occupancy levels and schedule in a new building. Despite these difficulties, some of the larger ESCOs have started to respond to developers' interest in green buildings and are offering various energy-related services that support green building certification processes.

as a way of paying for major capital improvements out of project savings.[8] ESCOs are also active in the commercial and industrial sectors, but have had more limited success in penetrating these markets. Relatively few ESCOs operate in the residential market; those ESCOs that are active in this market typically target larger multi-family and public housing facilities. Other types of energy service providers, including equipment and controls manufacturers, engineering and construction firms, various types of contractors (heating and air conditioning, controls, windows, lighting, and insulation specialists), and energy consulting firms also provide efficiency services to residential, commercial and industrial customers.

3.2. ESCO Industry Revenues and Growth Trends

We asked ESCO respondents to report their revenues from energy services[9] in 2008, average annual growth rates since 2007 and projected growth in revenues for the 2009-2011 period.[10] Aggregate revenues for the ESCO industry are estimated at about $4.1 billion in 2008 (see Figure 1). Hopper et al. (2007) estimated that ESCO industry revenues were $3.6 billion in 2006. Thus, our analysis suggests that ESCO revenues have increased about 7% per year since 2006.[11]

[8] See Hopper et al. (2005) for a discussion of the context, motivations for, and barriers to performance contracting in public and institutional markets.

[9] We defined energy services to include projects such as performance contracts, design/build projects, engineering, procurement & construction services (EPCS) projects, and consulting that involved energy efficiency or other energy-related services, including onsite generation projects for end users. We specifically asked companies to *exclude* revenues from retail commodity sales or projects built to supply power to wholesale markets.

[10] For companies that did not respond to the survey, we developed low and high estimates of revenues through a Delphi survey.

[11] The NAESCO/LBNL surveys conducted in 2001, 2007, and 2009 did not ask for reported revenues in the years 2001-2003 and 2007.

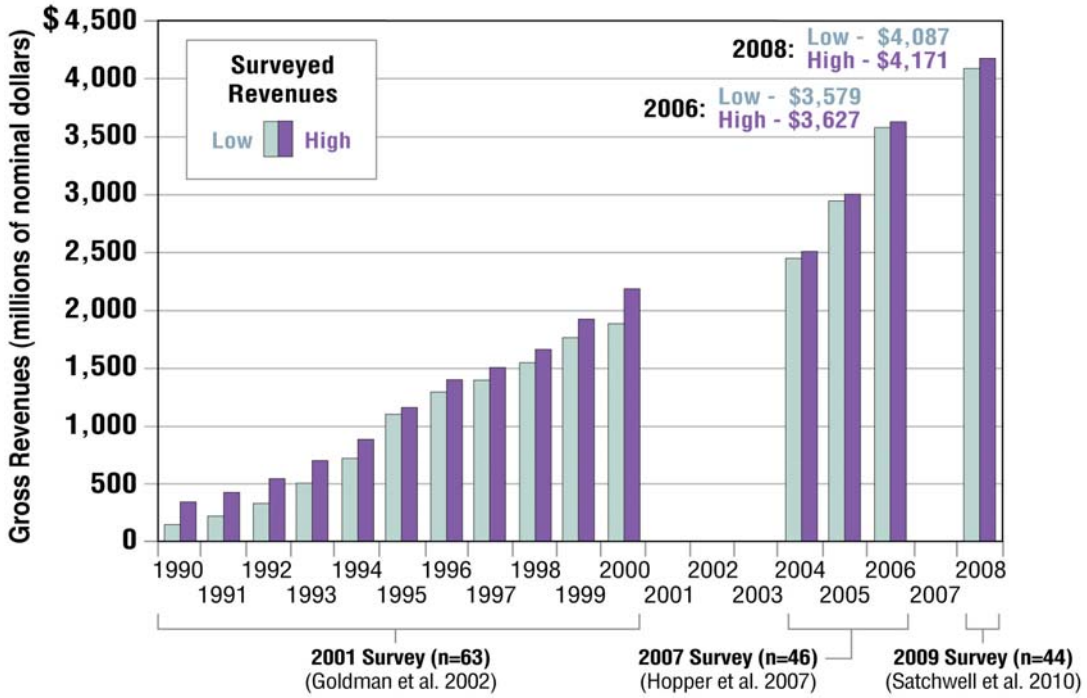

Figure 1. Aggregate ESCO industry revenue from 1990 to 2008

We developed an aggregate estimate of projected industry revenues through 2011 by using individual ESCOs' projections for revenue growth which were applied to their 2008 revenues. We project that the ESCO industry in aggregate will have annual revenues of $7.1–7.3 billion in 2011; this represents an average annual growth rate of 26% per year for the 2009-2011 period. ESCOs are quite optimistic about their business prospects over the next 2-3 years, even though the economy is just beginning to recover from a severe recession. ESCOs clearly hope to capitalize on energy efficiency programs funded by the ARRA. For example, about 51% of the $3 billion for the State Energy Program block grants is targeted at building retrofits primarily in public sector markets that have historically been receptive to ESCOs and performance contracts (Roehrig 2010). Some ESCOs also expect that the significant ramp-up in ratepayer-funded energy efficiency and renewable programs will improve the economics of projects for targeted customers (Barbose et al. 2009).

