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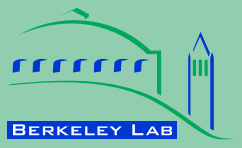

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Performance Contracting and Energy Efficiency in the State Government Market

Ranjit Bharvirkar, Charles Goldman, Donald Gilligan, Terry E. Singer, David Birr, Patricia Donahue, and Scott Serota

Environmental Energy Technologies Division

November 2008

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Table of Contents

List of Figures

List of Tables

Acronyms and Abbreviations

CSU	California State University
DGS	Department of General Services
EE	Energy Efficiency
ESPC	Energy Saving Performance Contracts
ESCO	Energy Service Company
IOU	Investor-owned utility
LBNL	Lawrence Berkeley National Laboratory
NAESCO	National Association of Energy Service Companies
NASBO	National Association of State Budget Officers
NYPA	New York Power Authority
NYSERDA	New York State Energy Research and Development Authority
PUC	Public Utility Commission
UC	University of California
U.S. DOE	U.S. Department of Energy
U.S. EPA	U.S. Environmental Protection Agency
WGA	Western Governor's Association

Executive Summary

There is growing interest in energy efficiency (EE) among state policymakers as a result of increasing environmental concerns, rising electricity and natural gas prices, and lean economic times that motivate states to look more aggressively for cost-saving opportunities in public sector buildings. One logical place for state policymakers to demonstrate their commitment to energy efficiency is to "lead by example" by developing and implementing strategies to reduce the energy consumption of state government facilities through investments in energy efficient technologies.

Traditionally, energy efficiency improvements at state government facilities are viewed as a subset in the general category of building maintenance and construction. These projects are typically funded through direct appropriations. However, energy efficiency projects are often delayed or reduced in scope whereby not all cost-effective measures are implemented because many states have tight capital budgets. Energy Savings Performance Contracting (ESPC) offers a potentially useful strategy for state program and facility managers to proactively finance and develop energy efficiency projects. In an ESPC project, Energy Service Companies (ESCOs) typically guarantee that the energy and cost savings produced by the project will equal or exceed all costs associated with implementing the project over the term of the contract. ESCOs typically provide turnkey design, installation, and maintenance services and also help arrange project financing. Between 1990 and 2006, U.S. ESCOs reported market activity of ~$28 Billion, with about ~75-80% of that activity concentrated in the institutional markets (K-12 schools, colleges/ universities, state/local/federal government and hospitals).

Scope

In this study, we review the magnitude of energy efficiency activity in the state government sector, identify remaining market barriers, and discuss "best practices" employed in successful ESPC programs in the state government market. We decided to focus on the state government market segment because previous studies have suggested that ESCO activity in this sector has lagged behind other institutional markets (e.g. K-12 schools, local governments, and federal market) and that there may be significant remaining energy efficiency opportunities in state government facilities. We define the state government market to include state offices, state universities, correctional facilities, and other state facilities (e.g. healthcare, transportation agency offices).

Given resource and budget constraints, we utilized a case study approach. We focused on twelve states that consist of some of the largest markets in terms of building stock and population in the US or have been cited as past and/or emerging leaders in ESPC: Pennsylvania, Kansas, New York, Illinois, Massachusetts, Texas, Washington, California, Maryland, Florida, Colorado, and Missouri (Donahue & Associates 2006).

Approach

We conducted interviews of state agency staff responsible for managing the ESPC programs and for managing and tracking energy consumption and utility costs at state government buildings. As part of these interviews, we attempted to collect baseline information on the number of state

buildings, their floor area, energy consumption and expenditures in state government buildings, and aggregate information on ESPC and other energy efficiency activity, investment and savings in state facilities. In many states, we found that agencies in charge of state facilities or state energy offices do not currently collect aggregate baseline information on energy consumption and facility characteristics (e.g., floor area) in a systematic fashion. Moreover, in some states where this information is collected, it is not always easily accessible in electronic format. Another issue in defining the scope of this market is the lack of consistency in the definition of facility types that are designated as state government facilities. Comprehensive data and information about state facilities was available only for a subset of the 12 states (see Table ES-1).

Table ES-1. Baseline data availability for state facilities in 12 case study states

Metric	Number of States		
	Complete Data	Partial Data	No Data
Floor Area	7	4	1
Energy Expenditure	6	4	2
Energy Consumption	6	3	3

We also analyzed project-level data in the LBNL/NAESCO database (Hopper et al. 2005) and added additional ESPC projects based on information provided by state agency staff during our interviews. The 12 states included in our study account for about 63% of the state government market projects in the LBNL/NAESCO database. We also reviewed and utilized several recent studies that analyzed ESPC programs in several states and identified barriers to ESPC activity as well as "best practices" in relatively successful ESPC programs (NAESCO 2007; Donahue & Associates 2006).

Energy Efficiency Activity in the 12 Case Study States

Among these 12 states, over $2 billion has been invested in energy efficiency projects since the late 1980s through ESPC, utility ratepayer-funded EE programs or loan programs (see Table ES-2). ESPC projects have played a significant role with more than $1.2B in project investment in these 12 states, accounting for ~60% of the total energy efficiency investment. Eight states have completed more than 15 ESPC projects in the state government market while five states (PA, MA, MD, KS, and MO) have completed ESPC projects with an investment of more than $100 million in aggregate. We believe that the ESPC project cost data presented in this study is comprehensive compared to the cost data available for other types of EE programs. We were only able to collect limited data on energy efficiency projects implemented through utility energy efficiency programs and loan programs and only two states (California and Massachusetts) were able to provide some information on energy efficiency-related projects funded through capital expense budgets. Thus, our estimate of total energy efficiency activity in state government market may significantly underestimate actual energy efficiency investments.

Ratepayer-funded energy efficiency and loan programs are an alternative and/or complementary strategy employed in several state government markets. Among our sample of 12 states, California, New York, Massachusetts, and Washington have a long, consistent history of ratepayer-funded energy efficiency programs that provide financial incentives, technical

assistance, and information about energy efficiency opportunities to customers. In several other states (CO, MD, FL and TX), utility energy efficiency programs funding levels have been inconsistent over the last decade. Only in New York, Massachusetts, Texas, and California were we able to obtain spending and savings data on utility ratepayer-funded energy efficiency programs from either state agency or utility staff that targeted state government facilities. This information and data allowed us to compare the relative levels of EE activity in these states between ESCO-delivered projects and other mechanisms.

In addition to performance contracting, the states of California, Massachusetts, New York, and Texas provide four different examples of how significant energy efficiency projects are being implemented in state government facilities. In California, the four investor-owned utilities have partnered with the University of California (UC) and California State University (CSU) to promote the use of energy efficiency measures to generate energy and dollar savings; the program has invested about $60 million in energy efficiency initiatives in state universities in four years which includes financial incentives for energy efficiency retrofits, monitoring-based commissioning, emerging technology demonstrations, and training and education. California has also implemented about 150 energy-related projects since 1987 in state facilities, with a total cost of about $365 million, using energy bonds and capital appropriations. These projects were typically not comprehensive retrofits, but rather single-technology projects, such as a chiller replacement or a cogeneration plant.

Table ES-2. ESPC and Other Energy Efficiency Activity in State Government Buildings

State	Number of ESPC Projects[1]	ESPC Project Investment (million $)[2]	1st Year when ESPC Activity started[3]	Other EE Activity (million $)	Other EE Program Duration	Total EE Activity (million $)
CA	10	79	2001+	453	1987-present	532
TX	16	117	1990++	162	1989 - Now	279
NY	20	95	1991	172	1991 - Now	266
PA	37	213	2000	*		213
MD	21	150	1992	*		150
KS	24	116	2002	*		116
MO	19	103	2004	*		103
MA	38	209.1	1984	27.2		236.3
IL	16	54	1994	*		54
CO	21	60	1988	*		60
WA	10	32	1985	NA		32
FL	4	23.9	1994	*		23.9
TOTAL	236	1252		814.2		2065.2

Notes: NA = Data not available

- = No program or very small utility EE program

[1] Number of projects in LBNL/NAESCO project database in state government market

[2] In estimating aggregate ESPC project investment in state government market in a state, we used the higher value from either survey responses of state agency staff or total project costs of projects in the LBNL/NAESCO database.

[3] Program start date is based on survey responses of state agency staff.

New York Power Authority (NYPA) Energy Services Programs (ESP) implement energy efficiency projects at public schools and other government facilities and have financed over $170 million in energy efficiency projects in state government facilities since 1991. The projects are financed by NYPA and the costs are recovered from the resulting electric bill savings. The facility retains all the savings once the loan is repaid.

The Texas LoanStar program, active since 1989, enables state and local agencies, including educational institutions, to acquire low-interest loans for EE projects. Since 1989, about $162 million of energy efficiency projects has been financed in the Texas state government market through the LoanSTAR program. State agencies repay the loan from energy cost savings realized as a result of reduced energy consumption and costs; project savings are not guaranteed and the maximum size of an energy efficiency project is capped at $5 million.

In Massachusetts, a combination of funds from state bonds and utility energy efficiency programs were used to implement 36 projects in state government facilities. These energy efficiency projects were typically small and focused on a few measures or a single end use (e.g. lighting). In the last two decades the total investment in such projects has been ~$27 million.

Indicators of Energy Performance Contracting Activity

We calculated several indicators of ESPC market activity, focused on project activity since 2000: (1) average annual ESPC project investment, (2) ESPC project spending in a state on a per capita basis, and (3) estimated market penetration of ESPC projects in state government facilities.[4]

Among our sample of 12 states, PA, MA, MO, KS, TX and MD report much higher ESPC project investment in state government buildings since 2000, with project investment ranging from $10 to $26 million per year in these six states. Because of differences in the size of the state government, we divided the total cost of ESPC projects by population and report ESPC spending on a per capita basis. This is a crude proxy to reflect the fact that ESPC activity levels in the state government market are typically related to the potential size of the market.

As shown in Table ES-3, six states are in the top tier in terms of ESPC spending ($) on a per capita basis: Colorado (38), Kansas (35), Massachusetts (32), Maryland (21), Missouri (17), and PA (17). ESPC market penetration was calculated by comparing completed ESPC projects that reported floor area to the floor area estimates for all state government buildings provided by state agencies. ESPC market penetration is very high in Kansas (~76%), Missouri (~55%), and Massachusetts (~47%). ESPC market penetration ranges between 10-25% in New York, Pennsylvania, Colorado, and Illinois and is probably less than 10% in Florida and California. Given the differences in the size of the state government market, ESPC activity levels in smaller states such as Kansas, Missouri, Massachusetts, and Colorado are particularly notable.

[4] Based on available data, 71% of all ESPC projects accounted for in this report were completed since 2001, accounting for 82% of the total project investment.

Table ES-3. Indicators of ESPC activity level in 12 case study states

State	Average Annual ESPC Project Investment for 2001 – 2008 (in million $)	Total ESPC Spending ($ per capita)	ESPC Market Penetration (based on floor area)
CA	4.1	1	6%
CO[5]	6.4	38	23%
FL	0.01	1	1%
IL	4.8	3	11%
KS	11.8	35	76%
MA	22.0	32	47%
MD	10.8	21	Baseline data incomplete
MO[6]	12.9	18	55%
NY	4.3	5	12%
PA	26.2	17	19%
TX	11.0	5	Baseline data incomplete
WA	2.3	5	Baseline data not available

Key findings from our efforts to characterize ESPC and energy efficiency activity in the state government market and to estimate market indicators are as follows:

- A major limitation to developing consistent and standardized indicators of energy efficiency project activity and performance in the state government market is the lack of consistent baseline data on the stock of buildings (e.g., floor area, historic energy consumption and expenditures) as well as centralized project tracking databases that are maintained by state agencies and include information on ESPC project costs, installed measures, and energy and peak demand savings. None of the 12 states currently has a comprehensive, centralized database of its state facilities and its energy use and expenditures that would facilitate tracking progress in meeting aggressive energy use reduction initiatives underway in most states.

- The extent of energy efficiency activity states varies substantially among the 12 states highlighted in this report. Several states (KS, MO, MD, MA, and PA) appear to have relatively successful ESPC programs that target state government buildings, as indicated either by project activity or investment levels. Massachusetts, Missouri, and Kansas appear to have achieved much higher market penetration rates compared to the other leading states in our study group. Several other states (CO, PA, IL, and NY) show steady progress in ESPC activity with market penetration rates ranging from 10 to 25% in the state government market.

