

Energy Savings Performance Contracting

**What is Performance Contracting?
How Does It Work?
How Are Savings Calculated?**

ABMA Annual Meeting
January 15, 2011

About the Energy Services Coalition



- Public-private partnership of individuals promoting energy savings performance contracting
- Department of Energy Partner providing education, outreach, tools and technical assistance

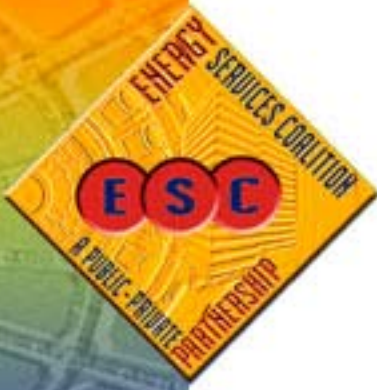
What is ESPC?



“The use of guaranteed savings from the maintenance and operations budget (utilities) as capital to make needed upgrades and modernizations to your building environmental systems, financed over a specified period of time.”

-United States Department of Energy

Another Perspective



A diversion of utility dollars to effect . . .

- Infrastructure Modernization
- Long term reduction in energy consumption
- Environmental Stewardship
- Our Nation's Safety

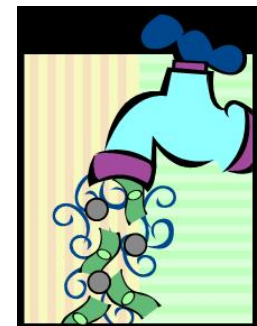
Energy Conservation Measures



- ✓ A training program
- ✓ or a facility alteration
- ✓ or equipment used
 - in an existing facility
 - or in new construction



... that reduces
energy costs



Heard of It?



- Nearly a \$5 billion per year industry

- Used in:
 - Cities
 - Counties
 - States for State Agencies
 - Universities and Schools
 - Federal Facilities
 - Department of Defense
 - Commercial and Industrial Sectors for nearly 30 years

What is an ESCO

What is Energy PC?

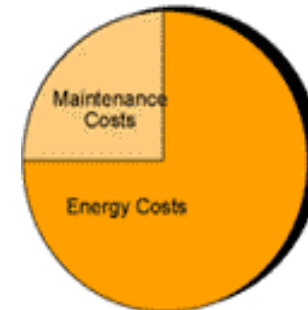


ESCO: Energy Services Company; PC: Performance Contracting

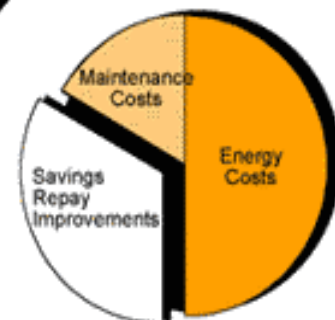
- ✓ Identify and evaluate energy-saving opportunities
 - ❖ recommend a package of improvements – paid for through savings

- ✓ Guarantee savings meet or exceed annual payments
 - ❖ If savings are not realized, the ESCO pays the difference
 - ❖ To ensure savings, the ESCO offers staff training and long-term maintenance services