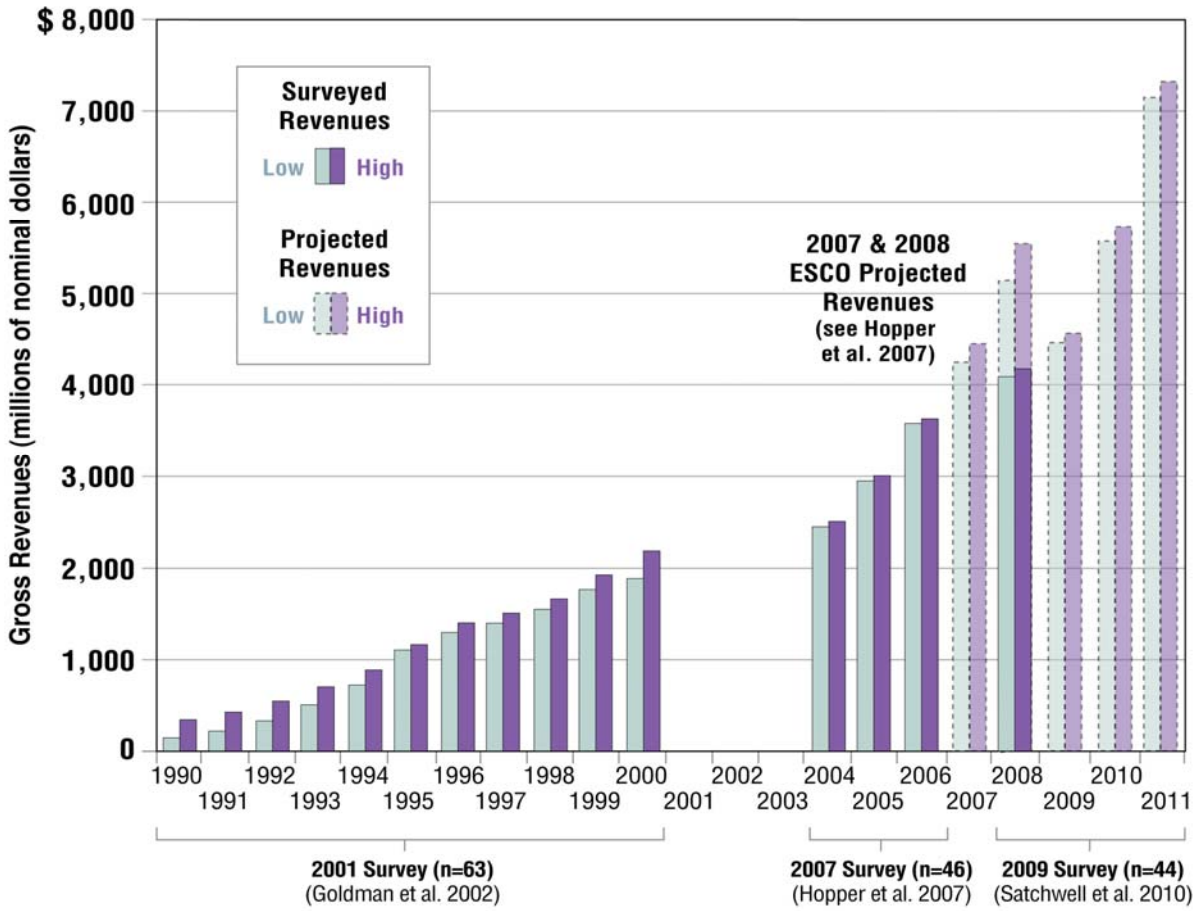

Figure 2. ESCO industry revenues with projections: 2007 to 2011

3.3. Comparison of reported ESCO Industry Revenues for 2008 with earlier ESCO projections of future revenues

We also compared actual reported revenues for the ESCO industry in 2008 (from this study) with the 2006 ESCO industry projections of future revenues for 2008 provided in our previous study (Hopper et al 2007). In that study, ESCOs projected that their revenues would be about $5.2-5.5 billion in 2008. Actual revenues reported by ESCOs in 2008 in aggregate were about $4.1 billion (see Figure 2).

We compared *projected* 2008 revenues for individual companies with 2008 reported revenues for 16 companies that responded to both surveys in an attempt to assess whether lower than expected revenues was a broad-based phenomenon or whether a few companies were responsible for the shortfall. Reported revenues in 2008 were lower for 11 ESCOs that responded to both surveys compared to revenue projections provided in our 2007 study. The largest ESCOs—those companies with revenues greater than $300 million—had the greatest difference (-25%) between projected and actual reported revenues in 2008, when compared to smaller companies (see Table 1). In contrast, the smaller ESCOs—those companies with less than $100 million in estimated 2008

revenues (n=6) —exhibited only a 7% difference between projected and actual reported revenues in 2008.

Table 1. Comparison of ESCO 2008 projected and estimated revenues among ESCOS that responded to both the 2006 and 2008 surveys

Company size	N	ESCOs 2006 projections of 2008 revenues ($M)	2008 ESCO Reported Revenues ($M)	% difference
<$100 M	6	$203	$190	-7%
$101 to 300 M	4	$686	$584	-17%
>$300 M	6	$3,407	$2,715	-25%
Total	16	$4,296	$3,489	-23%

We highlight below several factors that may account for the gap between ESCO industry revenues in 2008 and the projections of 2008 revenues from our previous study.[12]

General Downturn in the U.S. Economy

There has been a general and unexpected downturn in the economy since the original projections were made. Consequently, many private sector companies have been deferring large capital investments, including retrofits of existing building space. Several ESCOs indicated a decrease in customer demand for energy projects in recent public financial filings (Siemens, 2008), while one ESCO noted the long-run cyclical nature of customer demand for its services as a factor explaining their 2008 financials (AECOM, 2008).

ESCO's projected activity level in private sector markets did not materialize

In 2006, some ESCOs apparently expected the private sector commercial and industrial (C/I) segments of their business to grow significantly. For example, the commercial building marketplace was at a cyclical peak in value, and building owners seemed increasingly taken by the trends to make their buildings "greener" and more energy efficient. Since then, the commercial building real estate market has endured the worst downturn in decades (*e.g.* declines in property value, higher vacancy rates) and many building owners have been struggling to remain financially viable and have deferred major projects (including those that involve energy efficiency investments). Similarly, U.S. industry has been hit hard by the economic recession, resulting in plant closures, job losses, and reduced capital investment in facilities.

