Evolution of the U.S. Energy Service Company Industry: Market Size and Project Performance from 1990-2008

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Presentation Outline

- Introduction
- Approach and Data Sources
- Overview of U.S. ESCO Industry
- Typical Performance of Projects and Market Activity
- Project-level Trends in Public and Private Sector Markets
- Enabling Policies
- Summary and Future Research
- Contact and Citation Information

What is an Energy Service Company (ESCO)?

"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."

Definition of Energy Service Company (ESCO)

- **Project developer in business of improving end-use energy efficiency**
  - Combine engineering expertise with financial services to extract untapped potential for energy efficiency
  - Integrates broad range of services: project identification, engineering & design, financing, construction, M&V of savings, maintenance and billing
- **Performance contracting: ESCO's compensation is tied to project's performance**
- **Product and Service Strategies**
  - Full range of energy efficiency services
  - Energy and facility management services
  - Build/own/operate major energy facilities

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ESCO Industry "Snapshot" Before ARRA (2009)

- This study was conceived as a snapshot of the ESCO industry prior to the economic slowdown and the introduction of federal stimulus funding by enactment of the American Recovery and Reinvestment Act of 2009 (ARRA).

- In the future, we will build on this analysis by evaluating the size of the industry and performance of projects installed during the post-ARRA period.

Scope and Approach

- **ESCO industry and project-level trends: 1990-2008**
  - **Three time periods:** 1990-1997, 1998-2004, 2005-2008
  - **Market trends:** e.g., changing mix of retrofit strategies
  - **Project performance trends:** e.g., investment levels, project savings, cost/benefit ratios, payback times
- **Study utilizes two analytic approaches:**
  1. a "top-down" method involving a survey and interviews with ESCOs to estimate aggregate market activity and identify emerging trends; and
  2. a "bottom-up" analysis of a large database of 3,000+ projects provided by ESCOs and their customers

Survey of ESCOs

Objective:

- Track and analyze ESCO industry and market trends: industry revenues, market activity, changes in industry

Approach:

- Survey sent to ESCOs using following sources:
  - NAESCO membership list;
  - DOE-qualified ESC list; and
  - Qualified performance contractors on state lists
- Response rate
  - 2007 survey: 72% (33 out of 46);
  - 2009 survey: 55% (29 out of 53); but all large ESCOs responded
- Survey questions
  - Current revenues by market segment, contract type, and technology;
  - Anticipated revenues in next 3 years; and
  - Factors influencing trends in industry costs and savings

LBNL ESCO Database

Objectives:

- Track industry performance and evolution over time;
- Examine trends in savings, investment levels, market penetration of EE technologies, and customer preferences; and
- Database results can be used to support benchmarking projects in institutional and public markets.

Approach:

- NAESCO/LBNL partnership with voluntary participation from industry and government agencies;
- Project data primarily from NAESCO accreditation process;
- Database: 3,000+ ESCO projects in 49 states representing $8B+ in total investment; projects account for ~20% of total industry activity since 1990.

LBNL ESCO Database (cont.)

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

- ESCOs are asked to submit a representative group of projects by NAESCO in the accreditation process.
- ESCOs do not always collect or provide all relevant project information on customer projects.
- When reporting results, we do not assume that ESCO project data represent a random sample from the entire population of U.S. ESCO projects.

LBNL ESCO Database (cont.)

- A major focus of this project involves analyzing ESCO project trends over time.

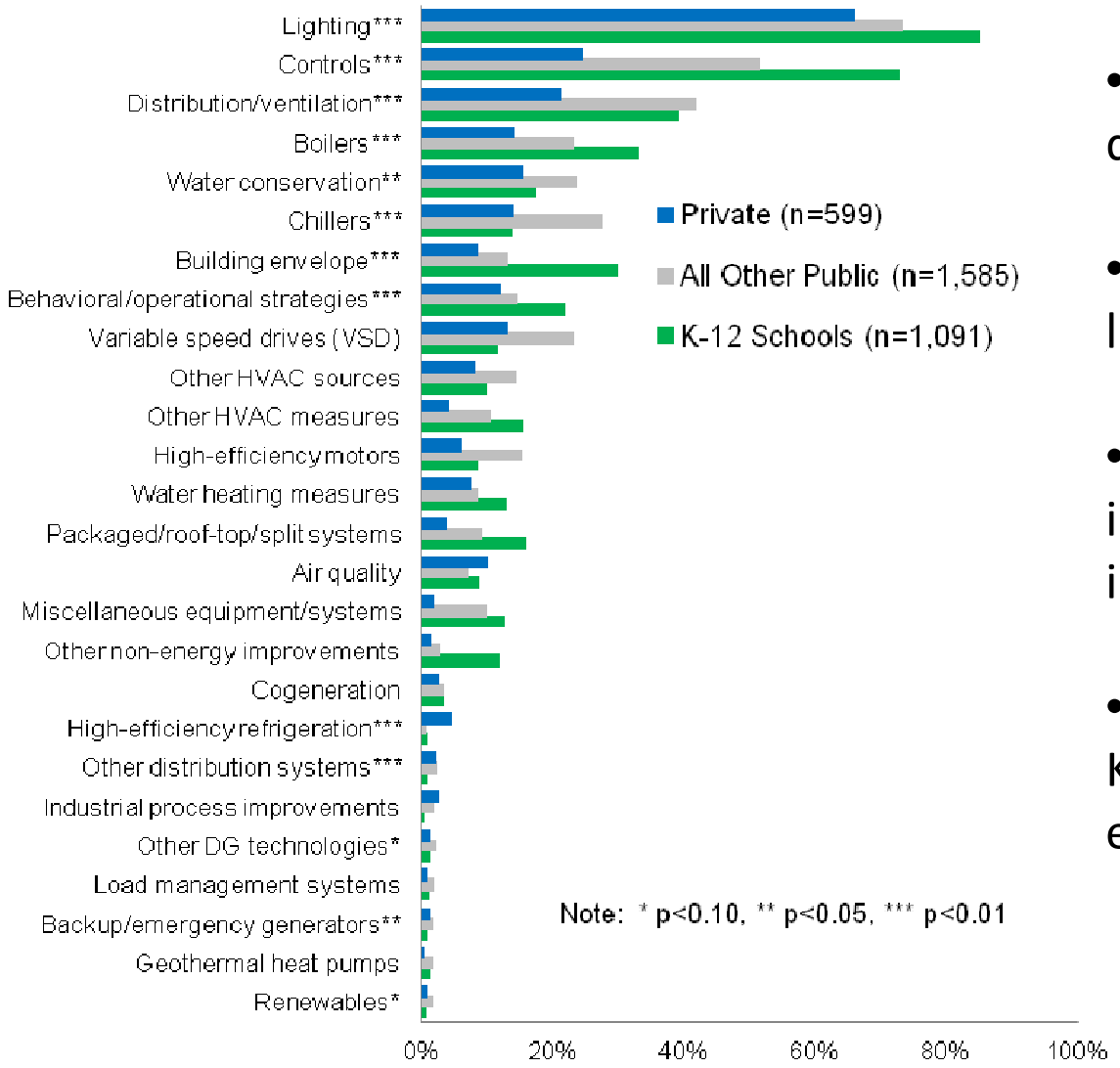
- We grouped projects by vintage (i.e., the year the project was completed) into three distinct time periods:

(1) 1990-1997
In this period, the ESCO industry was maturing and utilities made significant investments in energy efficiency improvements.