- New York, California, Massachusetts, and Texas have had success using other types of strategies to implement EE projects in state government facilities that include one-stop, turnkey program administered by a power authority (NY), leveraging rate-payer funded incentives (MA, CA,NY), providing technical assistance available through public benefit funds (CA, NY), and maintaining a revolving loan program (TX). In many cases, these other strategies complement an ESPC project delivery structure.

[5] Personal communication with John Canfield
[6] Market penetration estimate provided by Lonnie Thompson.

- There appear to be significant and cost-effective energy efficiency resources still available to capture in state facilities across the country as market penetration levels are generally low in most states (<20% since 2000). For some of the state government facilities – especially, small stand-alone facilities – ESPC may not be a cost-effective mechanism of implementing energy efficiency projects and other strategies should be considered.[7]

- The differences in the penetration rates of ESPC projects in the surveyed states appear to be related to the ability of state governments to overcome policy and programmatic barriers to ESPC implementation.

- In nearly all states, with the exception of Pennsylvania, state universities account for the largest share of energy expenditures in the state government market

- Since 2001, eight states have completed at least one ESPC project per year in their state government market (MA, MO, KS, PA, IL, MD, TX, and NY), with activity being significantly higher in Pennsylvania than all other states.

- Massachusetts, Missouri, and Kansas appear to have achieved much higher market ESPC penetration rates compared to other leading states (using floor area of completed ESPC projects compared to total floor area).

Key recommendations based on the study include the following:

- ESPC can be an important strategy in state facilities to achieve energy reduction goals, given fiscal realities in most states and the history of successful ESCO- delivered energy efficiency investment in state facilities.
- State agencies should consider pursuing funding and technical assistance available through ratepayer-funded energy efficiency programs administered by utilities or third party administrators, and possibly integrating these resources with ESCO-delivered energy efficiency investments to maximize the level of dollar and energy savings to be mined from state facilities.
- The Governor's office and senior management at all relevant energy and landlord agencies should recommend ESPC—where appropriate—as a vehicle to all state agencies.
- States need to focus on data collection and program evaluation issues as they are designing new energy efficiency programs and refining existing programs.

[7] It is possible to aggregate and implement projects at smaller facilities using an ESPC (see the DOE Super-ESPC program as an example). However, one of the challenges in aggregating smaller facilities is to identify a single contract execution authority and consolidate distinct budgets into a single source of payment to the ESCO.

1. Introduction

There is growing interest in energy efficiency (EE) among state policymakers as a result of increasing environmental concerns, rapidly rising electricity and natural gas prices affecting the energy costs of public sector buildings, and lean economic times that motivate states to look more aggressively for cost-saving opportunities.

One logical place for state policymakers to demonstrate their commitment to energy efficiency is to "lead by example" by developing and implementing strategies to reduce the energy consumption of state government facilities through investments in energy efficient technologies.[8] State governors and legislators in nearly all of the 12 states included in our study have adopted explicit energy savings goals or targets that apply to their state government buildings (see Table 1).

Table 1. Energy savings targets for state government buildings

State	Scope	Savings Target	Basis for Savings Target	Baseline Year	Authority
CA	State-owned buildings	20%	Grid-based energy purchases	Not defined	EO
CO	State facilities	20% by FY 2011-2012	Energy consumption	FY 2005 - 2006	EO
FL	State agencies and departments	10% by 2012, 25% by 2017, and 40% by 2025	Greenhouse gas emissions (GHG)	2007	EO
IL	State agencies	10% over next 10 years	Energy consumption	2007	L
KS	NOT APPLICABLE				
MA	State operations	25% by 2012, 40% by 2020 and 80% by 2050; 20% by 2012 and 35% by 2020	GHG; energy consumption	2002, 2004	EO
MD	State facilities	10% by 2010	Energy use	2005	L
MO	State Facilities	15% by 2010	Energy Consumption	2005	Governor's Task Force on Energy
NY	State facilities	35% by 2010	Energy use	1990	EO
PA[9]	State facilities managed by DGS	20% by 2010	Energy savings	FY2004 – 2005	Verbally initiated by Governor Rendell's Staff
TX	State facilities	5% per year for 6 years	Energy use	2005	L
WA	State agencies	15% by 2009	Energy purchases	2003	EO

Note: EO = Executive order; L = Legislation; DGS = Department of General Services (does not include state universities)

Energy Savings Performance Contracts (ESPC) offers a proven strategy for state program and facility managers to proactively develop and finance EE projects. For example, the Western Governors' Association (WGA 2006) included a commitment to employ performance contracting as one strategy to reduce energy use in Western states by 20% by 2020 and to meet

[8] http://epa.gov/cleanrgy/energy-programs/state-and-local/state-best-practices.html
[9] Personal communication with Bruce Stultz (Energy Manager, Pennsylvania Department of General Services)

regional clean energy goals. The Pennsylvania Governor's 2004 Executive Order designates the Department of General Services (PA DGS) as the centralized coordinator of the Commonwealth's energy management and conservation projects and encourages the use of performance contracting.[10]

Traditionally, energy efficiency improvements at state government facilities are viewed as a subset in the general category of building maintenance and construction. Most state facility capital projects (including EE projects) are implemented through a process that consists of two elements: development of a detailed specification for the project by the state agency, and selection of a contractor to implement the project predicated on the lowest responsible price bid. These projects are typically funded through direct appropriations and the contractor has limited responsibility to the state once the project is completed. However, many states are facing a challenging fiscal situation and capital budgets appear to be quite low in some states. As such, direct capital allocations through the budgeting process to fund energy efficiency improvements are not readily available in many states and alternative financing approaches have become more attractive to state facility managers and state financing departments.

We present data on capital expense budgets for various types of state government facilities (e.g. higher education, corrections, and general fund) for the 2005 to 2007 period (NASBO 2007) (see Table 2). We report data on a per capita basis in order to reflect differences in size among states. General fund capital expenses for Higher Education facilities are low ($0-4 per capita) for nine states, except Texas, Florida and Colorado. For correctional facilities, general fund capital expenses are low (0-$5 per capita) for all states except Florida and California. Given tight capital budgets, energy efficiency projects often are given lower priority than education, health, and transportation services in the hierarchy of priorities. Consequently, many energy efficiency projects are either only partially funded or not funded at all. This can result in extensive project delays or limited implementation of cost-effective energy efficiency projects.

Table 2. Capital expense budgets for state government facilities (2005-2007)

State	2007 Population (millions)	General Fund Capital Expenses: 2005-07 ($ per capita)	Higher Education Capital Expenses: 2005-07 ($ per capita)	Corrections Capital Expenses: 2005-07 ($ per capita)	All Other Capital Expenses: 2005-07 ($ per capita)
CA	36.6	23	0	7	1
CO	4.9	52	26	4	16
FL	18.3	124	17	16	13
IL	12.9	0	0	0	0
KS	2.8	19	4	5	9
MA	6.5	0	0	0	0
MD	5.6	28	4	1	14
MO	5.9	15	0	0	15
NY	19.3	0	0	0	0
PA	12.4	0	0	0	0
TX	23.9	49	17	3	23
WA	6.5	0	0	0	0

[10] PA DGS has the centralized authority for all ESCO projects implemented by Pennsylvania executive agencies.

ESPC projects are offered by Energy Service Companies (ESCOs) that provide comprehensive technical services and focus on reducing facility energy usage and costs utilizing a broad array of strategies that involve end use efficiency and/or onsite generation technologies. In an ESPC project, ESCOs typically guarantee that the energy and cost savings produced by the project will equal or exceed all costs associated with implementing the project over the term of the contract. ESCOs typically provide turnkey design, installation, and maintenance services and help arrange project financing.

A recent LBNL study estimated that ESCO industry revenues were about $3.6 billion in 2006 with energy efficiency services accounting for about $2.5 billion (Hopper et al. 2007). ESCOs also reported annual growth in revenues of ~20% per year during the 2004 to 2006 period. Institutional sector customers account for over 80% of ESCO industry revenues, with 22% in the federal market, and the rest in state and local government, universities, K-12 schools, hospitals markets, and 2% of revenues derived from implementing retrofits in public housing authorities.

1.1 Project Scope and Objectives

In this study, we review the magnitude of energy efficiency investment in state facilities and identify "best practices" while employing performance contracting in the state government sector. The state government market is defined to include state offices, state universities, correctional facilities, and other state facilities.[11] This study is part of a series of reports prepared by Lawrence Berkeley National Laboratory (LBNL) and the National Association of Energy Services Companies (NAESCO) on the ESCO market and industry trends. The scope of previous reports was much broader: Goldman *et al.* (2002) analyzed ESCO project costs and savings in public and private sector facilities, Hopper *et al.* (2005) focused on ESCO project activity in all public and institutional sectors, while Hopper et al (2007) provided aggregate results of a comprehensive survey of ESCOs on current industry activity and future prospects.[12] We decided to focus the current study on ESCO and energy efficiency activity and potential market barriers in the state government market because previous studies suggested that this institutional sector has significant remaining energy efficiency opportunities. Moreover, ESCO activity in the state government market has lagged behind other institutional markets (e.g., K-12 schools, local governments, and the federal market).

Our primary objectives were as follows:

- Assess existing state agency energy information and data sources that could be utilized to develop performance metrics to assess progress among ESPC programs in states;
- Conduct a comparative review of the performance of selected state ESPC programs in reducing energy usage and costs in state government buildings; and
- Delineate the extent to which state government sector facilities are implementing energy efficiency projects apart from ESPC programs using other strategies (e.g. utility ratepayer-funded energy efficiency programs, loan funds).

[11] The definition of the state government market varies somewhat among states. For example, in Missouri, the state government does not report and include information on state universities. In Massachusetts, the state government sector also includes community colleges.

[12] Previous LBNL/NAESCO reports and articles on the U.S. ESCO industry are available at: http://eetd.lbl.gov/ea/EMS/ee-pubs.html

Given resource and budget constraints, we utilized a case study approach. We focused on 12 states that consist of some of the largest markets in terms of building stock and population in the U.S.: Pennsylvania, Kansas, New York, Illinois, Massachusetts, Texas, Washington, California, Maryland, Florida, Colorado, and Missouri. Some of these twelve states have been cited as past and/or emerging leaders in ESPC and/or energy efficiency activity in the state government market and also provided regional diversity (Donahue & Associates 2006). Consultations with trade association representatives and industry experts also indicated that many of these 12 states are actively using ESPC to achieve their energy efficiency goals and have formally established ESPC procurement processes for state government facilities.

Based on project-level data in the LBNL/NAESCO database, the twelve states included in our study account for about 66% of the projects completed by ESCOs in the state government sector in all 50 states (see Table 3). Compared to the overall number of facilities, it appears that ESPC activity in the state government market is particularly concentrated in state universities and colleges and office buildings.

Table 3. ESPC projects completed in state government market: case study states vs. other states

State Government Projects in LBNL Database	Office Buildings	Universities and Colleges	Correctional Facilities	Other (e.g. healthcare, transportation agency offices)	Total
12 case study states	53	104	37	32	226
Other 38 states	49	51	6	12	118
Total	102	155	43	44	344

1.2 Approach and Data Sources

We conducted interviews of state agency staff responsible for the energy performance contracting (ESPC) programs and for managing and tracking energy consumption and utility costs at state government buildings. We collected and compiled baseline information on the number of buildings, their floor area, energy consumption and expenditures in state government buildings as well as performance contracting and other energy efficiency project activity completed in state facilities in the last 18 years. For energy efficiency and ESPC projects, we collected information on aggregate activity levels in state government buildings (e.g. dollar volume of completed projects, savings) as well as project-level data where available.

Availability and ease of access to data and information about state government facilities varies substantially across the twelve case study states. Overall, state agency staff were able to provide fairly complete information on aggregate performance contracting project activity but, with few exceptions (e.g. CA, MA, NY, and TX), were not able to provide much useful information on the level of energy efficiency activity completed in state government buildings that did not involve ESPC contracts.

The primary source of ESPC project-level data is the LBNL/NAESCO database (Hopper et al. 2005). The majority of projects in the LBNL/NAESCO database are self-reported by ESCOs as

part of their applications for NAESCO's voluntary accreditation program.[13] Additional project-level data were obtained from state government staff as part of the interviews conducted during this study and were entered into the LBNL/NAESCO database.[14] For ESPC projects, we request information on facility characteristics (e.g. floor area, facility type), installed measures, project cost, baseline energy consumption and expenditure, projected/guaranteed/actual energy and economic savings, and contract term. Data quality and availability vary among our sample of 230 ESPC projects in the state government market in these 12 states (see Table 4).