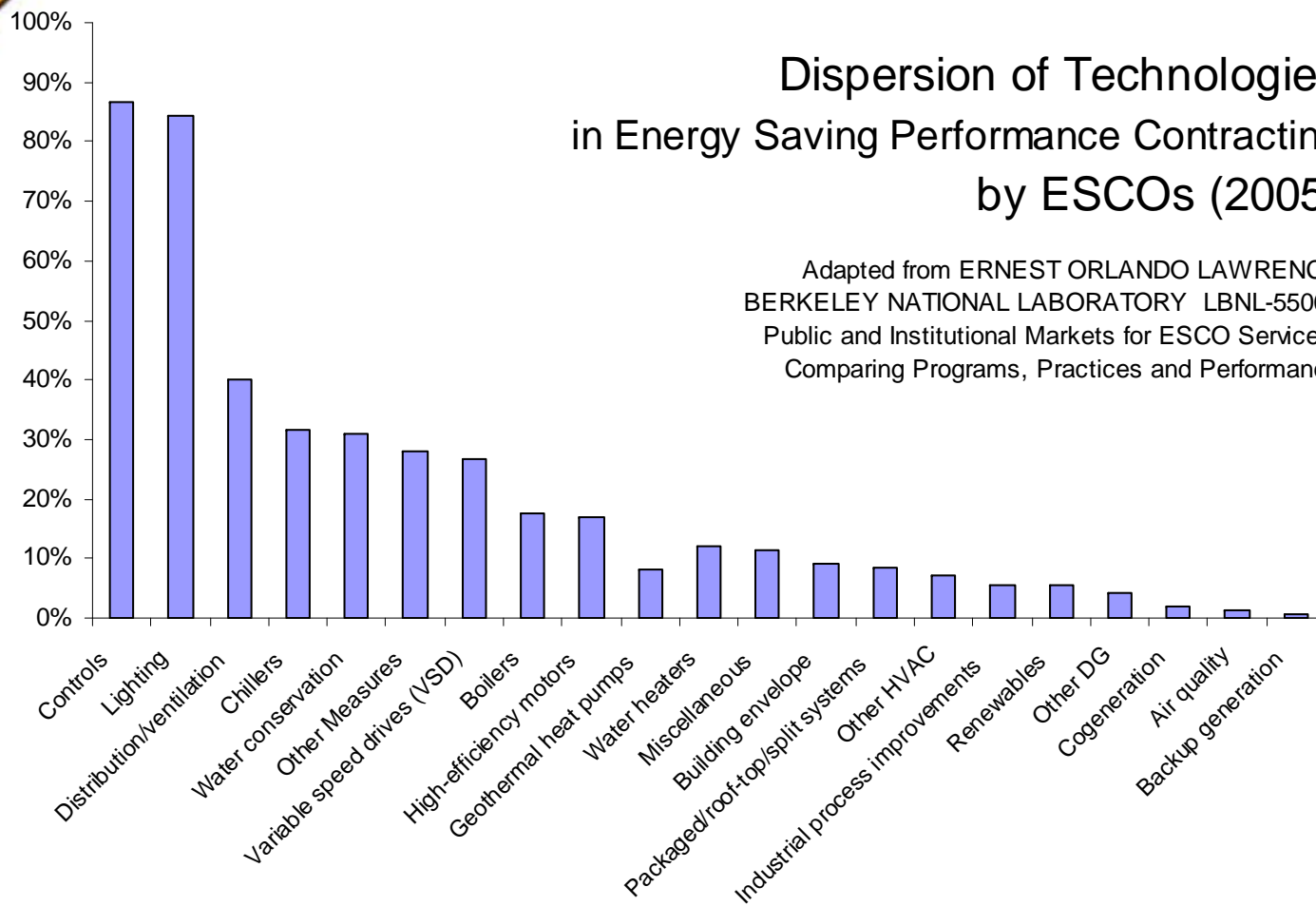
Before Improvements



After Improvements



Energy Conservation Measures



Dispersion of Technologies in Energy Saving Performance Contracting by ESCOs (2005)

Adapted from ERNEST ORLANDO LAWRENCE
BERKELEY NATIONAL LABORATORY LBNL-55002
Public and Institutional Markets for ESCO Services:
Comparing Programs, Practices and Performance

EPC Can Reduce Air Emissions



Estimated savings potential from 1990-2010 for 1400 energy performance contracting projects implemented by a national ESCO:

- \$18 billion on energy bills
- 352 million tons of CO₂ -- equivalent to eliminating emissions from 4 million cars



Some ... Energy Conservation Measures



BUILDING MEASURES

- Lighting System Improvements
- Lighting Controls
- Motor Replacements
- Pump Replacements
- Pumping System Upgrades
- Install Variable Frequency Drives
- AHU replacement
- Energy Management Systems Improvements and Expansion
- Chiller Upgrades
- Cooling Tower Replacement
- Boiler Upgrades
- Steam Trap program
- Pipe Insulation
- Boilers and LPS Conversion
- Window Replacements
- Attic Insulation
- Electrical System Upgrades
- Transformer Replacements

WATER/WASTE WATER CONSERVATION MEASURES

- Water Conservation & Controls
- Wastewater Facility Upgrades
- Pumping Station Improvements

ALTERNATIVE ENERGY MEASURES

- Landfill Gas-to-Energy Plant
- Solar PV Array
- Solar Domestic Water Heaters
- Solar Pool Heaters
- Fleet Vehicle Efficiency Measures
- Cogeneration
- Maintenance Vehicle Solar Conversions
- Solar Power Purchase Agreements

NON-TRADITIONAL CONSERVATION MEASURES

- Clothes Dryer Replacements
- Kitchen Equipment Replacement
- Upgrade Security Systems
- Trash Management
- Computer Power Management
- Vending Machine Controllers