(2) 1998-2004
Electricity market restructuring and fall-out; ESCO activity in the federal market was also affected by a sunset to legislation enabling performance contracting ("ESPC Program").

(3) 2005-2008
Many states adopted policies that promote energy efficiency; Industry influenced positively by the re-authorization of ESPCs.

LBNL ESCO Database (cont.)



- Database denotes ~150 different technologies
- 93% of all projects install lighting
- MUSH market: >80% install lighting and >65% install HVAC controls
- Significant percentage of K-12 schools install non-energy measures

LBNL ESCO Database (cont.)

LBNL-defined Primary Retrofit Strategy	Example of Energy Conservation Measures (ECMs) Included
Lighting-only	Technologies installed only include various lighting efficiency measures, controls and strategies.
Major HVAC	Technologies installed include major HVAC equipment replacements (e.g., boilers, chillers, cooling towers, HVAC dist. improvements) and may include other HVAC control, high-efficiency lighting, and motors measures.
Minor HVAC	Technologies installed only include less-capital intensive HVAC measures and controls (and exclude major HVAC equipment replacements) and may include lighting and other measures.
Onsite generation	Technologies include installation of onsite generation equipment and may include other energy efficiency measures (e.g., lighting, HVAC equipment and controls, motor efficiency measures).
Non-energy	Technologies installed include roof or ceiling replacement, asbestos abatement (i.e., measures that are not installed primarily for their energy savings, but may have other types of savings), and may include other efficiency measures (e.g., lighting or HVAC upgrades).
Other	Technologies installed include all other measures including domestic hot water (DHW), water conservation, and installation of energy-efficient equipment such as vending machines, laundry or office equipment, high-efficiency refrigeration, industrial process improvements and strategies such as staff training or utility tariff negotiation. These individual measures may also be included in other retrofit strategies (except lighting-only); projects categorized as "Other" retrofit strategy only installed these types of measures.

- In order to facilitate comparative analysis across projects, we group the ~150 energy conservation measures reported by ESCOs into generalized primary retrofit strategies.

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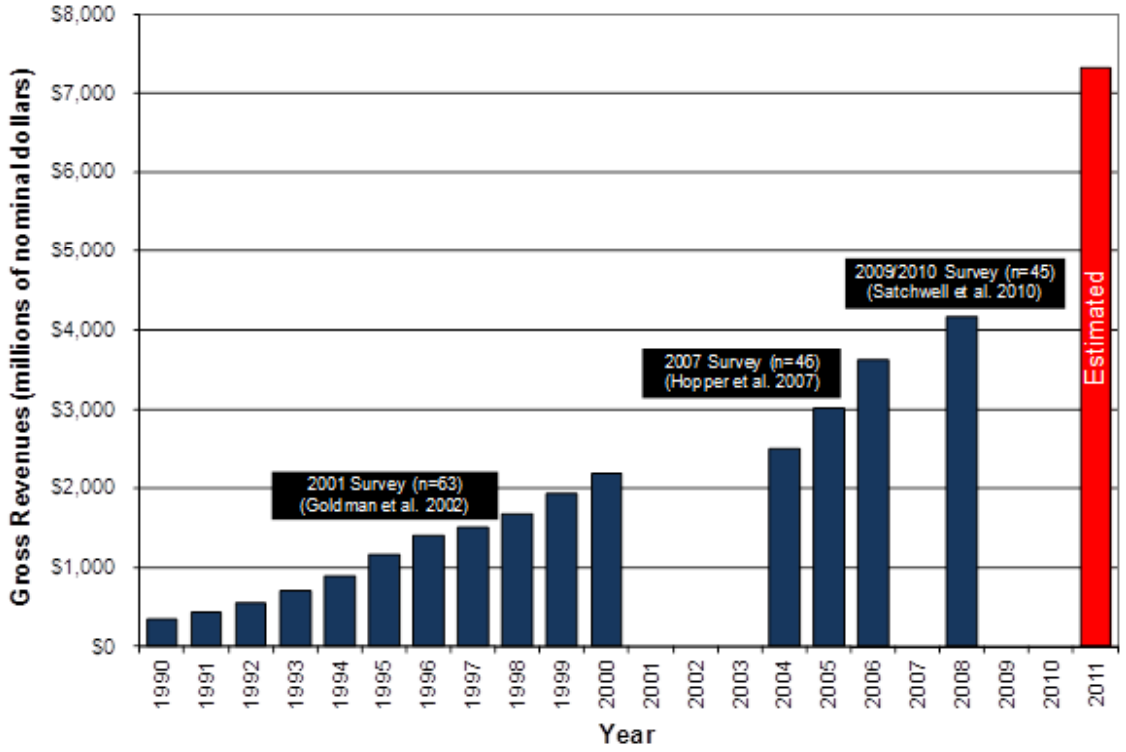
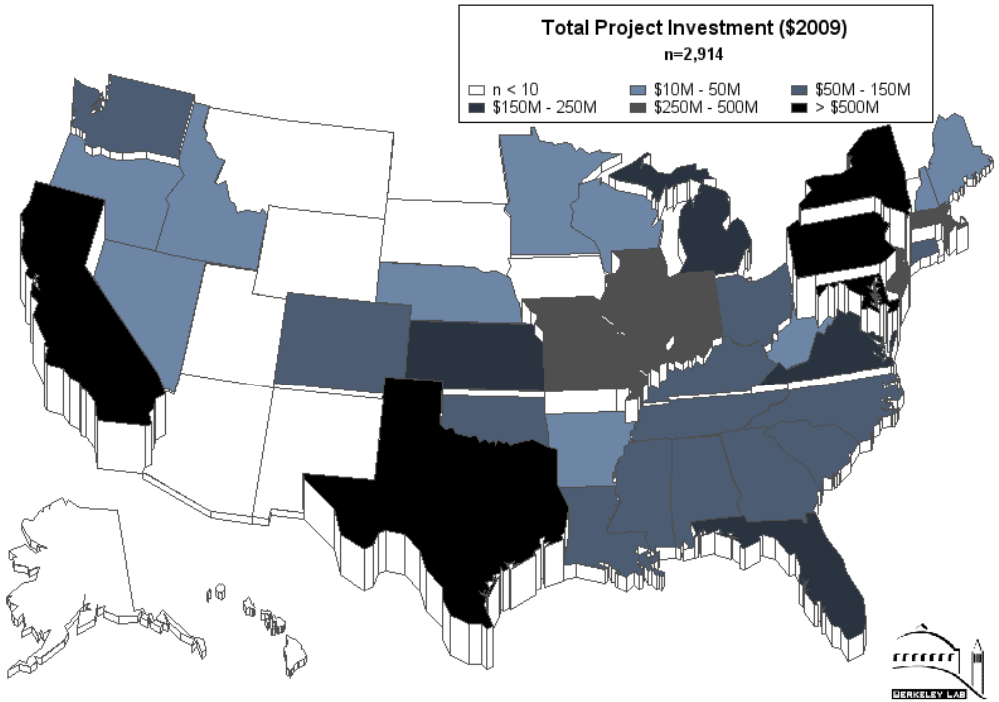
Size of U.S. ESCO Industry



- LBNL estimated annual ESCO industry revenues at $4.1B in 2008
- ESCOs projected 26% growth for 2009-2011
- Based on industry survey conducted in 2009/2010
- LBNL to conduct another survey in the Summer/Fall 2012