Table 4. Information on project-level characteristics for ESPC projects in state government market

Project-level Characteristic	Percent of state government ESPC projects in 12 states that provided information
Project Cost	88%
Floor Area	77%
Annual Energy Savings	42%
Annual Economic Savings	62%
Baseline Energy Consumption	42%
Baseline Energy Expenditure	31%

The main sources of information on baseline energy usage, energy costs and facility characteristics of state government buildings was provided by state agency staff during interviews and technical reports published by state governments. The availability and quality of baseline data on state government buildings also vary significantly among states.

We also reviewed and utilized two other studies that involved comparative analysis of ESCO and energy performance contracting in several states (NAESCO 2007; Donahue & Associates 2006). The discussion of the barriers to EPC activity in state government sector and "best practices" observed in states with relatively successful programs relies primarily on these recent studies.

1.3 Organization of Report

This report is organized as follows:

- In section 2, we characterize the state government sector in terms of annual baseline energy consumption and expenditure and physical characteristics (e.g. floor area). We also summarize ESPC project and other energy efficiency activity at an aggregate level for each of the 12 states, drawing upon survey results and project data. We also provide several indicators or metrics of ESPC activity among the 12 states: average number of projects completed per year, average spending on ESPC per year, total ESPC spending per capita, and estimated market penetration.

[13] Data quality is controlled by reviewing projects and working with ESCOs to ensure accuracy. Additionally, projects submitted for NAESCO accreditation are subject to verification by an independent committee of technical experts that conduct customer reference checks on ~10% of projects.

[14] In many cases, project-level data were incomplete. For a detailed discussion of our approach to quality assurance and missing data in the LBNL/NAESCO database, refer to Hopper *et al*. (2005).

- In section 3, we present a comparative analysis of ESPC projects among the case study states, focusing on project-level data to analyze project costs and annual economic savings.
- In section 4, we identify major barriers to performance contracting in the state government sector and discuss strategies to overcome barriers to ESPC in this sector.
- In section 5, we summarize key findings, discuss their implications, and offer several recommendations for federal and state policymakers and agencies that are interested in expanding performance contracting and energy efficiency in the state government market.

2. Energy Performance Contracting and Energy Efficiency Activity in the State Government Sector

In this section, we summarize ESPC project and other energy efficiency activity at an aggregate level for each of the 12 states, drawing upon survey results and project data in the LBNL ESCO database. In assessing energy efficiency activity in the state government market, it is first useful to characterize the historic pattern of energy expenditures and consumption. We then calculate several indicators of ESPC activity in the state government market, including estimates of ESPC market penetration for the 12 states in our sample.

2.1 Baseline Energy Consumption and Expenditures in State Government Facilities

As part of our survey of state facilities agencies and energy offices, we collected historic information on aggregate energy consumption, expenditures and energy intensity of state government facilities. In many states, we found that agencies in charge of state facilities or state energy offices do not currently collect aggregate baseline information on energy consumption and facility characteristics (e.g., floor area) in a systematic fashion.

Moreover, in some states where this information is collected, it is not always easily accessible in electronic format. For example, state agency staffs in Washington were unable to provide any information on baseline energy consumption, expenditures, or facility characteristics. In Maryland and Texas, agency staff indicated that initiatives are currently underway to develop comprehensive energy information databases for state government facilities. Finally, for those states that did provide baseline information, the information presented in this report typically represents the latest data available from each state, although the definition of most recent consumption and/or expenditures data is not necessarily consistent across states.

The types of facilities that are included by various states differs – for example, in Pennsylvania, state university student dormitories are included in their baseline data while this may not be the case for other states.[15] In Missouri, state-sponsored universities and colleges are not considered a part of the state government. In contrast, Massachusetts includes community colleges as part of the facilities managed by state agencies. In Pennsylvania, some universities (e.g. Pennsylvania State University, etc.) are not considered part of the state system of higher education, although their energy usage and expenditures are included in the state government's accounting system. Clearly, one important problem in comparing states is the lack of consistency in the definition of facility types that are designated as state government facilities.

To highlight data quality issues, we use the following conventions in presenting baseline information on energy consumption, expenditures and floor area.

In Tables 2 through 7:

- Numbers shown in "**Bold**" font were obtained from a formal published source;
- Numbers shown in "Regular" font were provided by agency staff during interviews and were not formally published;

[15] Personal communication with Paul Meister.

- Numbers shown in "*Italics*" font were estimated based on secondary sources and are less likely to be accurate; and
- Numbers shaded in blue in Tables 4-7 represent consumption of all fuels (electricity, natural gas, fuel oil); numbers that are not shaded represent only electricity consumption.

2.1.1 State Government Buildings: Floor Area

Table 5 summarizes information on floor area in state government buildings, segmented by facility type. New York and California report significantly larger floor area for state government market facilities than the other five states that provided this information (i.e., 260-400 million ft^2 vs. 20-110 million ft^2). The distribution of floor space among types of state government facilities varies significantly among the seven states that provided floor area information. In five of seven states (i.e., NY, CA, IL, CO, and KS), state universities and colleges account for more than half of all floor space. In contrast, other facilities (e.g. healthcare and transportation agency offices) account for ~36% of the total floor space in Pennsylvania.

Table 5. Distribution of floor area in the state government market

State	Total Floor Area (million ft^2)	Office Buildings	Universities and Colleges	Correctional Facilities	Other (e.g. Healthcare, transportation agency offices)
NY[16]	**215**	**12%**	**50%**	**18%**	**20%**
CA	**268**	**9%**	**65%**	**13%**	**13%**
PA	**109**	**10%**	**40%**	**14%**	**36%**
IL	**80**	**23%**	**51%**	**19%**	**8%**
MA[17]	64	16%	44%	14%	27%
CO	**62**	**3%**	**67%**	**11%**	**19%**
KS[18]	35	13%	60%	11%	16%

Four other states (TX, MD, MO and FL) were only able to provide data on floor area for certain types of state government facilities (see Table 6).

Table 6. Baseline floor area (million ft^2)

State	Total Floor Area (million ft^2)	Office Buildings	Universities and Colleges	Correctional Facilities	Other (e.g. Healthcare, transportation agency offices)
FL		**22.9**	**34.1**	**17.1**	
TX			**114.4**		**36.1**
MD		6.5			
MO	**28.8**	**14.8**		**9.6**	**4.4**

[16] The floor area data provided for "other" facilities was 192.5 million ft^2. However, 175 million ft^2 is from Port Authority and 9 million ft^2 is from parks that use very little energy. We exclude this floor area from our analysis.
[17] Personal communication with Jenna Ide.
[18] Kansas baseline data is estimated by grossing up data from the Kansas Board of Regents about square footage insured by the state, which they said represents about 70% of state buildings.

2.1.2 Baseline Annual Energy Expenditures

Disaggregated data on energy expenditures in the state government market by type of facility is available for six states out of twelve (MA, CA, NY, IL, PA, and CO). Partial data is available for Florida and aggregate data for the state government market is available for Texas, Maryland, and Missouri. State agency staff in Kansas and Washington indicated that aggregate data on energy expenditures of state government facilities is not available (see Table 7).

Energy expenditures are driven by consumption levels as well as retail electricity prices; thus, we have included 2006 data on average electricity prices for commercial customers in the 12 states to provide a sense of the range in retail rates. California state facilities have the highest energy expenditures among our case study states. In all states, state universities account for the largest share of energy expenditures in the state government market.

Table 7. Baseline annual energy expenditures (million $)

State	Year for which data available	Office Buildings	Universities and Colleges	Correctional Facilities	Other (e.g. Healthcare, transportation, agency offices)	Total	2006 Avg. Electricity Price for Comm. Customers ($/kWh)
CA	2007	**33.7**	510	**99.9**	**50.5**	**694.1**	**0.13**
NY	2002	**90.8**	**218.7**	**78.2**	**82.8**	**470.6**	**0.15**
TX	2006					**276**	**0.10**
MD	2006					**250**	**0.11**
IL	2007	**51.1**	**122.0**	**37.1**	**21.9**	**232.0**	**0.08**
MA[19]	2007	31.5	76.2	14.2	33.5	155.5	**0.15**
PA[20]	Not Provided	**14.8**	**66.7**	**26.2**	**34.9**	**142.6**	**0.09**
CO[21]	2006	**15.1**	**102.5**	**17.1**	**8.4**	**143.1**	**0.08**
MO	**2005**	**29**		**23**	**18**		**0.06**
FL	2007	**42.5**	**93.2**	**43.1**			**0.10**
WA	2004						**0.07**
KS	Not Provided						**0.07**

Note: Blue shading indicates energy consumption of all types of fuels while no shading indicates consumption of electricity only.

Given the disparities in the size of the state government market in these 12 states, it is helpful to normalize energy expenditures by floor area (see Table 8).[22] In comparing energy expenditure

[19] Personal communication with Jenna Ide.

[20] Personal communication with Bruce Stultz indicates an additional $40 million in expenditures for steam, coal, and oil. However, this additional expenditure is not available by facility type. Therefore we do not include it in the Table.

[21] Personal communication with John Canfield indicates that the total utility expenditure for Colorado state facilities in 2007 is ~$155 million. However, this expenditure is not available by facility type. Therefore we do not include it in Table 7.

[22] It is important to note that we are not confident that consistent definitions and reporting practices for conditioned space in facilities (i.e. floor area) are utilized among states.

levels across states, factors that influence energy expenditures normalized for floor area include retail energy prices, physical and operating characteristics of the building stock (e.g. vintage, construction materials, hours of operation), climate (e.g. heating and cooling degree days), accuracy of floor area data, and investment levels in high efficiency equipment, controls, and the building shell. For example, average retail rates for commercial customers vary by more than a factor of two among the 12 states, from a low of ~$0.06-0.07/kWh in WA and MO to a high of ~$0.15/kWh in NY and MA. Note that data quality on energy expenditures and floor area is uneven among states; therefore the normalized estimates may not always be comparable to industry benchmarks.

Energy expenditures per ft^2 range from a low of ~$1.30/$ft^2$ in Pennsylvania to a high of $2.90/$ft^2$ in Illinois. Energy costs per ft^2 are lowest in Pennsylvania in all facility types except healthcare and transportation agency offices where New York and Massachusetts are the lowest. Five states are on the high end of the energy expenditure spectrum: IL, CA, MA, MO, and CO. Massachusetts' and California's energy expenditures are clearly affected by their high retail rates (which are 50% greater than the other three states).

Table 8. Baseline annual energy expenditure normalized by floor area ($/ft^2)

State	Office Buildings ($/ft^2)	Universities and Colleges ($/ft^2)	Correctional Facilities ($/ft^2)	Other (E.g. Healthcare, transportation agency offices, etc.)	Total ($/ft^2)
IL	**2.82**	**3.00**	**2.38**	**3.59**	**2.89**
CA	**1.45**	**2.91**	**2.82**	**1.49**	**2.59**
MA[23]	3.18	2.73	1.65	1.93	2.44
MO	**1.96**		**2.40**	**4.09**	**2.43**
CO[24]	**8.12**	**2.46**	**2.51**	**0.72**	**2.32**
NY	**3.52**	**2.03**	**2.02**	**1.93**	**2.19**
PA	**1.33**	**1.54**	**1.73**	**0.89**	**1.31**
FL	**1.86**	**2.73**	**2.52**		

Note: Blue shading indicates energy consumption of all types of fuels while no shading indicates consumption of electricity only.

2.1.3 Baseline Annual Energy Consumption[25]

It is more challenging to compare historic energy consumption levels across states because only four states – Massachusetts, Pennsylvania, New York, and Illinois - provided comprehensive information on baseline energy consumption, segmented by type of state government facility (see Table 9). Information on some types of state government facilities is available for California and Florida. Three states (e.g., KS, WA, and MO) indicated that they do not collect baseline energy consumption data for their state facilities. Estimates of baseline energy consumption for CO, MD, and TX were based on secondary sources and less likely to be accurate as compared with the other states.

[23] Personal communication with Jenna Ide.
[24] In Colorado office buildings the energy expenditure per floor area is substantially higher than all sectors and all states. This may be data quality issue where the floor area of office buildings may be substantially underestimated.
[25] Unit conversion: 1 kWh = 3,412 Btu.