[12] We reviewed publicly available financial information reported by ESCOs (e.g., SEC 10-k filings) and talked with several industry experts in an attempt to identify potential drivers that may contribute to the lower than projected revenues for the 2007-2008 period.

Changes in the Project Finance Market

The recent downturn in the U.S. economy has also led to a temporary tightening of credit markets for customers looking to secure third-party financing for ESPC projects (AECOM, 2008). Some major financial companies, such as Citibank, dropped their ESPC financing businesses. The credit markets froze in 2008, and when they thawed, rates were higher than they had been in 2006, increasing project paybacks and lowering project volumes. ESPC financiers also shortened the contract terms that they are willing to finance, which has the effect of reducing project size.

Slower than Expected Acceleration of the Federal ESPC Market

In 2006, ESCOs apparently expected the federal ESPC market to accelerate rapidly. For example, Congress was on the verge of enacting legislation (EISA 2007) that mandated aggressive new energy efficiency goals without an accompanying increase in agency capital budgets for energy efficiency projects. The Bush Administration added the attainment of energy efficiency goals to the federal agency "scorecards". The Department of Energy showed a renewed interest in ESPC and the Super ESPC contracts were expiring, which in the past had meant a rush of new projects before the expiration date. However, the Department of Energy extended the Super ESPC contracts for eighteen months, which eased the pressure on the agencies, and hundreds of millions of dollars of contracts that the ESCOs might have anticipated in 2008 were in fact signed in 2009.[13]

ESCO Industry Consolidation

The ESCO industry has also undergone significant consolidation in recent years through buyouts and mergers, which may have affected prospects for industry growth (*e.g.,* fewer companies and the difficulty of integrating the merged companies). Hopper et al. (2007) noted that eight companies had revenues over $100 million and those companies together accounted for 79% of industry activity. We found that twelve companies reported 2008 revenues over $100 million and together they accounted for 88% of industry activity. In Figure 3, we illustrate – using two ESCOs as examples – the common types of industry consolidation: 1) an ESCO (Constellation Energy) that first started as a division within an electric utility and 2) an ESCO that started as a small ESCO (TAC) and then was bought by a large manufacturing and energy services firm, Schneider Electric. In both cases, the acquisition and merging of various ESCOs and other specialty energy services companies has led to a "bulking up" within the industry. It is evident that merger and acquisition activity is continuing in the ESCO industry, including during the recent unanticipated economic slowdown. ESCO industry consolidation may temporarily affect prospects for industry growth as companies reconfigure their business strategies and absorb companies with different business models.

[13] DOE reported project investment values for awarded Super-ESPC delivery orders as follows: $144M in FY2007, $300M in FY2008, $440M in FY2009.

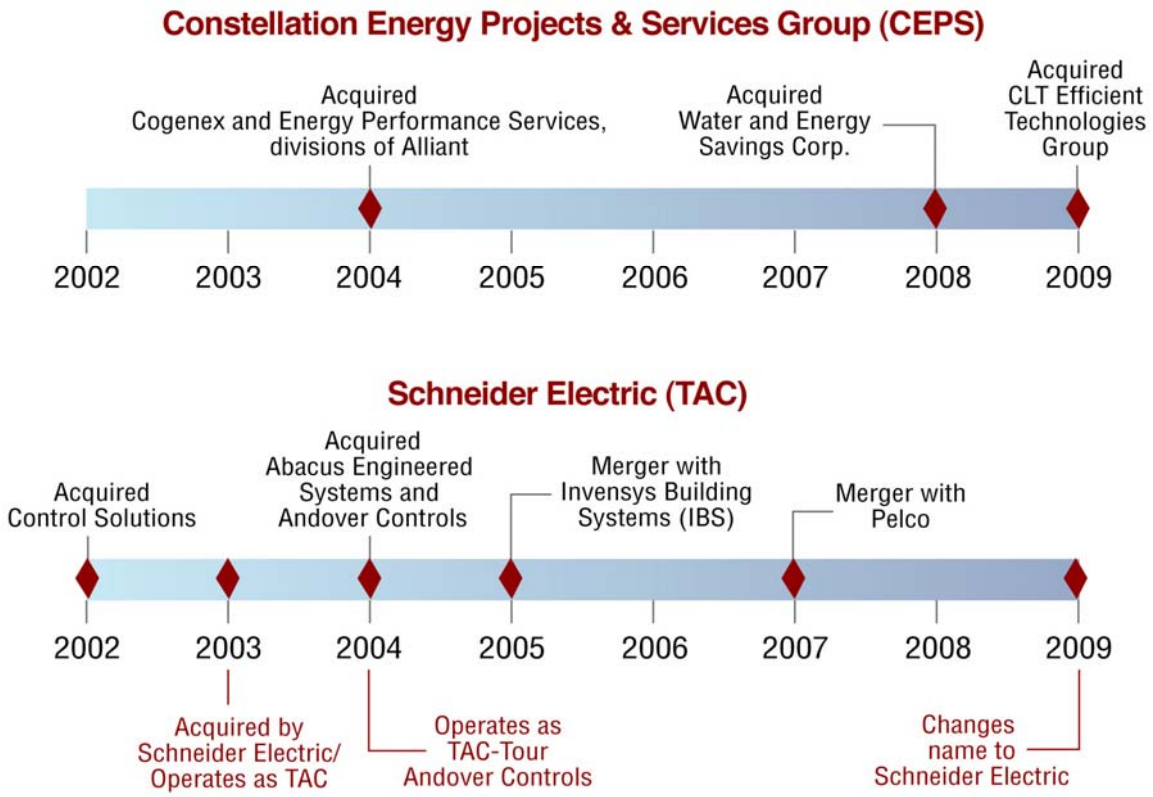

Figure 3. Examples of ESCO industry mergers and acquisitions

Overly Optimistic Projections

Irrespective of the recent economic downturn, it is possible that forecasts of revenue growth provided by individual ESCOs were overly optimistic. They could represent values used for internal business planning rather than their "best guess" of future revenues. However, because the expected business and economic environments were so different than what actually transpired with the economy, it is difficult to make a definitive assessment on whether ESCO revenue growth projections were skewed by optimism that may accompany the internal planning process or whether the growth projections were achievable had the economic downturn not intervened.