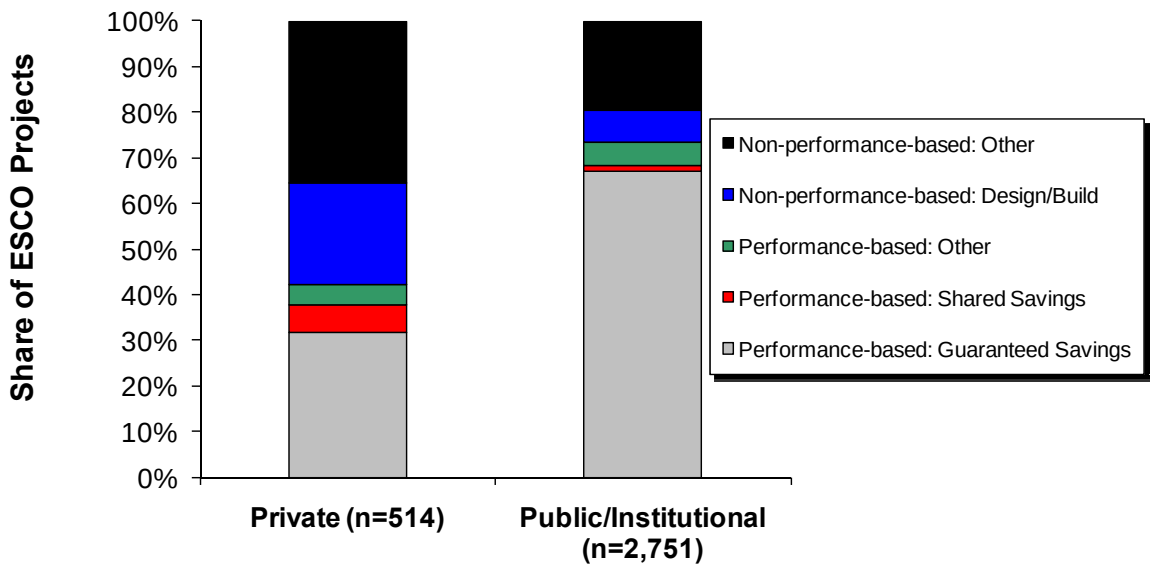
Project Investment Levels by State

- **ESCO project investments—in the database— tend to be concentrated in heavily populated states that have supportive enabling policies.**
- **Five states (CA, NY, TX, PA, MD) account for more than one-third of market activity based on projects in the database.**



ESCO Contracts and Business Types

Company Type	Number of Companies	Percent share of 2008 U.S. ESCO industry revenues
Building equipment manufacturers	4	49%
Utility affiliates	5	8%
Engineering services companies	25	22%
Other energy companies	10	21%



Public/Institutional Market:

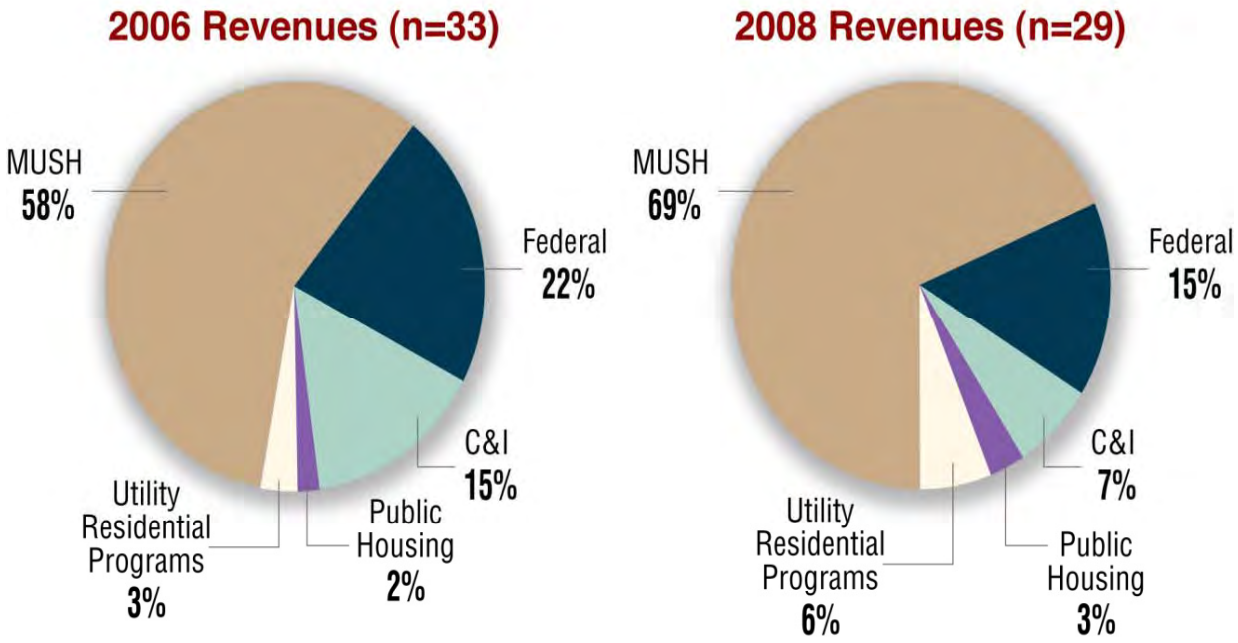
- Most U.S. ESCO projects are guaranteed savings (76%); very few use shared savings
- 15% are design/build

Private sector:

- Design/build and fee-for service contracts more prevalent

Industry Revenues by Market Segment: 2006 and 2008

- **Results of the most recent ESCO survey: MUSH markets account for $2.8B in 2008 (about 69% of total industry activity)**
- **MUSH market share of total ESCO industry revenues has increased more than 10% since 2006; similar trends exist in the LBNL ESCO database**