In NY, MA, PA, and IL, universities/colleges are the largest energy consumers accounting for 44% and 55% respectively of all energy consumed by state government facilities in these states.
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Table 9. Baseline annual energy consumption (million MMBtu)

State	Office Buildings	Universities and Colleges	Correctional Facilities	Other (e.g. Healthcare, transportation agency offices)	Total
NY	**6.9**	**26.9**	**9.5**	**9.7**	**53.1**
CA[26]	**1.4**	19.7	**7.0**	**3.8**	**32.9**
MD					*28*
IL	**4.2**	**10.8**	**2.9**	**1.5**	**19.4**
CO	*1.4*	*7.2*	*1.2*	*.008*	*9.8*
MA[27]	0.8	4.9	1.7	2.1	9.5
PA	**0.9**	**4.8**	**1.7**	**2.2**	**9.6**
FL	**1.7**	**4.2**	**2.3**		
TX		*6.9*			

Note: Blue shading indicates energy consumption for all types of fuels in state government facilities while no shading indicates consumption of electricity only.

Combining baseline energy consumption and floor area data, we developed estimates of energy intensity (MMBtu/ft^2) for all facility types where relevant data was available (see Table 10). Our results suggest that CA, MA, FL, and PA appear to have significantly lower energy intensity in office buildings compared with NY and IL. Similarly, universities/colleges in IL, CA, FL, and PA consume less than half that of NY normalized by floor area.[28] Note that data quality on energy consumption and floor area is uneven among states; therefore the normalized estimates may not always be comparable to industry benchmarks.

Table 10. Baseline annual energy consumption of State government facilities normalized by floor area (MMBtu/ft^2)

State	Office Buildings	Universities and Colleges	Correctional Facilities	Other (E.g. Healthcare, transportation agency offices, etc.)	Total
NY	**0.27**	**0.25**	**0.25**	**0.23**	**0.25**
CO[29]	*0.82*	*0.17*	*0.18*	*0.00*	*0.16*
MA[30]	0.08	0.18	0.20	0.12	0.15
IL	**0.24**	**0.09**	**0.11**	**0.10**	**0.13**
CA	**0.06**	0.11	**0.20**	**0.11**	**0.12**
PA	**0.08**	**0.11**	**0.11**	**0.06**	**0.09**
FL	**0.07**	**0.12**	**0.13**		
TX		*0.06*			

[26] Estimate for energy consumption in California universities sector includes only University of California system and does not include the California State University system.
[27] Personal communication with Jenna Ide.
[28] Ideally, one also needs to take into account climate zones (i.e. heating and cooling degree days) in order to normalize the energy consumption across states. However, lack of sufficient data on locations of state facilities did not allow us to do so.
[29] In Colorado, the energy consumption/ft^2 for office buildings is substantially higher than other sectors and states. This may be data quality issue where the floor area of office buildings may be substantially underestimated.
[30] Personal communication with Jenna Ide.

Note: Blue shading indicates energy consumption of all types of fuels while no shading indicates consumption of electricity only.

2.2 Aggregate Energy Performance Contracting and Energy Efficiency Activity in the State Government Market

As part of our interviews with state government staff, we requested information on number of ESPC projects completed, amount of project investment, energy and dollar savings and other project-level data. In response, seven states provided project-level data for ESPC projects; four states were only able to provide aggregate information on ESPC activity; and one state was unable to provide even aggregate information on ESPC activity. We also asked state agency staff to discuss and provide information on other strategies used to implement energy efficiency projects in their state government facilities. Only four states (MA, CA, NY, and TX) were able to provide estimates of the dollar volume for these other strategies (e.g. utility-ratepayer funded programs).

Table 11 provides aggregate data on the amount invested in ESPC projects in each state for projects in the LBNL/NAESCO database compared with ESPC project investment information reported by state agency staff during interviews. In eight states (MA, FL, IL, KS, MD, MO, PA, and TX), the LBNL/NAESCO project database either includes all or a large subset of the total number of ESPC completed projects reported by state agency staff, with California and Colorado being notable exceptions.

For California, state government staff was able to provide estimates of ESPC projects completed as part of SB5x legislation enacted during the California 2001 electricity crisis, but could not provide information on other ESPC projects. The LBNL/NAESCO project database includes only one project that was completed under SB5x. Thus, the aggregate investment and number of ESPC projects completed which was provided by CA State agency staff is almost mutually exclusive from CA projects included in the LBNL/NAESCO project database.

Table 11. Aggregate ESPC project investments

State	Survey Response (million $)	LBNL/NAESCO Database (million $)
PA	199.0	212.8
MD	149.9	119.3
TX	48.0	117.0
MO	~93.5	103.1
KS	97.3	97.2
NY	~95	94.8
MA	209.1	209.1
IL	53.6	54.5
WA	Data not available	31.9
FL	23.9	16.6
CO[31]	60	14.1
CA	31.1	8.1

[31] Personal communication with John Canfield (consultant to the Colorado Governor's Energy Office)

A few states (e.g., Washington) apparently do not collect and maintain centralized records of ESPC activity in state government facilities; thus, we are unable to assess the comprehensiveness of the LBNL/NAESCO project database for Washington. In estimating overall ESPC project activity in a state, we use the maximum value for projects and amount invested using both survey responses and the LBNL project database.

Table 12 shows the number of ESPC projects in each state for which floor area and project cost information is available as well as our calculated aggregate values (e.g. 207 million ft^2 and $1078M in project investment for the 12 states). Average floor area that is retrofitted in ESPC projects typically ranges between 0.6 to 1.8 million ft^2 among these states with the exception of New York (2.4 million ft^2).

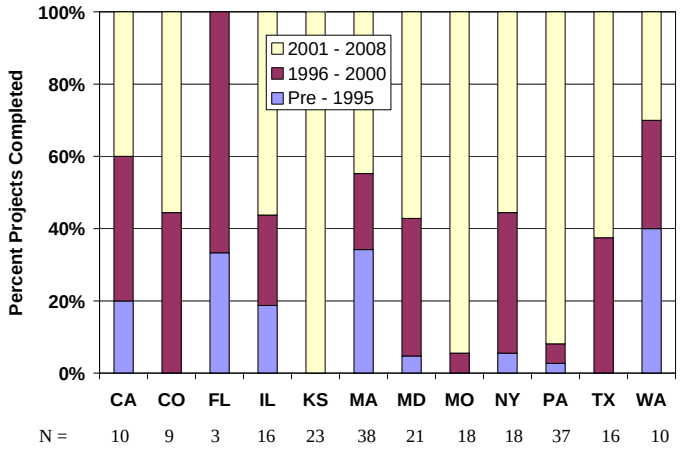
Table 12. Completed and "under construction" ESPC projects in state government market[32]

State	Total Number of ESPC Projects	ESPC projects that provided floor area data	Floor Area (million ft^2)	ESPC Projects that provided project cost data	Total Project Costs (million $)
PA	37	24	20.29	34	212.8
MD	38	35	34.15	36	209.1
TX	21	9	11.51	21	119.3
MO	16	14	19.56	16	117.0
KS	19	18	19.85	15	103.1
NY	24	24	26.70	23	97.2
MA	20	19	46.52	20	94.8
IL	16	10	8.89	15	54.5
WA	10	8	6.12	7	31.9
FL	4	1	0.64	4	16.6
CO	11	3	3.92	2	14.1
CA	10	9	8.93	7	8.1
Total	226	174	207.08	200	1078.4

Note:
Bold = data available for all projects;
Regular font = Data available for more than 75% of projects;
Italics = Data available for less than 75% of projects.
Shaded cells = Data for at least 5 projects is available.
Source: LBNL/NAESCO database

We disaggregated ESPC project activity into three time periods: recent activity (2001 to 2008), 1996-2000, and pre-1995 (see Figure 1). We observe some distinct time trends among those states that have completed at least 10 ESPC projects in the state government market. For example, in Pennsylvania, Kansas, and Missouri, more than 90% of ESPC projects have been implemented since 2001, while in Massachusetts, Illinois, Maryland, Texas, and New York, 45-64% of ESPC project activity in state government market has occurred since 2001. For California and Washington, only 30-40% of ESPC projects have been completed since 2001.

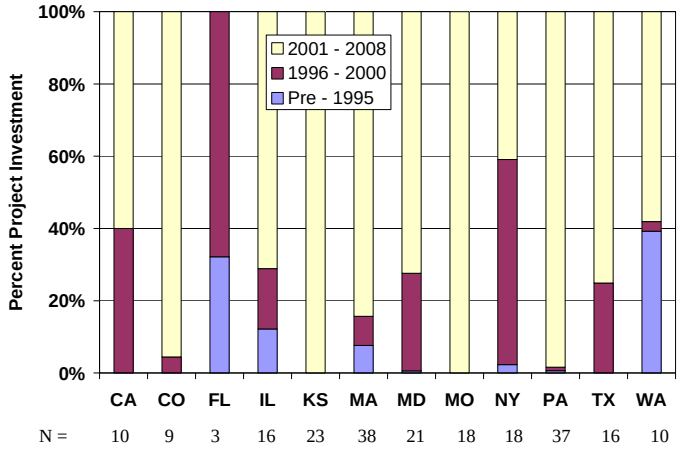
[32] The data shown in this table is from the LBNL/NAESCO database only.



Note: A few projects did not include information on year of completion: Kansas (1), Florida (1), Missouri (1), Colorado (2) and New York (2).

Figure 1. Distribution by time period of completed ESPC projects

Figure 2 shows the amount of ESPC project investment in each state disaggregated by these same three time periods. The time trend pattern of ESPC investment among states is generally consistent with time trend for number of completed projects with a few exceptions (e.g., CA, MA, and NY). In aggregate, 66% of all ESPC projects were completed since 2001, accounting for 82% of the total project investment. In all states except NY, the relative portion of project investments since 2001 is higher compared with the portion of projects completed during that time period.



Note: A few projects did not include information on project costs: Kansas (1), Florida (1), Missouri (1), Colorado (2), and New York (2).

Figure 2. Distribution of project investment over time for completed ESPC projects

Ratepayer-funded energy efficiency and loan programs are an alternative (and/or complementary) strategy to ESPC in state government markets. Four of the 12 states (California, New York, Massachusetts, and Washington) have a long, consistent history of ratepayer-funded energy efficiency programs that provide financial incentives, technical assistance, and

information about energy efficiency opportunities to customers. Table 13 summarizes information for the three states (California, Texas, and New York) that provided data on other energy efficiency activities in state government buildings. In several other states (CO, MD, FL and TX), funding and activity levels of utility energy efficiency programs have been much more sporadic. For example, utility EE programs were prevalent in MD during the early 1990s but were discontinued during electricity industry restructuring efforts.

In California, the University of California (UC), California State University (CSU), and Investor-Owned Utility (IOU) Energy Efficiency Partnership Program established a permanent framework for energy management at the 33 UC and CSU campuses served by California's four large IOUs (Pacific Gas & Electric, San Diego Gas & Electric, Southern California Edison, and Southern California Gas). The Partnership program is administered by the four utilities and includes financial incentives for energy efficiency retrofits and monitoring-based commissioning, emerging technology demonstrations, and training and education. The Partnership program is funded by California utility ratepayers of the investor-owned utilities as part of the broader public benefits charge for energy efficiency programs. The Energy Efficiency Partnership program has provided the state universities with ~$60M for energy efficiency projects and other supported activities in just four years (SBW Consulting Inc., 2008). How does this correspond with footnote 22—the Partnership has given $60 million but does not have any energy consumption data for CSU campuses?

In addition to ESPC projects, California has implemented about 150 energy-related projects since 1987 with a total cost of about $365 million using energy bonds and capital appropriations. These projects were typically not comprehensive retrofits, but rather single-technology projects, such as a chiller replacement or a cogeneration plant (California DGS, 2003).

The Texas LoanSTAR Program was established in 1989 and is administered by the State Energy Conservation Office (SECO) and the Texas Comptroller of Public Accounts. This program enables state and local agencies, including educational institutions, to acquire low-interest loans for EE projects (Taylor, 2006). State agencies repay the loan from energy cost savings realized as a result of reduced energy consumption and costs. In contrast to ESPC projects, under the LoanSTAR program there is no guarantee of project savings or performance and the maximum size of an energy efficiency project is capped at $5 million. Since 1989, about $162M of energy efficiency projects has been financed in the Texas state government market through the LoanSTAR program. The program has been oversubscribed for several years and has limited the number of state and local agencies able to take advantage of this program.

New York Power Authority (NYPA) Energy Services Program (ESP) implements energy efficiency projects at public schools and other government facilities (NYPA, 2008). NYPA works with facility managers to identify, design, and install various energy conservation measures. The projects are financed by NYPA and the costs are recovered from the resulting electric bill savings. The facility retains all the savings once the loan is repaid. NYPA’s program has been quite successful - financing over $170M in energy efficiency projects in state government facilities since 1991.

In Massachusetts, a combination of funds from utilities and state bonds were used to implement 36 projects in state government facilities.[33] All these EE projects were typically small and focused on a few measures or a single end use. In the last two decades the total investment in such projects has been ~$27 million.