4. ESCO Activity

4.1. ESCO Activity by Market Segment

Figure 4 compares U.S. ESCO industry revenues by various customer market segments for 2006 and 2008.[14]

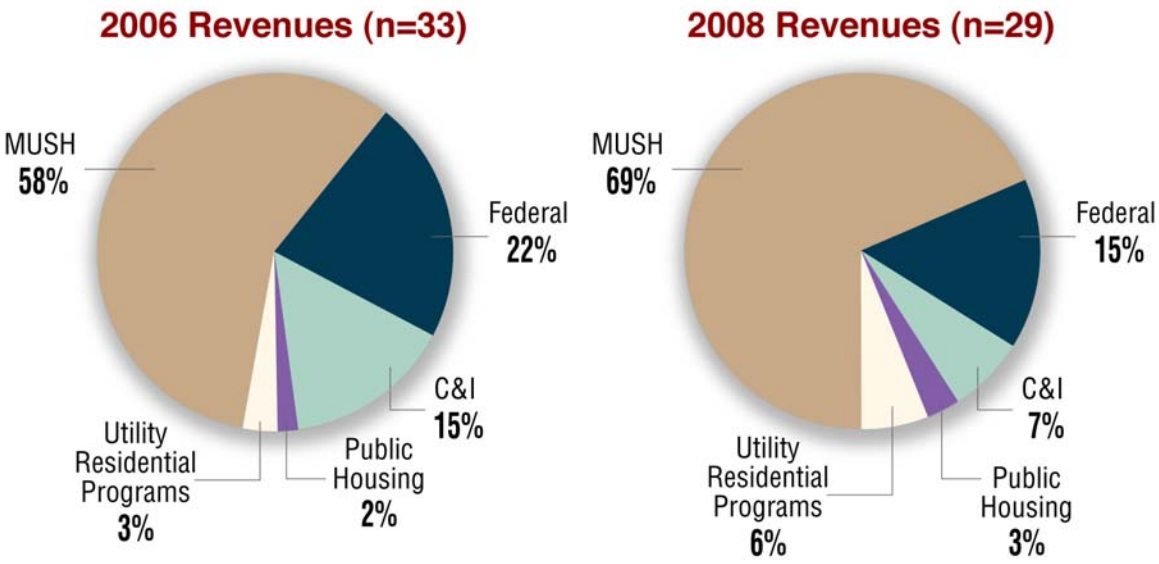

Figure 4. 2006 and 2008 ESCO industry revenues by market segment

The "MUSH" markets—municipal and state governments, universities and colleges, K-12 schools, and hospitals—have historically hosted the largest share of U.S. ESCO projects. The MUSH markets account for $2.8 billion in ESCO revenues in 2008, about 69% of total industry activity. The MUSH market share of total ESCO revenues has increased over 10% since 2006.[15] ESCOs have been active in the MUSH market for almost two decades and it is a mature market for ESCOs. However, the remaining market potential for energy efficiency is quite large in the MUSH market. An analysis conducted by LBNL indicated that remaining energy efficiency opportunities in larger facilities in the MUSH market could produce annual energy savings of 160 million MMBtu, lifetime savings of 2.4 billion MMBtu and require about $35 billion in additional ESCO investment.[16]

ESCO activity in the federal market appears to account for a somewhat lower share of total industry revenues in 2008 compared to 2006 (22% vs. 15%). ESCOs provide

[14] Breakdown of 2006 revenues comes from Hopper et al. (2007).

[15] Larsen et al. (2010) also reports a significant increase in ESCO project data in the K-12 schools market in recent years, which is consistent with self-reports by ESCOs of their activity by market segment.

[16] LBNL assumed that ESCOs would target facilities greater than 50,000 square feet (which accounts for about 65% of the floor area; that ESCOs had achieved ~40-45% market penetration in the MUSH market based on survey responses, and that ESCOs could achieve savings and cost per square foot levels that were comparable to completed projects in the ESCO database.

energy services to federal agencies through several contractual mechanisms, including Energy Savings Performance Contracts (ESPC), as implementers of Utility Energy Service Contracts (UESC) and as contractors for projects that rely on direct appropriations. We know from other public sources that ESCO market activity in the Federal market increased significantly in FY09 and FY10 as DOE reported $440M in project investment in FY09 and $498M in FY10 (which is not yet over), due in part to the extension of the previous DOE Super-ESPC contracts; thus this declining market share in 2008 may be a temporary phenomenon. Over the long run, the federal market is likely to be an important market for ESCOs because of mandates from the federal government to reduce the energy intensity of federal buildings and establish greenhouse gas (GHG) emissions reduction goals. For example, the Energy Independence and Security Act of 2007 (EISA, 2007) established an energy reduction goal for federal buildings of 30% by 2015 and the Obama Administration issued an Executive Order setting a 28% reduction in federal GHG emission levels by 2020 (Executive Order No. 13514, 2009).

The commercial and industrial (C&I) sector accounted for about 7% of ESCO industry revenues in 2008, declining from a 15% market share in 2006. The traditional ESCO business model based on long-term performance contracts has always been a tough sell to private sector customers and the economic downturn further crimped its attractiveness.

Several ESCOs increased activities in the residential market, mainly through managing and/or implementing utility residential energy efficiency programs which is reflected in the 6% share of total ESCO revenues in 2008 (compared to 3% of revenues in 2006).