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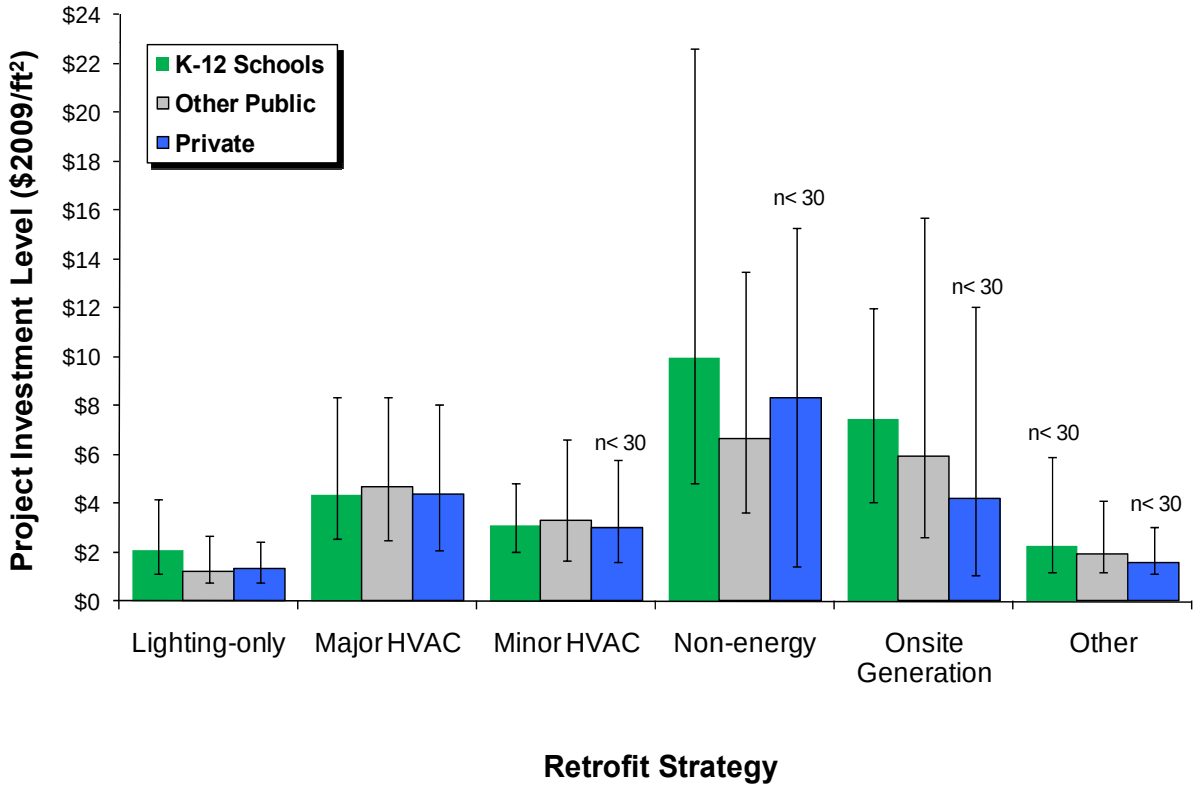
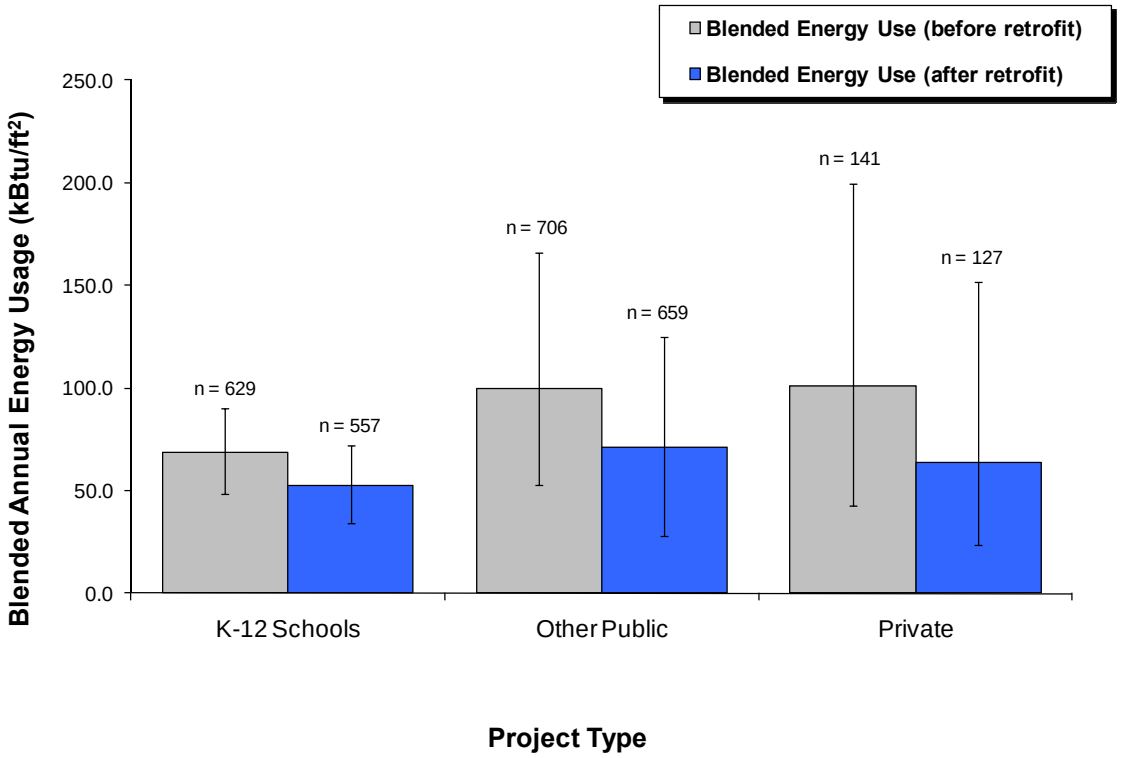
Normalized Project Investment Levels by Retrofit Strategy

- K-12 schools are using performance contracts to partially offset deferred maintenance needs; these non-energy projects typically cost more per square foot than other retrofit strategies.



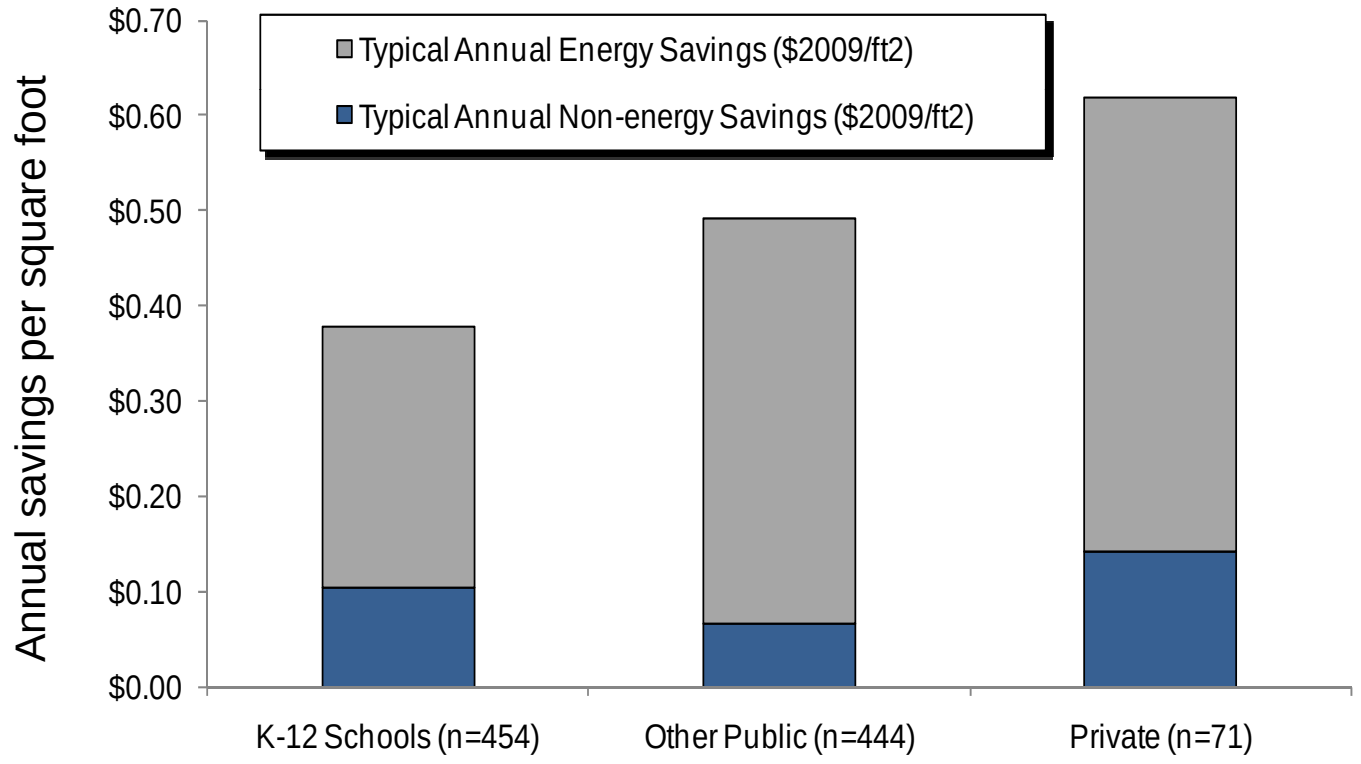
Blended Energy Use Before and After Retrofit

- Median blended energy usage before and after retrofit is lower in typical K-12 schools projects when compared to other sectors.