In California, New York, and Texas, there is greater investment in energy efficiency projects using mechanisms other than ESPC - compare Table 122 and Table 10. For example, in New York, the NYPA Energy Services Program has doubled the investment in EE projects as compared with ESPC projects in the state government sector (~$171M Vs $95M). In California, investments in EE projects using mechanisms such as partnerships between state universities and utilities or through capital projects are at least two to three times greater than investment delivered through ESPC projects.

Table 13. Other energy efficiency program activity in the state government market

State	Program Name	Year Program Started	Total Investment (million $)	Total Savings (million $/year)	Total Savings (million MMBtu/year)	# of Projects Completed	Project Floor Area (million ft^2)
CA	UC-CSU-IOU Partnership	2004	60.0	8.6	Not available	36	5.9
CA	DGS Energy Projects	1987	365	20	N/A	151	N/A
NY	NYPA Energy Services Program	1991	171.5	20.3	0.92	141	Not available
TX	LoanSTAR Program	1989	161.7	32.3	0.44	60	Not available
MA	Utility EE program funds and Bonds	1987	27.2	4.13	Not available	36	16

2.3 Indicators of Energy Performance Contracting Activity

Using available baseline information on the state government market and ESPC project activity, we focused on the most recent time period (2001 to 2008) and calculated several indicators of ESPC market activity: (1) the average number of ESPC projects completed each year, (2) the average annual project investment, and (3) estimated market penetration of ESPC projects in state government facilities.

2.3.1 ESPC project activity and investment levels

Since 2001, eight states have completed at least one ESPC project per year in their state government market (MA, MO, KS, PA, IL, MD, TX, and NY), with project activity being significantly higher in Pennsylvania than all other states (see Table 14). Similarly, six states (MA, MO, MD, PA, KS, and TX) report average ESPC project investment of at least $10M per year since 2001. Given the differences in the size of the state government market, ESPC activity

[33] Personal communication with Jenna Ide.

levels in smaller states such as Massachusetts, Kansas, Missouri, and Maryland are particularly notable.

Table 14. Annual average number of completed ESPC projects and project investment

State	Average Annual number of completed ESPC Projects (2001 - 2008)	Average Annual ESPC Project Investment for 2001 –2008 (million $)	ESPC Market Penetration (based on floor area)
CA[34]	3.5	4.1	6%
CO[35]	0.6	6.4	22.6%
FL	0.0	0.0	1%
IL	1.1	4.8	11%
KS	2.9	11.8	76%
MA	2.1	22	47%
MD	1.5	10.8	Baseline data incomplete
MO[36]	2.1	12.9	55%
NY	1.3	4.3	12%
PA	4.3	26.2	19%
TX	1.3	11.0	Baseline data incomplete
WA	0.4	2.3	Baseline data not available

Source: LBNL/NAESCO database

2.3.2 ESPC market penetration in the state government market

There are several possible ways to estimate market penetration of performance contracting in the state government market: amount of floor area retrofitted compared to total floor area of state facilities, number of facilities retrofitted compared to total number of facilities, and percentage savings in baseline energy consumption or baseline energy expenditures. We decided to use floor area to develop a crude estimate of market penetration, because data was generally not available for the other metrics. We compared completed ESPC projects that reported floor area (77% of the total) to the floor area estimates for all state government buildings provided by state agencies in nine states (see Table 14).

ESPC market penetration is very high in Kansas (~76%), Missouri (~55%), and Massachusetts (~47%). ESPC market penetration ranges between 10-25% in New York, Colorado, Pennsylvania and Illinois and is probably less than 10% in Florida and California. Baseline data on floor area is not available or incomplete in several states (TX, WA, and MD).

2.4 Indicators of Energy Efficiency Activity

We also combined aggregate ESPC project investment and other types of energy efficiency project activity in state government buildings in the 12 states to estimate indicators of overall energy efficiency activity (see Table 15). We believe that the data are more accurate and

[34] The California market penetration estimates include the SB5x ESPC projects.

[35] Personal communication with John Canfield suggests that the total ESPC investment in Colorado state facilities in the last five years is $48.8 million. However, data about all the ESPC projects is not available.

[36] Market penetration estimate provided by Lonnie Thompson.

complete for ESPC activity compared to other EE programs. For example, we were unable to obtain information on financial incentives provided through utility ratepayer-funded energy efficiency programs to state government facilities in all states (with the exception of Texas, Massachusetts, California, and New York) where we know that EE programs are currently available or were offered historically during periods where ESPC projects were completed.

In California, we only have data from the UC/CSU Energy Efficiency Partnership which began in 2004; this represents only a fraction of EE projects in state government facilities that have received incentives from utility EE programs over the last decade. In New York, we have comprehensive information on project activity in state government facilities that occurred through NYPA and NYSERDA programs as well as in Texas through the LoanStar program. Among these 12 states, at least $1.8 billion in energy efficiency projects has been implemented in state government buildings since the late 1980s. Given data limitations, our estimate of total EE activity should be treated as a lower bound estimate of investments in energy efficiency in the state government market in these states.

To summarize, ESPC projects appear to have played a significant role in many states, although lack of data on energy efficiency projects implemented using other strategies limits our ability to draw definitive conclusions on the overall level of energy efficiency investments and activity in state government buildings.

Table 15. ESPC and energy efficiency investment and activity in state government buildings

State	ESPC Project Investment (Million $)	1st Year when ESPC Activity Started as per Survey	Other EE Program Activity (Million $)	Other EE Program Duration	Total EE Activity (Million $)
CA	78.7	2001+	453	1987-present	531.7
TX	117	1990++	161.7	1989 - Now	278.7
NY	94.8	1991	171.5	1991 - Now	266.3
PA	212.8	2000	*		212.8
MA	209.1	1984	27.2	1987-present	236.3
MD	149.9	1992	*		149.9
KS	116.4	2002	*		116.4
MO	103.1	2004	*		103.1
CO[37]	60	1988	*		60
IL	53.6	1994	*		53.6
WA	31.9	1985	NA		31.9
FL	23.9	1994	*		23.9
TOTAL	1252		813.4		2065.4

NA = Data not available

Notes:

++ TX start date is the start of the Loan Star revolving loan fund, which has financed a few ESPC projects. Data does not specify when ESPC projects were initiated.

* = No program or very small utility EE program

Shaded cells = Data for at least 5 projects is available.

[37] Personal communication with John Canfield.

2.5 Summary

Key findings from our effort to characterize ESPC and energy efficiency activity in the state government market and estimate market indicators are:

- A major limitation to developing consistent and standardized indicators of energy efficiency project activity and performance in the state government market is the lack of consistent baseline data on the stock of buildings (e.g., facility characteristics, such as floor area, historic energy consumption and expenditures) as well as centralized project tracking databases that are maintained by state agencies and include information on ESPC project costs, installed measures, energy and peak demand savings, use of incentives, and facility characteristics.

- Many states will need to improve their information on facility characteristics (e.g. floor area and number of buildings) and baseline energy consumption in order to facilitate tracking progress over time in meeting energy savings targets or goals established by state legislatures or Executive Orders. As a practical matter, this means developing some type of centralized energy information tracking system that can produce electronic reports. Consistent approaches to reporting facility size (i.e., floor area) are also important in order to produce meaningful indicators of energy intensity.

- The extent of energy efficiency activity in the states varies substantially among the 12 case study states. Several states (MA, KS, MO, MD, and PA) appear to have relatively successful ESPC programs that target state government buildings, as indicated either by project activity or investment levels. Massachusetts, Missouri, and Kansas appear to have achieved much higher market penetration rates compared to even other leading states (using floor area of completed ESPC projects compared to total floor area). Several other states (Colorado, Pennsylvania, Illinois, and New York) show steady progress in ESPC activity with market penetration rates ranging from 10 to 25% in the state government market. New York, California and Texas have had success using other types of strategies to implement EE projects in state government facilities that include one-stop, turnkey program administered by a power authority, leveraging incentives, providing technical assistance available through public benefit funds, and offering a revolving loan program. In many cases, these other strategies complement an ESPC project delivery structure. Our estimates of ESPC (and EE) market penetration should be treated with some caution and represent a lower bound estimate, given the lack of comprehensive and consistent data on total floor area, limited information on other energy efficiency strategies in some states, and the share of state buildings that are not good candidates for ESPC projects.

- Even in states with active ESPC programs, significant opportunities for energy efficiency remain in the state government market as market penetration levels are generally low in most states (<20% since 2000). For some of the state government facilities – especially, small stand-alone facilities – ESPC may not be a cost-effective mechanism of implementing energy efficiency projects and other strategies should be considered.

3. Energy Performance Contracts in the State Government Market: Analysis of Project-level Data

In this section, we analyze ESPC project-level data. Our initial objective was to assess whether there were significant differences in ESPC project performance among the 12 case study states (e.g., average percent savings, lower energy intensity after retrofits, economic benefits to customers). We conducted exploratory analysis that tested these hypotheses, analyzing and comparing ESPC project results in the state government market in the 12 case study states. Ultimately, we concluded that it was not possible to do a meaningful comparison of ESPC project-level characteristics and results among the various case study states, due to small sample size (e.g. number of projects) and data limitations for completed projects. We then decided to assess whether there were differences in ESPC project outcomes by classifying states into two groups - "leading states" and "other states" using several indicators. For this analysis, we included project-level data for all 50 states and decided that the other 38 states would be placed in the "other states" category.

The indicators used to classify and group the 12 case study states are shown in Table 16. Because of differences in size of the energy services market among states, we divided the total cost of ESPC projects by population and report ESPC spending on a per capita basis. This is a crude proxy to reflect the fact that ESPC activity levels in the state government market are related to the potential size of that market. Among the 12 states, ESPC spending per capita ranges from $3 to 34 per capita in 10 states, while per capita spending is much lower in California and Florida ($1/capita). Estimated market penetration of ESPC projects (in terms of floor area) is also low in Florida and California compared with the other 10 states.

Table 16. Indicators of ESPC activity levels in 12 case-study states

State	Average Annual ESPC Project Investment for 2001 –2008 (in million $)	Total ESPC Spending ($ per capita)	ESPC Market Penetration (based on floor area)
CA	4.1	1.2	6%
CO[38]	6.4	37.6	22.6
FL	0.0	0.9	1%
IL	4.8	3.4	11%
KS	11.8	34.8	76%
MA	22.0	32.2	47%
MD	10.8	21.3	Baseline data incomplete
MO[39]	12.9	17.5	55%
NY	4.3	4.9	12%
PA	26.2	17.2	19%
TX	11.0	4.9	Baseline data incomplete
WA	2.3	4.9	Baseline data not available

We also looked at average annual ESPC project investment in recent years (2001-2008). Based on this indicator, annual ESPC investment ranges from $10-26M per year in six states (MD, MA, KS, MO, TX, PA) while annual ESPC investment ranges from $2-6M in six other states

[38] Personal communication with John Canfield
[39] Market penetration estimate provided by Lonnie Thompson.

including California, with Florida on the low end.[40] Based on these three indicators, we decided to include Colorado, Illinois, Kansas, Massachusetts, Maryland, Missouri, Pennsylvania, Texas, New York, and Washington in the group of "leading states" and include Florida and California with the other 38 states in our "other states" group" for the purposes of this analysis.[41]

3.1 Comparison of ESPC Project Characteristics between "Leading States" and "Other States"

ESPC projects completed at state government facilities in the 10 leading states account for ~70% of the total investment of all ESPC projects completed in the state government market, based on projects in the LBNL/NAESCO database. The distribution of investment among various types of state government facilities differs substantially between the 10 leading states and the other 40 states (see Table 17). For example, ESPC projects at correctional facilities account for a substantially higher portion of investments in the 10 leading states as compared with the other 40 states. In all states, state universities represent a significant share of ESPC project investment (44-46%) in the state government market.

Table 17. ESPC project costs by type of state government facility

	Corrections	Office	Other	University	TOTAL (Million $)
10 "leaders"	22%	20%	13%	46%	1,054
Rest of the U.S.	8%	44%	4%	44%	370
TOTAL	$259M	$375M	$148M	$642M	1,423

In Table 18 and Table 19 we compare the median ESPC investment per project in terms of both absolute value and normalized with respect to floor area. The size of ESPC projects and their investment intensity may provide some insights on a state's willingness to invest in comprehensive energy efficiency projects and possibly the type of measures installed. For example, higher project costs normalized by floor space suggests that more capital-intensive measures (e.g., HVAC equipment) are included in ESPC projects or that more comprehensive projects that target multiple end uses are being undertaken.