Typical Process

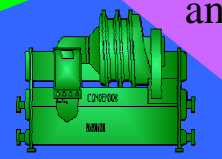
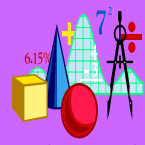
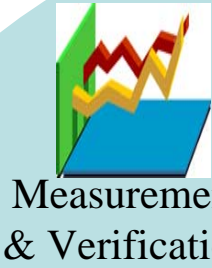
Project Management

Project Development

Training

Project Commissioning

Implementation



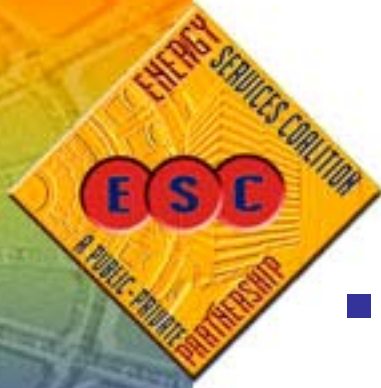
Construction Installation



Single Source of Responsibility



Financing Vehicles



- **Municipal Lease**

<http://energyservicescoalition.org/resources/financing.htm>

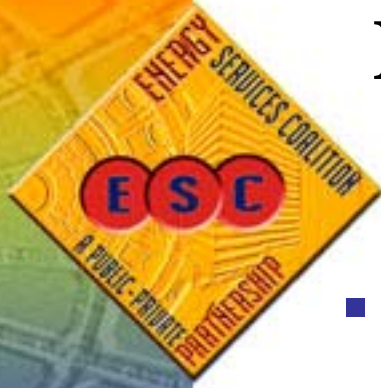
- **Bonds**

- Traditional
- Tax Credit Bond Financing
- Community Development Bonds

- **Grants and Incentives**

- Utility Incentives
- American Recovery and Reinvestment Act
- Incentives

How an ESCO Creates Value



- A qualified ESCO can help you put the pieces together:
- Identify and evaluate energy-saving opportunities
- Develop engineering designs and specifications
- Manage the project from design to installation to monitoring
- Arrange for financing
- Train your staff and provide ongoing maintenance services
- Guarantee that savings will cover all project costs.

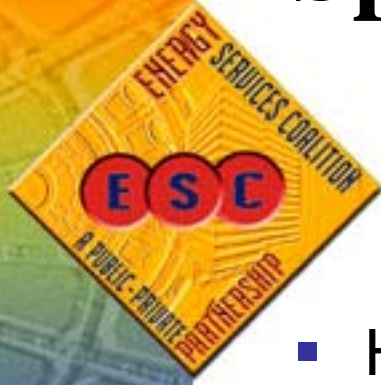


Why Use Energy Performance Contracting?



- Speed of the process from beginning to post construction
- Single Point Accountability before, during, and after the construction period.
- Quality Assurance – Performance and savings are guaranteed

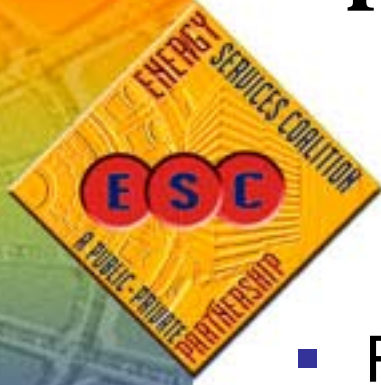
Specific ECM Opportunities



STEAM ...

- Hi temperature or process steam required
- Replace with more efficient steam boiler
- Reduce steam supply pressure if possible
- Fit proper boiler size to match actual load
- Optimize boiler combustion
- Provide heat recovery where feasible (stack, steam condensate)
- Decentralization of campus type system to individual steam boilers.

Specific ECM Opportunities



HOT WATER HEATING ...

- Replace with higher efficiency hot water boiler
- Lower water temperature set point when possible
- Fit proper hot water boiler size to match actual load
- Optimize hot water boiler combustion
- Provide heat recovery where feasible
- Decentralization of campus type loops to individual hot water boilers.

Savings Calculation:



- Several options, methods and tools are used for calculating energy savings.
- Preferred methodology to calculate savings including hourly analysis programs such as:
 - Trane TRACE 700
 - DOE computer simulation program and hand calculations using spreadsheets.

Savings Calculation:



- $\{DL + \text{all losses}\} \times \text{diff. in EE}$
- Multiplying the demand load including all losses times the difference in equipment efficiency.
- Depending on the methodology used, calculation are performed hourly by the mentioned programs, or by hand after the totalized load of the system is determined

Savings Calculation:



ELECTRIC BOILERS ...