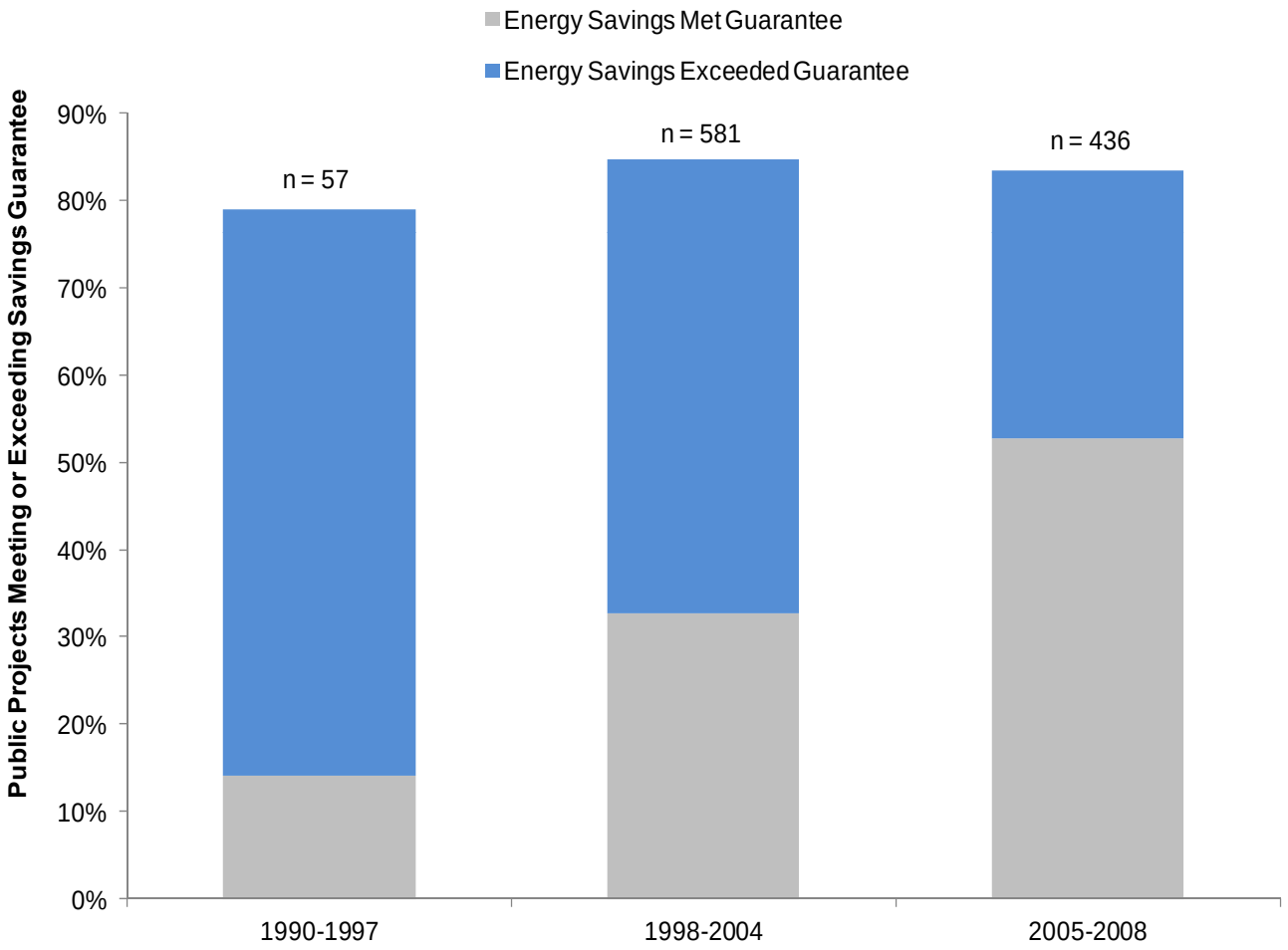


Median Annual Energy and Non-energy-related Dollar Savings

- K-12 schools projects report the largest share of non-energy savings to overall savings per square foot.

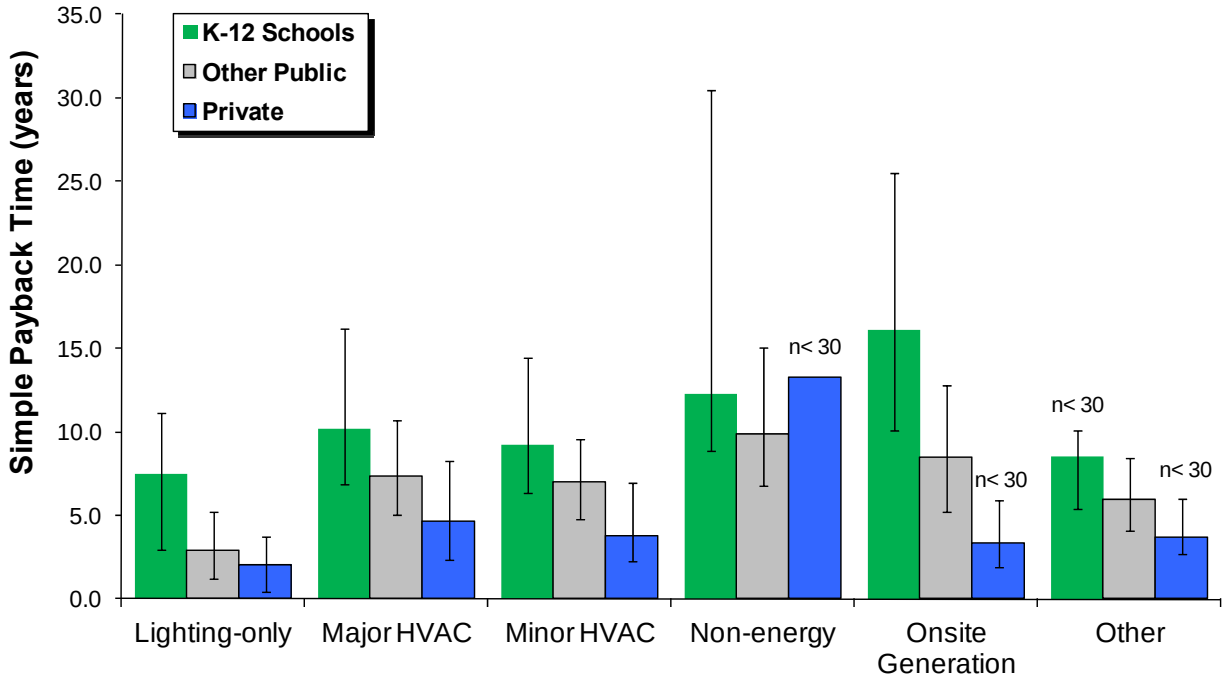


Most Public Projects Meet or Exceed Savings Guarantee



Simple Payback Time by Retrofit Strategy

- Payback times for all retrofit strategy types except non-energy projects, were shorter for private sector projects than for public/institutional and K-12 projects.
- K-12 school projects had the longest median payback times for all retrofit strategies