In the industrial sector, many customers are reluctant to enter into long-term contracts, because they are not sure how long the manufacturing plants will remain open or at what operational level. Also, measurement and verification (M&V) of savings tends to be more challenging for industrial process retrofits, which may involve technologies that are proprietary or commercially sensitive, as a result of which outside parties on site are not typically welcome.

In the private commercial building sector, most building owners are looking for a short-term increase in net operating income (NOI), which leads them to emphasize low-cost/no-cost operating improvements or short payback retrofits (*e.g.*, retro-commissioning or common area lighting) rather than the comprehensive retrofit projects that ESCOs deliver. Also, during the period covered by the survey, the commercial building market has been in a severe downturn, making it difficult for building owners to finance comprehensive energy efficiency retrofits at attractive interest rates.

However, it is worth noting that ESCOs retain a stronger presence in industrial and commercial markets in Asian and European markets (Vine, 2005; Murakoshi and Nakagami, 2009).[17]

[17] Murakoshi et al. (2009) reported the industrial sector had a 46% share of FY 2007Japanese ESCO industry revenues (~$162 M out of ~$353 M) from projects that include performance contracts, Energy Service Providers (ESP), or on-site generation.

4.2. Project/Technology Types Installed by ESCOs

We also asked ESCOs to allocate their 2008 revenues among various project and technology strategies (see Figure 5).[18] ESCOs reported that energy efficiency technologies represent a major share of industry activity, accounting for 75% of ESCO industry revenues or about $3.0 billion per year in 2008. The share of ESCO revenues from energy efficiency has increased slightly since 2006 (73% was reported by Hopper et al. in 2007).

Onsite renewable generation accounts for 14% of ESCO industry revenues in 2008 ($570 million), compared to 10% of ESCO industry revenues in Hopper et al. (2007). Factors that may contribute to the increased deployment of renewable energy and onsite generation technologies are that ESCOs are leveraging publicly-funded incentives and bundling renewable energy with energy efficiency improvements to help customers meet various goals (*e.g.*, energy independence, environmental footprint reductions).

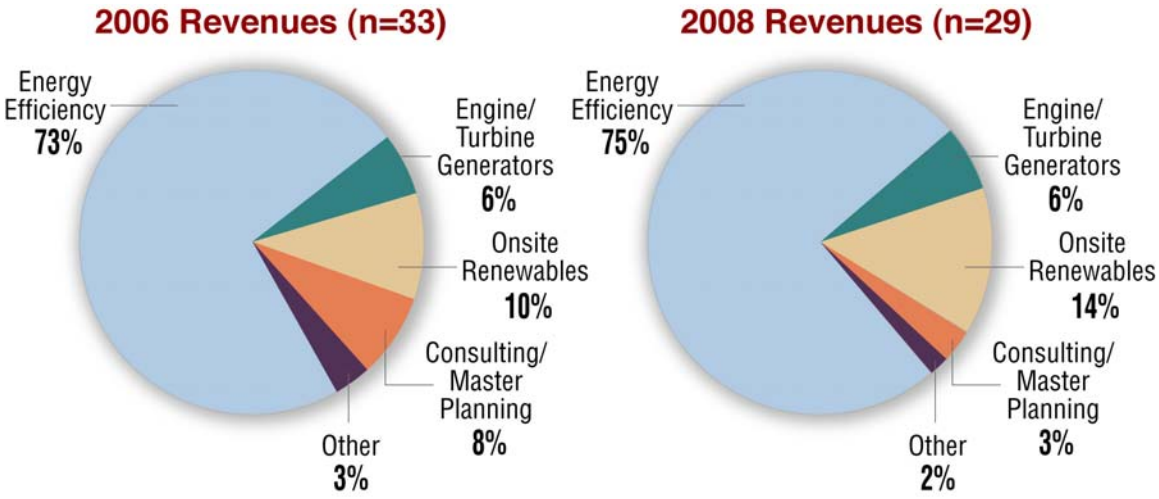

Figure 5. 2006 and 2008 ESCO industry revenues by project/technology type

Consulting and master planning and other services (typically operations and maintenance, water conservation, or other non-energy improvements) account for about 5% of ESCO industry revenues in 2008 ($200 million), somewhat lower than the share for these services reported in 2006 (11%).

4.3. ESCO Contract Types

ESCOs also reported the break-down of their 2008 revenues into several types of contracting vehicles. Performance-based contracting types continue to be the dominant contracting platform accounting for 69% of revenues in 2008 (see Figure 6).[19]

[18] The breakdown of 2006 revenues originally came from Hopper et al. (2007).
[19] *Ibid*.