- Hourly analysis programs or hand calculations taking into consideration demand and consumption charges. (\$/kW and \$/kWh)

Savings Calculation:

GAS FIRED BOILERS ...

- Hourly analysis programs
- OR
- Hand calculations. (\$/therm)



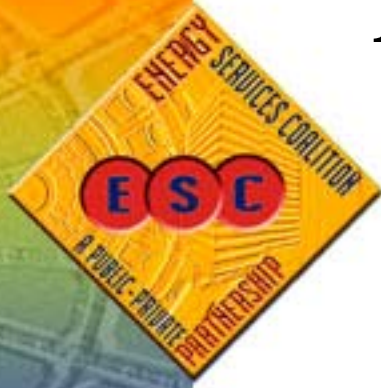
Savings Calculation:

FUEL OIL FIRED BOILERS ...

- Hourly analysis programs
OR
- Hand calculations. (\$/gal of oil)



Measurement and Verification



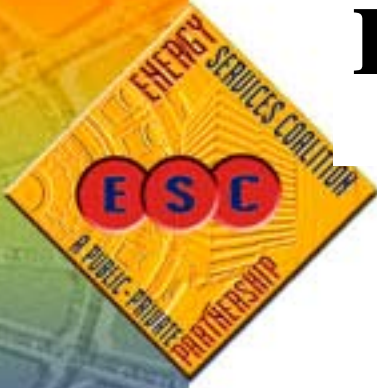
- A. Retrofit Isolation: Key Parameter Measurement
- B. Retrofit Isolation: All Parameter Measurement
- C. Whole Facility
- D. Calibrated Simulation

Benefits



- Contractually guaranteed measured savings
- Integrated project analysis, design, and construction
- Long term monitoring of savings and performance
- Up-to-date training for facility operating personnel
- Services and materials based upon quality and life cycle value, rather than on lowest first cost

Energy Service Company's Role



- Identify and evaluate opportunities
- Design systems (engineering), specify & purchase
- Manage construction
- Arrange for financing without upfront costs
- Provide long-term energy management services
- Guaranteed performance!

A Turnkey Solution

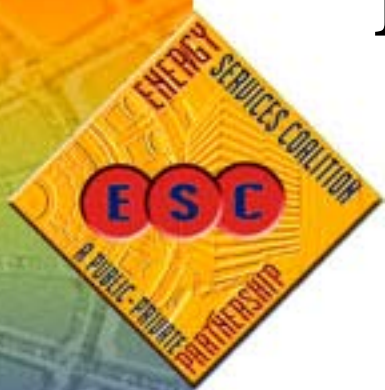
Questions



Unresolved . . .
Raises another thought . . .
But what about . . .
Tell me more about . . .



Resources



www.energyservicescoalition.org

Performance Contracting and Energy Efficiency in the State Government Market

<http://eetd.lbl.gov/EA/EMP/reports/lbnl-1202e.pdf>

Introduction to Energy Performance Contracting

http://www.energystar.gov/ia/partners/spp_res/Introduction_to_Performance_Contracting.pdf

Emerging Technologies for Energy Savings Performance Contracting in the Federal Sector

http://www1.eere.energy.gov/femp/pdfs/emerging_technologies_a_se_report.pdf

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http://www1.eere.energy.gov/femp/pdfs/emerging_technologies_a_se_report.pdf

Funding Options and Financial Incentives for On-Site Renewable Energy Projects - Introduction to Energy Performance Contracting

http://www.naco.orhttp://www.osti.gov/bridge/servlets/purl/796107-9vxYdG/native/796107.pdfg/cfiles/ggi/webinars/pdfs/CatalystFinancialGroup_NeilZobler.pdf

Assessing U.S. ESCO Industry Performance and Market Trends: Results from the NAESCO Database Project

<http://www.osti.gov/bridge/servlets/purl/796107-9vxYdG/native/796107.pdf>

Additional Resources



<http://www.energyservicescoalition.org/webinars/index.html>

[ESPC National View](#)

[Build America Bonds](#)

[Green Performance Contracting](#)

[The Biggest Bang for Your Buck - Leveraging Funds](#)

[Optimizing Economic Stimulus Dollars through Energy Savings](#)

[Performance Contracting](#)

<http://www1.eere.energy.gov/wip/solutioncenter/financialproducts/ESPC.html>

<http://www1.eere.energy.gov/wip/solutioncenter/webcasts/default.html>

Basics of Energy Saving Performance Contracting

Energy Saving Performance Contracting Program Implementation

Additional Resources



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