Direct Net Benefits to Customers

Market Segment	Count	Total Net Benefits (million US$)	Median Project Benefit-cost Ratio
State/local Government	367	$442.3	1.5
Federal Government	319	$2,111.9	1.7
Health/Hospitals	186	$330.5	2.6
Public Housing	68	$68.8	1.4
K-12 Schools	910	$28.4	1.1
Universities/colleges	281	$442.9	1.4
Private	353	$512.9	2.6
Total	**2,484**	**$3,937.8**	

- **If net benefits per database project are representative, we estimate that ESCOs generated ~$23B in net direct economic benefits for customers (1990-2008).**
- **Typical public sector project generated $0.89/ft^2 in direct net benefits and typical private sector project generated $2.52/ft^2**

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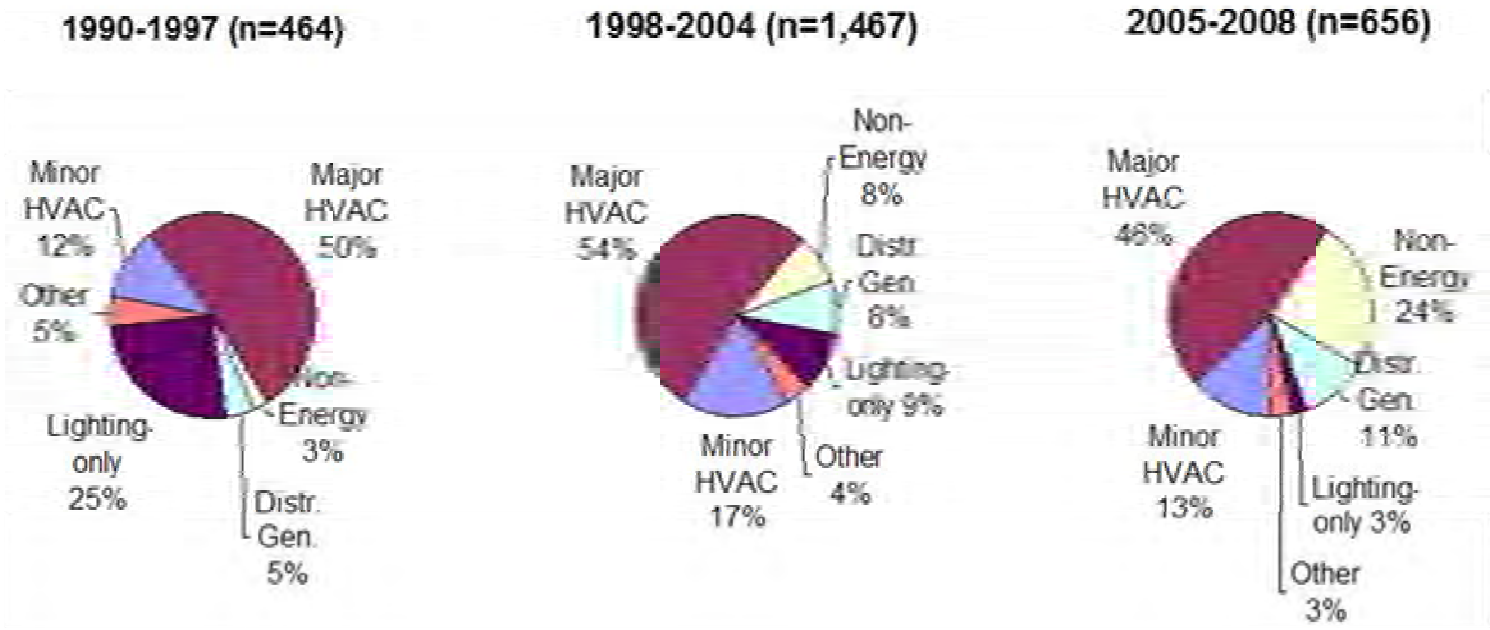
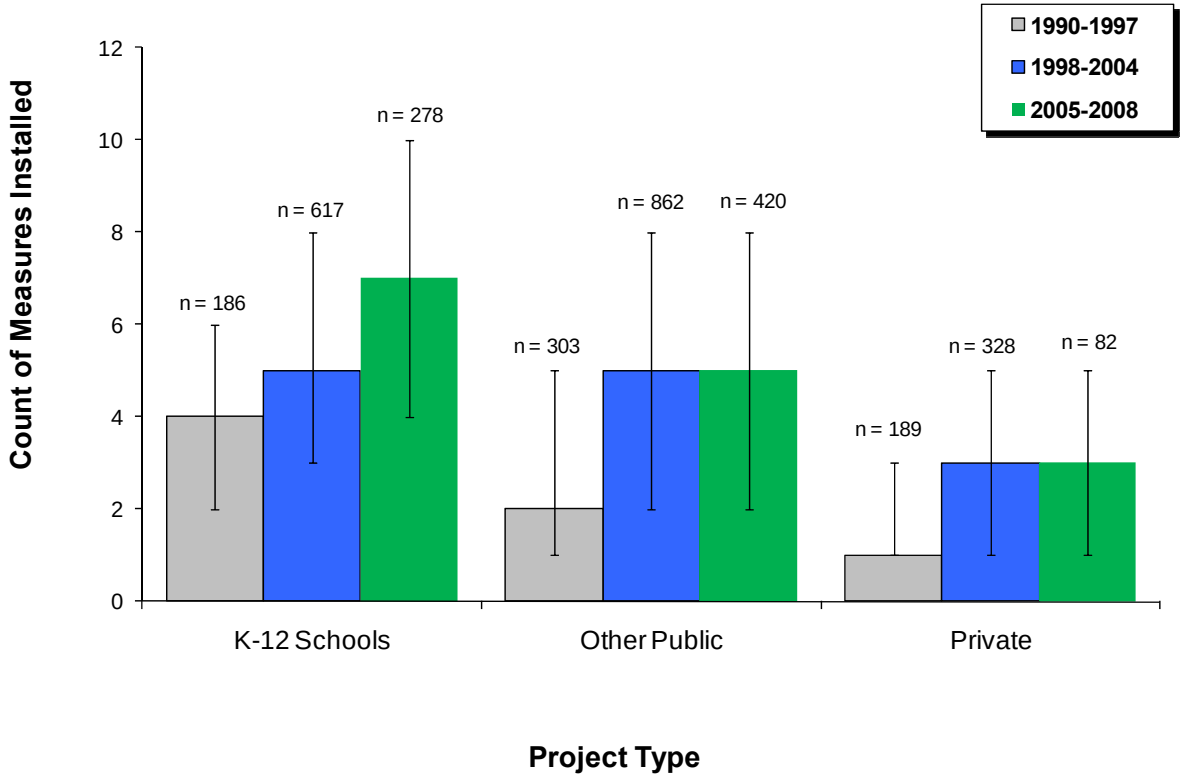
Retrofit Strategy Trends

- In public sector, major HVAC remains dominant strategy
- Share of lighting-only projects has declined significantly over time
- Share of projects with onsite generation increasing