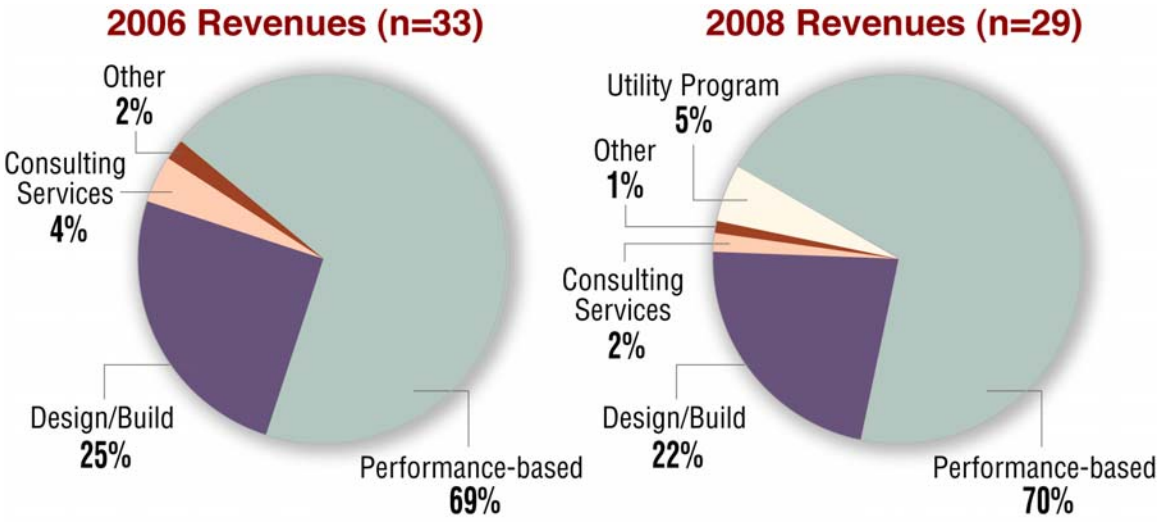

Figure 6. 2006 and 2008 ESCO industry revenues by contract type

As noted in Hopper et al. (2007), the continued reliance on performance contracting by ESCOs is driven by legislative or procurement requirements placed upon institutional sector customers (without the concomitant increase in capital budgets) that push the customers into long-term performance contracts and/or the increased use of power purchase agreements. For example, in the EISA (2007), the U.S. Congress permanently authorizied ESPC in the federal market, which suggests that performance contracting is likely to remain an important influence in the ESCO market. Several ESCOs also provide implementation services to utility energy efficiency programs which accounts for about 5% of ESCO revenues in 2008.

Non-performance-based agreements, such as design/build and "engineering, procurement and construction services" (EPCS) projects, accounted for about 22% of reported 2008 industry revenues and 3% of ESCO revenues were attributed to consulting services.

4.4. Perceived Trends in Project Investment Levels and Savings

We also asked ESCOs to report on trends in projects investment levels and O&M savings. These questions were asked in an effort to better understand results from a parallel analysis of the LBNL/NAESCO project database, which found that median project investment levels more than doubled in the last decade, even after accounting for the effects of inflation and floor area (Larsen et al., 2010).

Specifically, we asked ESCOs whether they believed installed project costs (*i.e.*, per-project ESCO investment levels) have been increasing, decreasing, or staying about the same over the past decade. About 60% of the 26 ESCOs that responded to this question stated that they believed project installation costs have been increasing over the past decade while 40% indicated that project installation costs have remained "about the same" (see Figure 7).

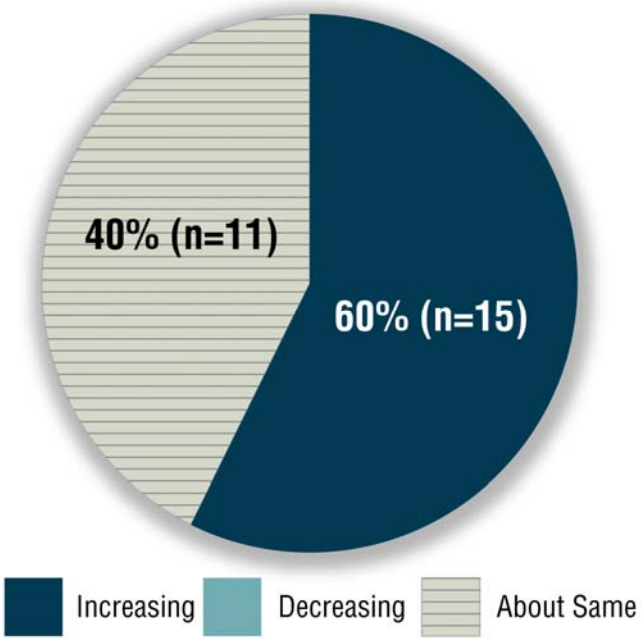

Figure 7. Have project installation costs been increasing, decreasing, or staying about the same over the past decade?

We also asked ESCOs to rank factors that they believe are most influential in changing long-run project installation costs; Table 2 ranks factors listed by ESCOs in order of most influential to least influential. Not surprisingly, the most influential factor in project cost increases has been increasing costs of ESCO production inputs, including labor and material costs. Other factors including market barriers (*e.g.* transaction costs and contract rules), demand for more comprehensive (larger) retrofits, and "other factors" (*e.g.* outside consultant costs) were ranked as having moderate influence (scores of 5 to 6 on average), although in aggregate ranked much lower than ESCO production inputs.

Table 2. What factors most influenced increasing project investment levels (i.e., customer installation costs)?

Factor[20]	Rank	Average Score[21]
ESCO production inputs (e.g., labor and material costs)	1	2.6
Market barriers (*e.g.*, transaction costs, contract rules)	2	5.1
Demand for comprehensive/capital-intense retrofits	3	5.1
Other factors	4	6.3

We also asked ESCO respondents to identify whether they believe O&M savings have been increasing, decreasing, or staying about the same since 2000.

[20] The survey included nine factors for the ESCO respondent to rank and we combined the nine factors into four mutually exclusive factors for purposes of analysis and reporting.
[21] 1=most influential; 9=least influential.

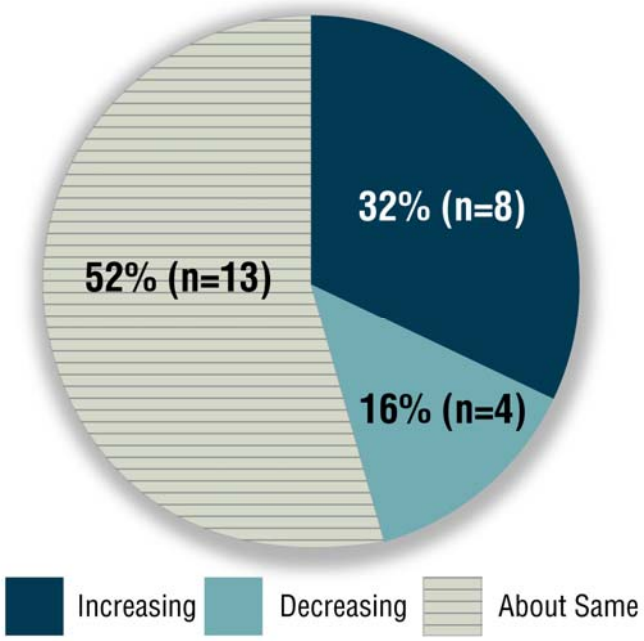

Figure 8. Have O&M savings been increasing, decreasing, or staying about the same over the past decade?