Table 18. Median project investment for ESPC projects by type of state facility

	Corrections (Million $)	Office (Million $)	University* (Million $)
10 "leaders"	3.5	2.4	3.4
Rest of the U.S.	2.5	0.90	2.1

Note: * = difference between 10 leading states and rest of the U.S. is statistically significant

[40] Comprehensive data on floor area of state government buildings is not available for Maryland, Missouri, Texas, and Washington. However personal communications with state government staff suggests that ESPC market penetration is at least in the mid-range (10-20%) in these states.

[41] Note that California's ESPC investment occurred in the time-period of 2001-2003 driven largely by legislation that responded to the electricity crisis.

For the three facility types (universities, state office buildings, corrections), the median cost of an ESPC project in the 10 leading states is substantially higher than the median cost in the other 40 states, both in absolute terms and in terms of $/ft^2. These results suggest that ESPC projects in the state government market in these 10 states may be more comprehensive projects.

Table 19. Median investment/ft^2 for ESPC projects by type of state facility

	Corrections ($/ft^2)	Office ($/ft^2)	University* ($/ft^2)
10 "leaders"	5.0	6.4	4.0
Rest of the U.S.	2.9	2.7	2.3

Note: * = difference between 10 leading states and rest of the U.S. is statistically significant

In Table 20 and Table 21, we show median values for annual economic savings of ESPC projects between the 10 leading states and the 40 other states. From a customer's perspective, the economic value of an ESPC project depends primarily on two factors: the amount of energy saved and the cost of energy (i.e. electricity, natural gas, fuel oil).

Table 20. Median annual economic savings for ESPC projects by type of state facility

	Corrections: Annual Savings (Million $)	Office: Annual Savings (Million $)	University*: Annual Savings (Million $)
10 "leaders"	0.37	0.31	0.42
Rest of the U.S.	0.29	0.21	0.35

Note: * = difference between 10 leading states and rest of the U.S. is statistically significant

The annual economic savings per ESPC project normalized with respect to floor area is substantially higher for each type of facility in the 10 leading states compared to the other 40 states. Note that six of the 10 leading states have relatively low electricity prices (e.g. Missouri, Kansas, Washington, Colorado, Pennsylvania, and Illinois) so this result can not be attributed solely to differences in energy prices. These results suggest that the typical ESPC project in the 10 leading states is achieving somewhat higher energy savings than the typical project in the other 40 states.

Table 21. Median annual economic savings/ft^2 for ESPC projects by type of state facility

	Corrections ($ savings/ft^2)	Office ($ savings/ft^2)	University* ($ savings/ft^2)
10 "leaders"	0.60	0.80	0.60
Rest of the U.S.	0.13	0.42	0.32

Note: * = difference between 10 leading states and rest of the U.S. is statistically significant

4. Barriers to Performance Contracting in State Government Market

Currently, nearly all states allow ESPC in state government facilities and enabling legislation has been on the books for more than a decade in many states. Yet, ESPC market penetration is relatively low overall (20% or less) with a few notable exceptions (Missouri, Kansas and Massachusetts), even in states that are most active in promoting ESPC. The results of our quantitative analysis combined with other studies of ESPC in institutional sector markets suggests that there are some key barriers that hamper the widespread use of ESPC in state facilities. This section provides an overview of these barriers, including how these barriers affect implementation of a robust ESPC program. We identify, categorize and discuss barriers in three broad areas: (1) legislative barriers, (2) institutional barriers, and (3) other barriers. We then offer some suggestions to overcome barriers to ESPC in the state government market.

4.1 Legislative Barriers

The use of ESPC as a contracting mechanism in state government facilities nearly always requires enabling legislation that permits state agencies to enter into multi-year contracts with energy service providers. ESPC enabling legislation allows the development and implementation of energy efficiency projects outside the normal state bidding laws that apply to public construction projects.[42] In this section, we identify and discuss key issues and deficiencies found in ESPC enabling legislation: (1) limited coverage or inconsistent rules of state government market, (2) failure to designate a capable state agency that can champion ESPC, (3) failure to fund the technical resources required to facilitate the development and implementation of ESPC projects, and (4) contract terms that are too short or provisions that include arbitrary financing limits.

4.1.1 Scope of Legislation

In some states, ESPC enabling legislation does not encompass all state public facilities or includes different provisions for various institutional sector markets (e.g. state facilities, state universities or community colleges, local government and local school district facilities). Lack of consistency in project requirements across institutional sector markets can lead to higher transaction costs (e.g., procurement and contracting process) for both state agencies and ESCOs. Developing common sets of project requirements can reduce these transaction costs.

For example, in Illinois, enabling ESPC legislation allows for a 20 year contract term for universities and schools. However, other state agencies and local governments in Illinois are limited to a contract term of 10 years, which limits the type and scope of ESPC projects that can be implemented. All five current ESPC RFPs under development in Illinois are for state university projects, rather than for other state agencies. The IL state corrections agency identified 11 facilities two years ago in dire need of an ESPC project, but no RFP has been issued yet.

[42] Most public construction projects are built in a “spec and bid” format, in which the state develops a detailed specification for a project, and then selects a contractor to implement the project who makes the lowest responsible price bid. “Spec and Bid” projects are typically funded through direct appropriations and the contractor has limited responsibility to the state once the project is accepted.

In contrast, Pennsylvania amended and increased their contract term from 10 to 15 years, which was a key factor in expanding the scope of projects that could be delivered using the ESPC model. Currently there is legislation pending to extend the term to 20 years in Pennsylvania. Pennsylvania has an active ESPC program in its state government market that has resulted in ~$210M in ESPC project investments, the highest among our 12 case study states.

Including all state and local government and education facilities in ESPC enabling legislation may prompt ESCOs to target more resources in that state (e.g. opening a local office, allocating full-time staff) in the anticipation of substantial ESPC project opportunities.

4.1.2 Availability of Financial and Technical Resources to Assist State Agencies in ESPC

In some states, a legislative statute may not identify a specific state agency (e.g., state energy office) that is responsible for developing ESPC program guidelines and/or assisting other state agencies to develop and implement ESPC projects. Assistance can range from technical help in establishing procurement and evaluation requirements, creating standardized documentation, and participating in an advisory capacity throughout the process. Even in states where a specific agency is designated for implementing ESPC projects, the legislature often fails to appropriate funds for that agency to discharge its responsibilities. Agencies that are inexperienced with ESPC project development and implementation often feel their resources are inadequate, and the risk of proceeding with ESPC is too great. In such situations, the enabling legislation could authorize retention of technical consultants (engineering or financial) to advise the agency through the project development and implementation process.

For example, in Pennsylvania, the state designated their landlord agency (i.e. Department of General Services) as the ESPC champion agency and retained outside technical experts to help develop and implement their ESPC program. Strong executive support for the administrative and technical resources to run this program was consistently provided to support other agencies in their ESPC projects. Significant investment in ESPC projects has been accomplished ($210M) and ESPC project activity has averaged ~$25M/year in state government facilities since 2001, which is the highest among our 12 case study states. In contrast, Florida has not provided a champion agency with sustained administrative and technical resources required to effectively implement projects in state facilities and has not had a long history of strong, long-term, executive branch support for an ESPC program. The result has been a limited number of projects implemented in state facilities.

4.1.3 Contract Term

Enabling legislation often limits ESPC projects to a maximum contract term that may be shorter than the expected economic lifetime (or the normal payback) of energy efficiency technologies sought by the state agency (e.g., a new boiler or chiller).[43] As a result, a state agency may lose interest in using an ESPC because the agency does not see the value of expending resources on a "solution" that fails to meet its most critical needs. The maximum terms allowed for ESPC projects has become a more significant issue in recent years because of increased interest (and

[43] In Illinois, the maximum contract terms allowed for ESPC projects were a limiting factor in developing more comprehensive projects.

explicit policies in some cases) among states that want to include renewable energy (e.g. solar photovoltaic) and distributed generation in state facility projects which have longer paybacks and require longer contract tenures.

Several states (see Table 22) and the federal government have found that contract terms in excess of 15 years may be necessary in order to finance comprehensive energy efficiency projects or projects that involve central HVAC plant replacement (Donahue & Associates, 2006). Over a dozen state statutes permit ESPC contract terms ranging from 18-35 years for state facilities. The majority of these states have authorized 20-year terms. Federal agencies permit 25-year contract terms and public housing authorities are authorized to enter into 20-year contract terms for projects (Donahue & Associates, 2006). The simple project payback required to pay for the cost of financing a fifteen year project is about 10 years at current interest rates, while the project payback requirement for financing a 20 year project is about 15 years.

Table 22. Contract terms specified in legislation and administrative decisions

State	Maximum ESPC Contract Term in Legislation (Years)
CA	Administrative decision - 7 years
CO	25
FL	20
IL	10 years; 20 years for universities
KS	30
MA	20
MD	15
MO	15 (legislation), 10 (administrative decision)
NY	35
PA	15
TX	20
WA	State financing terms - 30 years

Illinois recently enacted legislation that extended the contract term for state universities to 20 years. This allowed universities to use ESPC to address needed capital improvements in their aging central plant infrastructures. In Pennsylvania, the authorizing legislation allows limited non-energy measures (up to 15% of the total project value) to be added to ESPC contracts to expedite overall facility modernization. Given the likelihood that utility rates will increase over the term of a contract, the use of life cycle cost analysis as the basis for making capital investment decisions is nearly always superior to using a simple payback method (see ESPC legislation in Florida, Arizona, and District of Columbia).

4.2 Institutional Barriers

ESPC programs in state government markets must also overcome a number of barriers that arise from institutional arrangements and practices in this market. In this section, we discuss several issues identified in recent studies (e.g. Donahue & Associates 2006) and in our interviews.

4.2.1 State Landlord Agency

In most states there is a landlord agency (e.g., Department of General Services or Department of Administration) that is solely responsible for the operation and maintenance of all state facilities. Historically, the orientation of landlord agencies is towards centralized control and maintenance of state facilities. Donahue & Associates (2006) reported that ESCOs indicate that some states have landlord agencies that are not supportive of ESPC either because they are unfamiliar with ESPC implementation and execution requirements or employing ESPCs potentially weakens their control over all decisions related to state buildings.

Support of the state landlord agency is critical to the success of a state ESPC program. However, the State agency embarking on an ESPC program must also be fully committed and have staff at all levels (operation, finance, legal, upper management) actively involved in individual projects and overall decision-making processes. Many ESPC projects have faced long delays and/or failed to develop because there was not buy-in from all inter- and intra-state agency stakeholders.

4.2.2 State Budget Office

State budget offices may perceive ESPC as an attempt by state agencies to circumvent the traditional state budget process for funding capital improvements.[44] State budget agency staff also may not be familiar with energy efficiency technologies and the M&V protocols used by ESCOs. Lack of awareness and understanding may lead state budget offices to prescribe unnecessarily lengthy project approval procedures and timetables, resist the use of standard project financing documents, and not allow ESCOs to receive progress payments during project construction. Other project financing-related issues that can affect ESPC project development and implementation include delays in securing approvals of finance staff, high transaction costs (incurred for example by the. placement costs of State-issued Certificates of Participation) and restrictions arising from the legal separation of capital and operating budgets.[45]

4.2.3 State Agencies approach to Budget Process

State agencies are often encouraged, particularly at the beginning of a new administration, to put forward all of their capital needs, including energy efficiency projects, with the promise that these needs will be met from new funding sources (e.g., a major bond issue). The agencies respond with their wish lists. In many cases, the new state administration is overwhelmed by the size of the deferred capital needs and is able to fund only a small fraction of the proposed projects.[46] The competition for scarce capital budget dollars typically results in many needed capital projects not being funded, which results in extensive project delays or failure to implement energy efficiency-related capital projects.

[44] In some cases this perception may be true as state agencies that are starved for capital improvement and/or maintenance funds may consider ESPC to fund necessary projects.
[45] The purpose of legal separation of capital and operating budgets is to prevent the agency from using funds intended for capital improvements to fund operating budget shortfalls. However, this separation undermines the use of energy savings from the operating budget, which can not be used to pay for energy-saving capital improvements.
[46] In 2004, the state treasurer of North Carolina estimated that the deferred capital needs of state agencies were $1.2 billion (Source: Presentation by the North Carolina Energy Office at the Utilities Savings Initiative Performance Contracting Briefing, January 30, 2004).