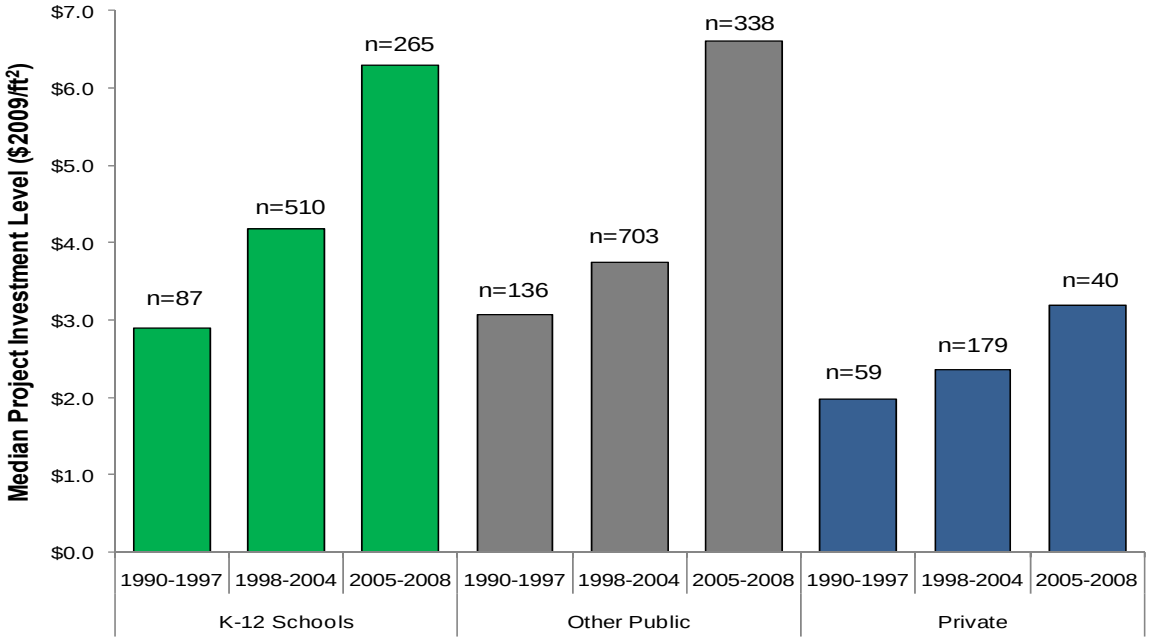
Number of ECMs Per Project

- Number of unique efficiency measures typically installed has increased over time; K-12 projects continued to trend upward between 2005 and 2008.
- Upward trend appears to be leveling off for other institutional/public projects as well as for private sector projects.



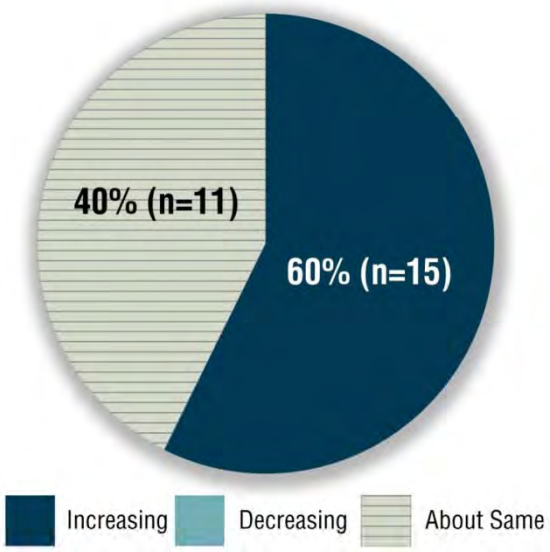
Investment Intensity Trends

- Median project investment levels per sq. ft. more than doubled in the last 10 years, even after accounting for inflation.
- Investment levels (i.e., project installation costs) are increasing faster than savings.
- Driving factors may include changes in retrofit strategy mix (e.g., more DG, fewer lighting only, more non-energy projects).



Investment Levels: ESCOs Respond

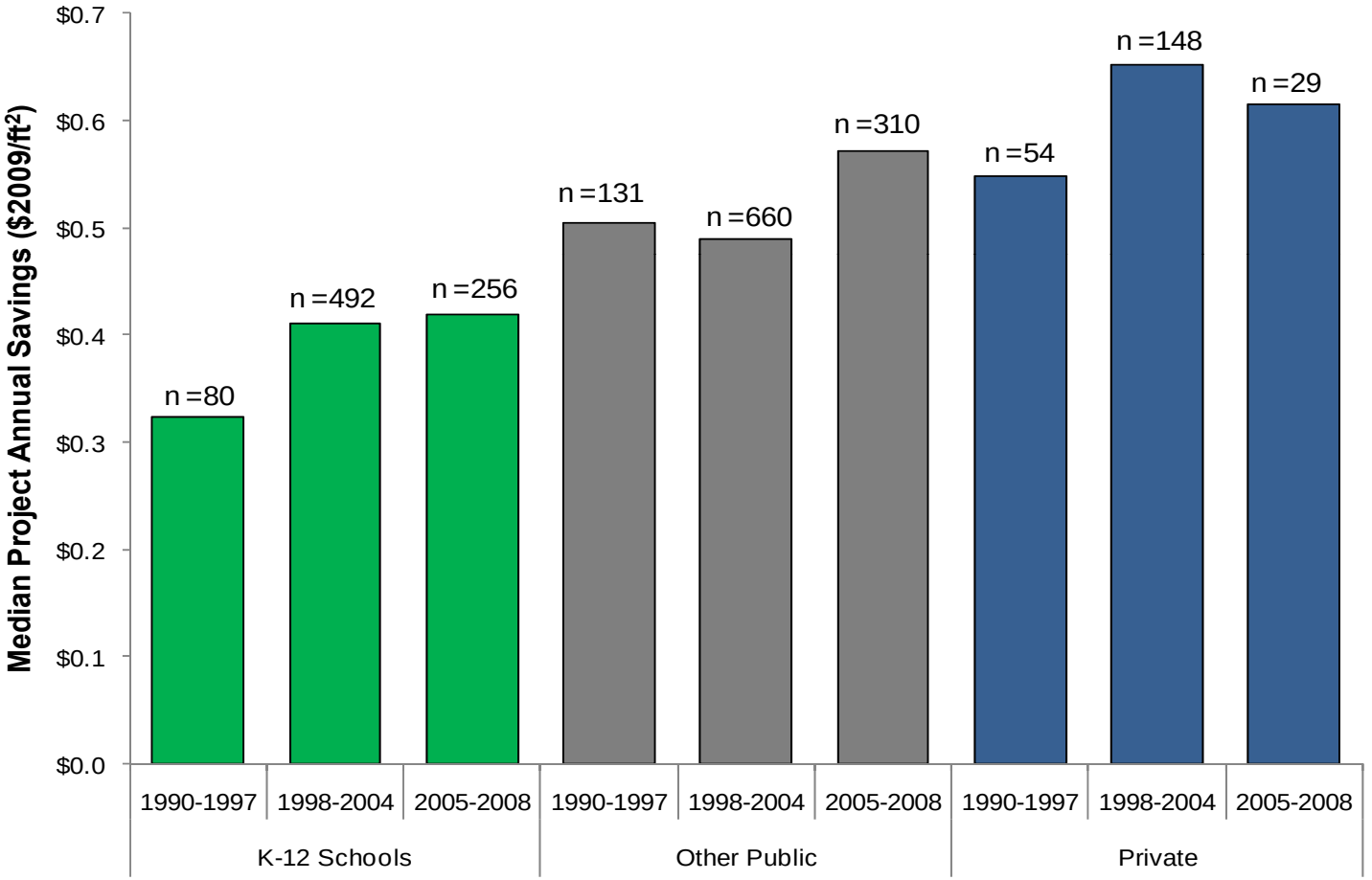
- **"Have project installation costs been increasing, decreasing or staying about the same over the past 10 years?"**



- **"What factors most influenced increasing project investment levels?"**

Factor	Rank	Average Score
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

Project Savings per Square Foot



Trends in Project Economics

- Median payback times for ESCO projects are increasing over time in all market segments.
- Median benefit cost ratios have generally decreased over time in these market segments (with the exception of private sector projects in the 2005-2008 period).
- *Direct* benefits from K-12 school retrofits—completed after 2005— do not typically cover turnkey installation costs over the lifetime of the project…..