About 52% of the 24 ESCOs indicated that O&M savings have stayed "about the same" since 2000, while 8 ESCOs believed that O&M savings have increased (see Figure 8). ESCOs that indicated that O&M savings have accounted for an increasing share of total dollar savings tended to be smaller ESCOs; five of these eight ESCOs reported that 2008 revenues were less than $35 million.

We also asked companies to rank the factors that are most influential in affecting the inclusion and level of O&M dollar savings for ESCO projects (see Table 3). The most influential factor was the willingness of customers to recognize O&M savings, while better methods and techniques to estimate and recognize O&M savings were ranked second. Changes in internal and external contract labor costs, and new technologies that result in O&M savings ranked third and fourth overall.

Table 3. What factors most influence increases in O&M savings levels?

Factors[22]	Rank	Average Score[23]
Customers more willing to recognize savings	1	2.8
Better methods to estimate O&M savings	2	3.1
Changes in labor costs (ESCO and external)	3	3.3
New technologies	4	3.5
Changes to internal ESCO policies regarding O&M estimation	5	4.5

[22] The survey included seven factors for the ESCO respondent to rank and we combined the seven factors into five mutually exclusive factors for analysis purposes.
[23] 1=most influential; 7=least influential.

5. Implications for Policymakers

We highlight several trends from this study that should be considered by policymakers who are interested in encouraging private-sector investments in energy efficiency:

- **The ESCO industry continues to grow despite a general downturn in the broader economy.**

Despite the onset of a severe economic recession, the U.S. ESCO industry managed to grow at about 7% per year between 2006 and 2008. We estimate that ESCO industry revenues are about $4.1 billion in 2008. While ESCO industry growth was slower than anticipated, the industry continued to deliver energy efficiency services to many market sectors even when facing higher financing costs. We expect the ESCO industry's growth rate to increase through 2011, due in part to the large infusion of federal ARRA dollars to support state and local government energy efficiency programs and increased spending in ratepayer-funded energy efficiency programs.

- **ESCOs are installing a more comprehensive mix of technologies at project sites.**

The market share of revenues for onsite/renewable generation is 14% of 2008 revenues ($570 million), which is an increase from 10% of ESCO industry revenues in 2006 ($360 million). It appears that ESCOs and their customers are leveraging incentives offered by public benefit funds, government tax credits, and bundling onsite generation with energy efficiency improvements in order to enhance the overall economic attractiveness of these projects. We expect that ESCOs will continue to deliver more comprehensive services to customers in the near future, driven in part by ratepayer-funded energy efficiency programs that encourage comprehensive retrofits and government initiatives that support deployment of renewable energy projects.

- **The public/institutional market sector continues to be the dominant market for ESCOs.**

ESCOs continue to target, and have the most success in, the public/institutional market in the U.S., which accounted for 84% of ESCO revenues (~$3.4 billion) in 2008. This represents a slight increase from 2006 when 80% of ESCO revenues (~$2.9 billion) were from projects in public/institutional market sector. Some industry observers believe this sector may be approaching saturation, as first noted in Hopper et al. (2007), yet market activity continues to increase in both absolute and relative terms. It appears that "lead by example" programs established by state and local governments, the infusion of federal stimulus dollars, and the continued support by the federal government for performance contracting programs will continue to support ESCO market growth in the public/institutional sector.

- **The investment level of ESCO projects continues to expand both because of ESCO production input cost increases and customer demand for a more comprehensive mix of technologies, many of which are significantly more capital intensive to procure, install, and operate.**

A majority of ESCO respondents – 54% – indicated that typical project installation costs have increased over the past decade, even after accounting for inflation, due in part to increased labor and material costs. Many ESCOs also noted an increased demand by customers for more comprehensive and thus more capital-intensive retrofit strategies employing a more diverse and comprehensive set of efficiency and renewable technologies. As the total project investment costs increase for customers, ESCOs need to continue to demonstrate the economic case for the retrofits by delivering additional savings and value to customers through a combination of energy and O&M savings, capital cost avoidance allowances and other non-energy benefits. [24]

[24] Many states have amended their laws to allow avoided future capital equipment expenditures to be counted as savings due to the installation of new equipment or services provided by the ESCO. For example, if the customer budgeted a new chiller for $500,000, and intended to pay the capital costs with a ten-year 5% bond, it would incur an annual capital cost of about $65,000. Incorporating the new chiller in an ESPC project would enable the customer to avoid this annual capital cost, which would be included in the project savings.

References

AECOM 2008., *Form 10-K,* December 1.

Barbose, G., C. Goldman, and J. Schlegel, 2009. "The Shifting Landscape of Ratepayer-Funded Energy Efficiency in the U.S." *The Electricity Journal* 22(8):29-44.

Bharvirkar, R., C. Goldman, D. Gilligan, T. Singer, D. Birr, P. Donahue, and S. Serota 2008. "Performance Contracting and Energy Efficiency in the State Government Market", LBNL-1202E. November.

Cuddeback, G., E. Wilson, J. Orme, and T. Combs-Orme, 2004. "Detecting and Statistically Correcting Sample Selection Bias." Journal of Social Service Research, 30(3), 19-33.

Energy Independence and Security Act (EISA) of 2007, H.R. 6, 110th Cong., 1st Sess. (2007).

Exec. Order No. 13,514, 74 C.F.R. 194 (2009).