Some state agencies also believe that it is financially beneficial to wait for a capital appropriations budget in the future rather than borrow funds in order to proceed with an energy efficiency projects now. The validity of state agency staff's view can be assessed using spreadsheet-based tools that analyze the net present value of cash flows for energy efficiency projects that are developed through an ESPC approach that can be implemented today vs. energy efficiency projects that are delayed for different periods of time and use appropriated capital spending amounts. This type of analysis often provides additional evidence that ESPC offers an effective way for state facility managers to proactively finance infrastructure upgrades and improvements (Hughes et al. 2004).

4.3 Other Barriers

In addition to legislative and institutional barriers, there are other barriers that may need to be mitigated in order to encourage the development and implementation of ESPC projects at state facilities.

4.3.1 Education and Awareness

A common theme that emerges from our interviews and other studies is the lack of understanding by state facility managers, program managers, legislators, and administrative officers about energy efficiency technologies and the ESPC process. State government staff and legislators must be informed and educated on potential energy and cost savings from implementation of energy efficiency technologies, the range of proven EE technologies that will likely be utilized at state facilities, and the elements of the ESPC process such as contracting, financing, monitoring, and verification of savings. Several ways of addressing this issue include:

- Designating one agency where knowledge about the benefits of the use of energy efficiency technologies and ESPC is centralized and which is charged with disseminating information to staff at other state agencies
- Allocating full-time staff or portions of staff time to address energy efficiency and ESPC issues, develop in-house expertise
- Arrange access to technical consultants that are knowledgeable about performance contracts and can advise state agencies in analyzing the benefits of energy efficiency retrofits, selecting ESCOs, and evaluating their project proposals. (See also Section 4.4).

4.3.2 Standardized Procedures, Documents, and Protocols

Lack of transparent and standardized processes, documents, and protocols can result in delays in obtaining inter- and intra-agency approvals as well as delays in ultimate project construction and acceptance. This, in turn, can lead to high transaction costs which could have been avoided. (See section 4.4.2 for strategies to overcome these barriers).

4.4 Strategies to Overcome Barriers to Performance Contracting in State Government Market

In this section, we discuss strategies and offer some suggestions to overcome barriers to ESPC acceptance in the state government market; strategies and suggestions are organized by stages of

ESPC program development: (1) effective enabling legislation, (2) administration and management of a state ESPC program, (3) facilitating ESPC project implementation, and (4) financing ESPC projects.

4.4.1 Effective Enabling Legislation authorizing ESPC

ESPC enabling legislation should reflect and incorporate provisions used by other states with successful ESPC programs. The National Council of State Legislators (NCSL), the National Association of State Energy Offices (NASEO), the Energy Service Coalition (ESC), and the National Association of Energy Service Companies (NAESCO) have produced reports that provide model legislative provisions, examples of procurement and evaluation documentation, and reports and case studies on design and implementation of effective ESPC programs.

4.4.2 Administration and Management of an ESPC Program: Getting Started

Once enabling legislation is in place, states should consider the following suggestions in their administration and management of an ESPC program.

Overall Administration and Procurement Issues

- Explicitly designate a state agency as a champion agency for ESPC;
- Consider issuing an Executive Order from the governor that establishes the importance to senior management of successfully implementing energy efficiency measures through the use of ESPC in state facilities;
- Create an approval process and timetable with the cooperation of all agencies that are charged by state law with review and approval of procurement of energy services from third party providers.
- Encourage cooperation among multiple state agencies; successful ESPC programs nearly always involve the active cooperation of several state agencies (e.g., governor's office, energy office, state landlord agency, attorney general's office) working in a coordinated effort to facilitate the use of ESPC;
- Develop clear, efficient, and effective procurement procedures;
    - Standardize procurement and contracting procedures and documentation (e.g. establishment of the use of a RFQ/RFP as the procurement process, clarification of the role of the Investment Grade Audit in finalizing the Energy Services Agreement, and the identification of the standard provisions that should be common in every Energy Services Agreement to which the state is party);
    - Develop checklists for project compliance with state program requirements as part of contracting procedures and for required ESCO submittals (e.g., standardized project results reporting forms);
    - Centralize the procedural approvals and technical assistance resources of the state and clearly define the roles of reviewing agencies and specific departments within the agency;
- Train state lead agency staff on ESPC and have designated staff meet with their peers from other states employing successful ESPC programs;

- Provide ongoing training and needed technical assistance to individual state agencies; technical consulting support to individual state agencies can result in a higher volume of project procurements;[47]
- Establish an advisory group that includes ESCO and financing companies as well as state agency personnel to provide feedback on how the state procurement process is working.

Management of the Request-For-Proposal process to select pre-qualified ESCOs
Design the RFP to limit the contract approval process to a maximum number of months – say, 9 months

Managing ESPC Project Development and Implementation[48]

- Successful ESPC programs share several features: a short transaction cycle between issuance of RFQ/RFP and project award, flexibility of financing, use of standardized documents, and allowance of construction progress payments;
- Consider bundling procurement of multiple facilities for the same agency to reduce transaction time by up to 50%;
- Develop tools and services to facilitate project review, evaluation and contract negotiation (e.g. standardized evaluation process and forms, procurement and contracting procedures and documents such as RFP/RFQ and sample Energy Service Agreement contracts);
- Reduce the number of required approvals and reviews to a minimum consistent with due diligence;
- Centralize the procedural approvals and technical assistance resources of the state and clearly define the roles of agencies
- Retain experts as needed for project evaluation process training and to participate in complex evaluations
- Develop checklists for project compliance with state program requirements
- Require preliminary project technical feasibility reviews done by using standard technical facility profiles;
- Consider providing funding for investment grade audits (IGA) that do not progress to implemented projects.[49]

[47] State agencies that implement multiple projects can develop significant in-house ESPC expertise and become capable of overseeing their own projects over time and can share their expertise with other agencies.
[48] See Donahue & Associates (2006) for more detailed discussion of approaches to ensure timely development and implementation of ESPC projects.
[49] The normal ESPC contract sequence begins with the competition among a number of ESCOs for a project, often providing preliminary energy audits or feasibility studies at their own risk as part of that selection competition. Once an ESCO is selected for a project, the ESCO performs an investment grade audit (IGA), which is a detailed technical and economic analysis of the potential energy saving improvements, and provides a proposal to deliver a specific project that meets the agency's technical and economic requirements at a negotiated price. If the project goes ahead, the cost of the IGA is incorporated into the project price. Many state agencies do not have budgeted dollars for IGA that do not lead to projects. As a result, some state agencies may decide not to move ahead with an ESPC process for fear that proposed projects will not implemented and the state agency will be left responsible for the cost of the IGA.

4.4.3 Actively Facilitating the ESPC Process

In establishing the procedures for selecting energy efficiency service providers, the following recommendations should be considered in order to facilitate the process:

- Allow combining of capital appropriations dollars with energy performance contract funding to permit larger projects to be completed as a single transaction;
- After a state lead agency has selected a group of pre-qualified ESCOs to participate in a state ESPC program, consider limiting to three the number of pre-qualified ESCOs that respond to an RFP issued by an individual state facility or agency in order to reduce transaction costs and expedite evaluation of project proposals;
- Consider not requiring investment grade audits as part of the RFP response, but ask for preliminary technical proposals and technical samples of work product from completed projects and use the IGA to verify the proposal selected;[50]
- Allow inclusion of operations and maintenance (O&M) savings in assessing project benefits in cases where they can be fairly estimated or have generated documented budget savings.
- Consider allowing rate and fuel switching savings when they reduce operational costs.
- Consider allowing agencies to count avoided capital costs savings where major equipment is failing or creating extremely high emergency maintenance costs.

4.4.4 Financing of ESPC Projects

- The project financing components of successful ESPC programs share a few key characteristics:

    - Short Transaction Cycle – Project financing that can be readily obtained; financing agreements can be executed quickly after receipt of project technical approvals
    - Flexibility of Financing – Typically this will involve the use of third-party tax-exempt financing which offers customized structures to maximize agency benefits
    - Use of Standardized Financing Documents Attractive to Lenders (e.g., the use of standardized installment purchase contracts that are familiar and acceptable to lenders)
    - Construction Progress Payments - It is standard industry practice to include financing terms that permit progress payments to an ESCO during construction.

- Seek to leverage financial incentives offered in energy efficiency and renewable energy programs funded through a public benefits charge or utility ratepayers;

[50] Given the number of business opportunities for ESCOs where an IGA is not required, it is unlikely that ESCOs would commit funds to doing in IGA in the state government sector. Clearly, requiring an IGA could be a barrier for ESCOs to consider state government projects.

- Encourage, when appropriate, the capture of transaction cost economies from the combination of capital funds with ESPC financing;
- Consider requiring an economic analysis of the cost of delaying energy efficiency projects that are proposed to be funded out of a state's capital appropriations budget.

5. Conclusions and Discussion

In this section, we summarize our key findings, discuss their implications, and offer several recommendations for consideration by federal and state policymakers and agencies interested in expanding the use of performance contracting and energy efficiency in their state government buildings.

5.1 Summary of Key Findings

Our study produced several key findings:

- None of the 12 case study states currently have a comprehensive, centralized database of state facilities and their energy use and expenditures that would facilitate tracking progress over time in meeting aggressive energy use reduction initiatives underway in many states.
- Several states (KS, MO, MA, MD, and PA) appear to have relatively successful ESPC programs that target state government buildings as indicated either by project activity, market penetration, or investment levels.
- There appears to be significant, cost-effective energy efficiency resources still available to capture in state facilities across the country. Our results suggest that only three of the 12 states have implemented ESPC projects in more than 45% of the floor area of its state facilities while four states have implemented ESPC projects in 10-25% of the floor area of their state buildings.
- In analyzing project-level data, ESPC projects in 10 leading states typically had higher investment and energy savings intensities among three types of state facilities (e.g. corrections, offices, and universities) compared to similar types of state facilities in the other 40 states: these results are suggestive but not statistically significant.
- The differences in the penetration rates of ESPC projects in the surveyed states appear to be related to the ability of state governments to overcome policy and programmatic barriers to ESPC implementation.

5.2 Discussion of Key Findings

- **None of the 12 case study states have a comprehensive, centralized database of state facilities and their energy use and expenditures that would facilitate tracking progress over time in meeting aggressive energy use reduction initiatives underway in many states.**

Ten of the twelve case study states have formally established aggressive energy use reduction or greenhouse gas reduction targets by Executive Order or legislation that require significant reductions in energy use at state government facilities (10-40% over the next 10 years). Yet none of the twelve states appears to have a comprehensive, centralized database of state facilities and their respective energy use and energy expenditures. Most states have some data for specific

types of facilities (*e.g.*, the state university system has data on campuses), but often facility characteristics or energy consumption data is not current or available in electronic format. Consistent, well-documented approaches to reporting facility size (i.e. floor area) are also rare. Given this lack of data, it is not clear how states either set goals or plan to manage and track accomplishment of their energy use reduction goals for state government market facilities. States should also be collecting and tracking information on participation in all types of EE activities: ESPC, ratepayer-funded EE programs, and investments in energy efficiency through capital budgeting and O&M budgeting processes.

Three states (Missouri, Maryland, and Texas) reported that they have embarked on projects to build these facility and energy information databases. Creating a database took 2-3 years to design and implement, cost several million dollars, was funded by earmarked legislative appropriations, and is being managed by state energy offices. In conversations with state officials in other states, it became clear that state energy offices lack the resources to replicate these data collection projects undertaken in Maryland and Texas.

- **There appears to be significant, cost-effective energy efficiency resources that are still available to capture in state facilities across the country. Our results suggest that only three of the 12 states have implemented ESPC projects in more than 45% of the floor area of its state facilities while four states have implemented ESPC projects in 10-25% of the floor area in their state facilities.**

Our study results suggest that the aggressive energy use reduction targets for state government facilities set by these states are probably achievable (at least from a technical standpoint) because there are cost-effective energy efficiency projects still available in state facilities. Only three states (Kansas, Missouri, and Massachusetts) appear to have implemented ESPC projects in more than 45% of the floor area of state facilities. Several of the case study states have ESPC market penetration rates that are less than 10%. Our market penetration estimates are not precise, due to data limitations discussed above, and the fact that ESPC programs in several states are complemented by other state energy efficiency investments and utility-administered energy efficiency programs. However, we believe that our results are indicative of low penetration of energy efficiency opportunities at state buildings and the existence of major opportunities to generate energy and dollar savings.