Market segment	Installation Year	Simple Payback Time (years)	Benefit-cost Ratio
K-12 Schools	1990-1997	8.2 (n=125)	1.5 (n=121)
K-12 Schools	1998-2004	9.6 (n=540)	1.1 (n=536)
K-12 Schools	2005-2008	13.1 (n=263)	0.9 (n=263)
Other Public	1990-1997	3.9 (n=225)	3.0 (n=220)
Other Public	1998-2004	7.0 (n=724)	1.6 (n=708)
Other Public	2005-2008	9.0 (n=353)	1.2 (n=339)
Private	1990-1997	1.9 (n=138)	4.3 (n=138)
Private	1998-2004	3.7 (n=197)	2.2 (n=185)
Private	2005-2008	3.2 (n=33)	2.7 (n=31)

Project Performance at K-12 Schools

- Several factors help explain relatively lower benefit-cost ratios for K-12 school projects:

  (1) projects implemented to partially offset substantial accumulated deferred maintenance needs and include some capital-intense measures (e.g., new roofs, asbestos removal) that do not provide energy savings but are integral to maintaining the facilities;

  (2) K-12 schools tend to have lower hours of operation and minimal operations during summer months when energy costs are typically highest; and

  (3) energy efficiency savings potential may be lower in K-12 schools, because K-12 schools tend to have lower baseline energy use prior to retrofits than other public/institutional sectors.

- Despite the fact that non-energy measures generate little or no energy-related savings, these projects are highly valued by customers.

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Enabling Policies to Facilitate Growth

- Promote international EM&V standards to quantify and report non-energy (O&M savings, avoided capital costs) that can be monetized and included in performance contracts

- Standardize the collection of project-level data detailing measure-specific and transactional costs

- Provide access to project-level performance benchmarking data

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Summary

- ESCO industry grew ~7% annually 2006-2008 despite onset of recession
- Typical public sector project generated $0.89/ft2 in net, direct economic benefits and typical private sector project generated $2.52/ft2;
- We estimate the ESCO industry provided ~$23 billion ($2009) in net, direct economic benefits to customers for projects installed between 1990 and 2008;
- Median payback times for ESCO projects are increasing over time in all public market segments; and
- K-12 schools are using ESCO model to address deferred maintenance, but this trend is affecting the traditional economic measures policymakers use to evaluate success.

Future Research

(1) 2012 LBNL/NAESCO Industry Survey

- Follow-up to 2009 survey
- Helps answer questions about size and evolution of industry; trends in various market segments; market potential; and other emerging issues

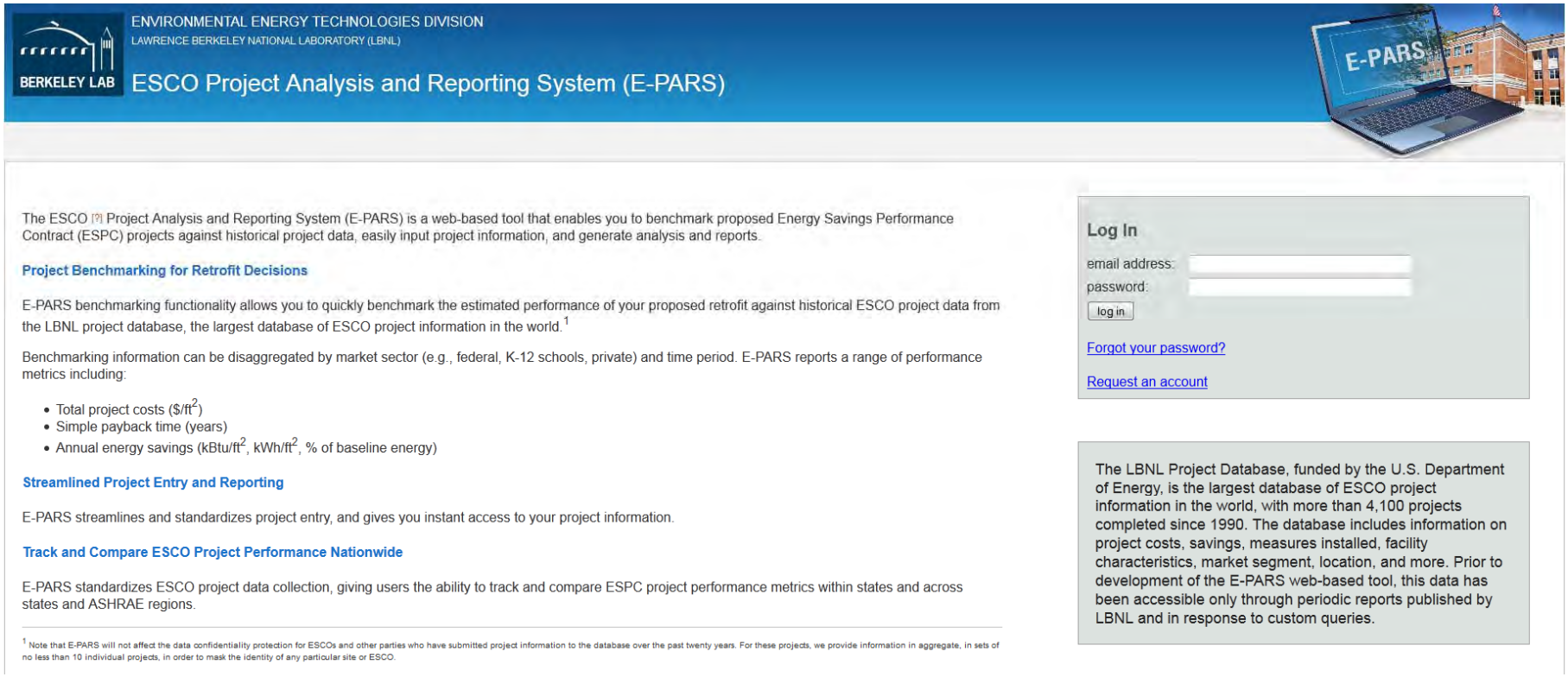
(2) New methods to quantify non-energy benefits (NEB)

- Case study analysis of projects successfully incorporating NEB
- Convene a working group of ESCOs to identify current EM&V barriers for NEB estimation and identify innovative policies to encourage widespread adoption….

Future Research (cont.)

(3) ESCO Project Analysis and Reporting System

- Secure, online project entry and reporting for accreditation
- Compare ESCO project performance nationwide
- LBNL will give webinars in near future



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