Goldman, C., J. Osborn, N. Hopper, and T. Singer, 2002. "Market Trends in the U.S. ESCO Industry: Results from the NAESCO Database Project" Lawrence Berkeley National Laboratory: LBNL-49601, Berkeley, CA, May.

Heckman, J., 1979. "Sample selection bias as a specification error." Econometrica, 47, 153–61

Hopper, N., C. Goldman, D. Gilligan, T. Singer, and D. Birr, 2007. "A Survey of the U.S. ESCO Industry: Market Growth and Development from 2000 to 2006" Lawrence Berkeley National Laboratory: LBNL-62679, Berkeley, CA, May.

Hopper, N., C. Goldman, J. McWilliams, D. Birr and K. McMordie Stoughton, 2005. "Public and Institutional Markets for ESCO Services: Comparing Programs, Practices and Performance" Lawrence Berkeley National Laboratory: LBNL-55002, Berkeley, CA, March.

Hopper, N., C. Goldman, and D. Birr (Synchronous Energy Solutions). 2004. "The Federal Market for ESCO Services: How Does it Measure Up?", LBNL-54952. August.

Larsen, P., A. Satchwell, and C. Goldman, 2010. "Evolution of the U.S. Energy Service Company Industry: New Results from the NAESCO Project Database" In preparation.

Linstone, H. A., and M. Turoff (Eds.), 1975. "The Delphi method: Techniques and applications." London: Addison-Wesley.

Murakoshi, C. and H. Nakagami, 2009. "Current state of ESCO activities in Asia: ESCO industry development programs and future task in Asian countries." *ECEEE 2009 Summer Study*.

Roehrig, P., 2010. "Building the Clean Economy" Office of Energy Efficiency and Renewable Energy, Department of Energy, presentation to Clean States Energy Alliance, February 8.

Siemens 2008. *Form 20-F*. February 12.

Vine, E., 2005. "An international survey of the energy service company (ESCO) industry" *Energy Policy* 33(2005): 691-704.

Appendix A

In Appendix A, we summarize our qualitative analysis of ESCOs that focused on determining whether non-respondent companies were either not ESCOs per our definition or were no longer active in the ESCO market (see Figure A-1 for decision tree and qualitative criteria).

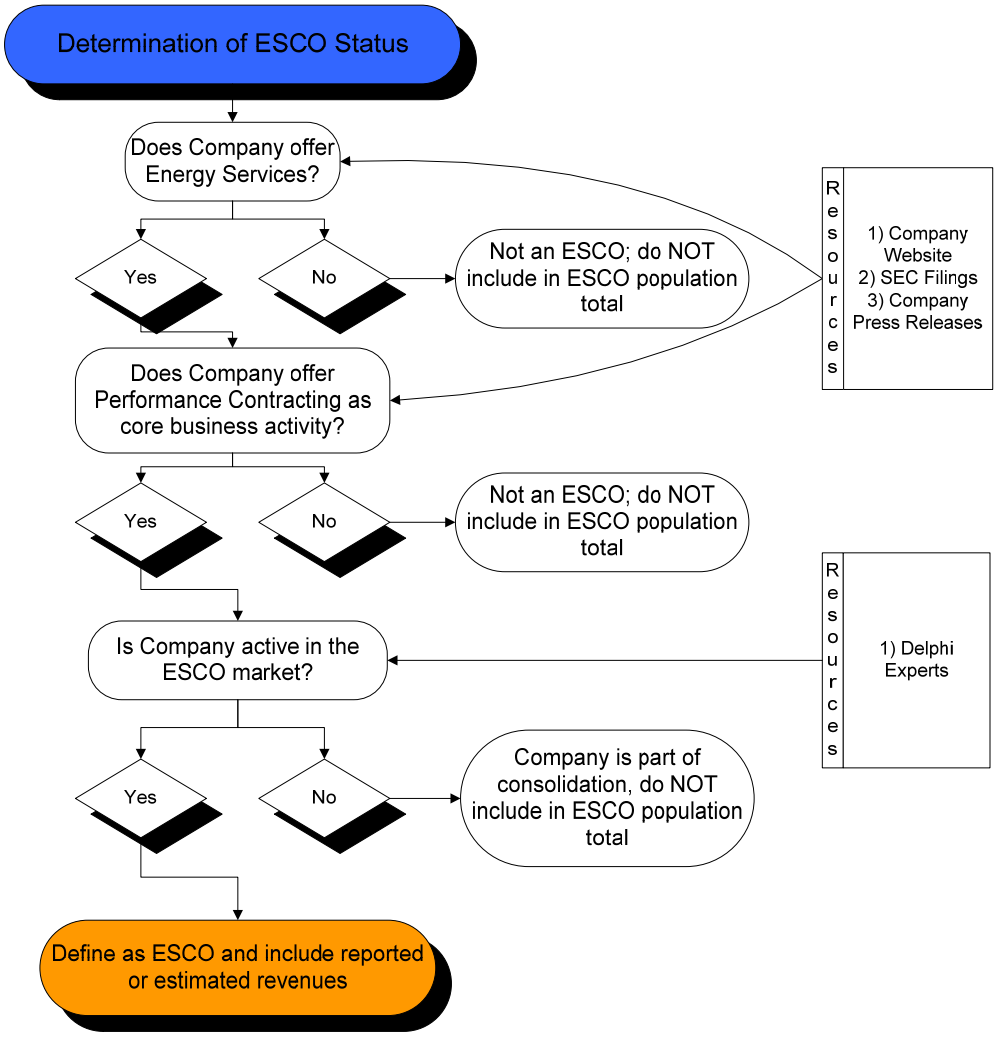

Figure A-1. Decision tree for determining ESCO status

Using this decision tree, we were able to identify 56 companies from our original survey target list of 109 that were either *not* an ESCO per our definition or not currently active in the ESCO market. When these companies were removed, our overall response rate improved to 55% (29 out of 53).