- **In analyzing project-level data, ESPC projects in 10 leading states typically had higher investment and energy savings intensities among three types of state facilities (e.g. corrections, offices, and universities) compared to similar types of state facilities in the other 40 states: these results are suggestive but not statistically significant.**

When we began this project, we hypothesized that states with active and relatively successful ESPC programs may also have significant differences in project outcomes and results compared to other states. We expected to see significant differences in such factors as project investment levels, energy intensity (e.g. savings per square foot), length of ESPC contract or project payback period that would explain why ESPC projects in "leading" states would be more attractive to state facility managers. We analyzed project-level data a number of different ways and ultimately compared project-level data between 10 states, which we defined as "leaders" (based on activity level and/or market penetration), with the other 40 states. We found a number of substantial

differences in project-level data between the 10 leading states and the 40 other states, but generally the results were not statistically significant.

- The pattern of project development varies. In the 10 leading states, ESPC projects at correctional facilities account for a substantially higher portion of investments as compared with the other 40 states
- The median cost/ft^2 of an ESPC project in the 10 leading states is substantially higher (by 30 to 200%) in three types of state facilities (corrections, offices, universities) compared to the median cost/ft^2 in the other 40 states.
- The median annual economic value of savings ($/$ft^2$) in the 10 leading states is substantially higher for three types of state facilities (corrections, offices, universities) compared to the other 40 states; this suggests that the typical ESPC project in leading states is achieving somewhat higher energy savings than a typical project in the other 40 states.

- **Differences in the penetration rates of ESPC projects in the case study states appear to be related to the ability of state governments to overcome policy and programmatic barriers to ESPC implementation.**

In section 4, we discussed the various types of barriers (legislative, institutional and program implementation) that a state may typically have to overcome in order to implement a successful ESPC program. Five states in our sample (Massachusetts, Maryland, Missouri, Pennsylvania and Kansas) seem to have had more success in overcoming these barriers based on their significantly higher spending on state building ESPC projects ($17-34 per capita) compared to the other seven states in our study ($1-9 per capita). Unfortunately, the methods used to overcome barriers to ESPC in these five states are not easy to identify. The development of ESPC programs is grounded in the particular political context and institutional structure and arrangements in these states. The ingredients for success appear to be dependent on strong policy leadership from the Governor's office, coupled with the work of individual ESPC program "champions" in the state energy office, state landlord agency and budget office, and state agencies that implement ESPC in their facilities. See Appendix B for summary of state experience with ESPC programs.

5.3 Recommendations

We offer several recommendations to federal and state agencies and policymakers to consider, based on results of this study:

1) U.S. DOE should consider providing technical and financial assistance to help states develop and implement comprehensive state facility and energy information systems that can facilitate energy usage benchmarking, tracking EE project activity and outcomes (e.g. ESPC, utility-funded energy efficiency, etc.), and progress towards meeting energy reduction goals in state facilities.

Our interviews and attempts to compile energy-related information on state facilities and energy efficiency project activity in 12 states reveal that there is a significant need for additional technical and financial resources if states are to develop facility and energy information systems to support and document efforts to achieve energy reduction goals in state facilities. We found

that a few states have embarked on multi-year, multi-million-dollar data collection projects to develop these databases. If other states were to pursue this course of independent database development, they would spend hundreds of millions of dollars in aggregate, and the projects might stretch out over the next decade.

US DOE should consider providing technical and financial assistance to help states develop comprehensive facility and energy information systems that can facilitate more consistent and standardized reporting of facility characteristics, energy usage information, and energy efficiency project activity. If DOE were to provide technical assistance and grants to assist states (e.g. help compile and populate facility and energy information databases), such an approach might significantly reduce the total cost of these facility and energy information systems and shorten implementation time by years.[51]

2) States should consider quantifying the remaining potential for energy efficiency in state facilities and develop coordinated programmatic strategies (e.g. the use of ESPC, leveraging utility-funded energy efficiency, loan programs) to capture this potential among state agencies as part of a state energy planning effort.

Our survey yielded a substantial (although imprecise) glimpse at the potential EE resources that exist in state facilities across the country. States that are trying to achieve aggressive energy use reduction goals should quantify this potential and develop implementation plans to realize and capture the full energy efficiency potential. We believe that ESPC will be an important strategy to achieve energy savings and/or reduction goals, given the fiscal realities in most states (e.g., the lack of available allocated funding to achieve these goals), and the history of ESCO activity in state facilities. Based on those states with particularly successful ESPC programs, it is also crucial for state energy reduction goals and implementation plans to be clearly communicated by the Governor's office and by senior management at all relevant energy and landlord agencies to all state agencies, including the state universities and community college systems.

3) State agencies that are the "champions" of ESPC programs should understand the economics and technology of typical ESPC projects, systematically track ESPC project activity and outcomes, and provide this information to state agencies that will implement ESPC projects as well as the agency designated as the state-wide steward of all energy usage data.

This report and other related studies of performance contracting in institutional markets (Hopper et al 2005; Goldman et al 2002) document the energy and dollar savings, costs, and economics of ESPC projects developed by ESCOs that implement a range of energy efficiency measures and strategies. In aggregate, the LBNL/NAESCO database includes measured and verified results for ~3500 ESCO projects representing more than $6B in project investment. The LBNL/NAESCO database project has also developed standardized project data forms and field definitions which can be used by state agencies to collect consistent information on ESPC projects.[52]

[51] Under U.S. DOE's Super-ESPC program, such technical assistance has been provided to federal agencies.

[52] The project data forms and field definitions are an Excel spreadsheet-based application and are also used by ESCOs participating in NAESCO voluntary Accreditation Program.

Based on our interviews, we found that many state lead agencies collect incomplete information on ESPC projects, that some states do not maintain a central database of ESPC project information, that project information is not consistent among states, and that often key data is not collected or missing that would allow documentation and benchmarking of results (e.g. estimated savings not actual, lack of baseline energy consumption or floor area). State "lead" agencies should systematically track ESPC project activity and results and collect sufficient project-level information to benchmark and document performance and savings. This will improve management of statewide ESPC and non-ESPC energy efficiency programs by providing the empirical data to support future energy efficiency initiatives. In addition, benchmarking and documentation of energy and dollar savings could accelerate the implementation of additional ESPC projects by providing documented evidence of results to legislators, regulators, as well as individual state agencies that are considering installing similar energy efficiency technologies in similar types of facilities.

4) US DOE should continue and expand initiatives to facilitate performance contracting in the state government market.

In this study, we examined ESPC and energy efficiency activity in the state government market in 12 states and have attempted to document activity levels, program practices, and strategies to overcome barriers to ESPC and energy efficiency. In combining the available quantitative data and anecdotal evidence from interviews, we find that states that have developed relatively successful ESPC programs have often overcome legislative, political and institutional barriers that are quite situational and specific to their state. Thus, the process of disseminating information on successful ESPC programs (e.g., Kansas or Pennsylvania) is not as simple as replicating program structures in those states. Rather, it involves providing information/educational workshops and targeted technical assistance to key players in the state government market (e.g., Governor's office, key legislators, state energy office, and state landlord agency) on how to identify barriers in their state and successfully adapt experiences and lessons learned from successful states to their situation. Moreover, because of turnover among key state personnel, this type of effort may often involve continuous or ongoing education/information and targeted technical assistance.

Given the size of the market, barriers and remaining energy efficiency potential, US DOE can play an important role by continuing and/or expanding its current education, training and targeted technical assistance activities on ESPC to states, which is currently delivered through various organizations (e.g. Energy Services Coalition, NAESCO, NASEO, national laboratories). We would also recommend that US DOE continue to support, as appropriate, the development of document standardization to facilitate ESPC program development and implementation across states. This promotes best practices and helps to shorten the learning curve in states that have not yet used ESPC as a contracting and financing mechanism to generate energy and dollar savings at public facilities. Finally, we recommend that US DOE consider how they might actively support the acute data collection needs of the states.

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Appendix A. Overview of Energy Performance Contracting in State Government Market

This appendix summarizes key features of enabling legislation, administrative procedures, and processes to implement enabling legislation on Energy Performance Contracting in the state government market in the case study states.

State	Definitions	Guarantee	Contract Term	Procurement	Authority/Approval	Bonds	Incentives	Financing	Rules
Maryland Maryland Code Annotated § 11-101; § 12-301-303; § 14-401	Energy performance contract (s. 11.101(h))	Payments and the total contract amount may not exceed the savings realized Board of Public Works has authority to require contractors to furnish appropriate guarantees	15 years	RFP; must consult with Maryland Energy Administration (MEA) prior to issuance	MEA reviews RFP; monitors contracts and annually reports to Board of Public Works Contracts are subject to Board of Public Works review and approval prior to execution Board of Public Works may modify or waive authorization, source selection, solicitation, or contract requirement	Guarantee may include performance bond or other assurance to state; failure to meet guaranteed performance savings results in forfeit of portion of bond equal to savings shortfall	Not specified	Not specified	Not specified
Illinois State agencies: Compiled Statutes 30 ILCS 500 §25-45	Not specified	Not specified	Not specified	Not specified	Contract execution: State purchasing officers	Not specified	Not specified	Not specified	Chief procurement officer can promulgate rules to implement
Illinois Universities: Compiled Statutes 110 ILCS 62	Public universities (law specifies 9 universities) Energy conservation measure Guaranteed energy savings contract Qualified provider	Written guarantee required	10 years 20 years (universities)	RFP Notice 10 days' prior to opening; publication in newspaper in county in which university is located Registered architect or PE must review and evaluate Can be either in-house or university can pay a reasonable fee for such	Board of trustees of each university or designee	Sufficient performance bond	No grants or other funds or amounts appropriated to a university will be reduced as a result of energy savings	Installment payment contract Lease purchase	Not specified

State	Definitions	Guarantee	Contract Term	Procurement	Authority/Approval	Bonds	Incentives	Financing	Rules
	Request for proposals			evaluative services from architect or PE					
Pennsylvania Guaranteed Energy Saving Act 57 of 1998 as amended by Act 77 of 2004 (HB 1996)	Allowable capital cost ECM's Guaranteed energy savings contract Governmental unit Industry engineering standards Qualified provider	Written guarantee required	15 years	Competitive seal proposals RFPs announced via public notice Publication in Pennsylvania Bulletin	Not specified	Performance bond (in a sufficient amount) re: Public Works Contractor's Bond Law	None specified	Installment or lease purchase	Not required
Colorado CRS §24-30-2001-2003	Energy Performance Contract O& M Savings Shared Savings Contracts State Agency Utility Cost Savings Utility Cost Savings Measure	Written guarantee required	Up to 25 yrs.	RFP	Not specified	Not specified	None specified	Installment or lease purchase	Not required
Texas State agencies §2166.406	Energy savings performance contract	Guarantee required; may require a separate bond to cover value of the savings	20 years	RFQ	For State Agencies: TX State Energy Conservation Office must approve contracts	Payment and performance bond relating to the installation of the measures in	None specified	Tax-exempt lease purchase contract Lease purchase contract under the	The State Energy Conservation Office shall establish guidelines and an approval process for

State	Definitions	Guarantee	Contract Term	Procurement	Authority/Approval	Bonds	Incentives	Financing	Rules
Public Higher Education §51.927					For Public Higher Education: The Texas Higher Education Coordinating Board, in consultation with the State Energy Conservation Office shall establish guidelines and an approval process for awarding energy savings performance contracts.	accordance with Chapter 2253 The agency may also require a separate bond to cover the value of the guaranteed savings		master equipment lease purchase program administered by the Texas Public Finance Authority under Chapter 1232 Bond proceeds Under a contract with the provider of the energy or water measures	awarding energy savings performance contracts.
Missouri RSMO §8-231 & §8-235	Energy Cost Savings Measure Governmental Unit Guaranteed Energy Cost Savings Contract Operational Savings Qualified Provider Request for Proposals	Written guarantee required	15 years	Request for Proposals	RSMO Chapter 8	Not specified	Not specified	Installment or lease purchase Appropriated funds, or master lease	performance contracts
Washington RCW 39.35C	Energy Equipment and Services Energy Management Systems Cogeneration Conservation	Not specified (conditioned on contractually specified savings)	Not specified State Financing contracts not to exceed 30 years	Request for Qualifications	Not specified	Not specified	Provisions for participation in any utility incentive programs	State Treasurer financing	Not specified Payments under financing contracts of the state shall be made by the state from currently appropriated funds or funds not constituting "general state revenues".

State	Definitions	Guarantee	Contract Term	Procurement	Authority/Approval	Bonds	Incentives	Financing	Rules
	Cost-Effective Energy Energy Audit Energy Efficiency Project Energy Efficiency Services Department of General Administration Performance-based contracting Public agency Public facility State agency State facility Utility Local Utility								Energy Performance Contracting shall be the preferred method for conducting energy audits and implementing improvements
New York § 9-101-103	Agency Municipality Public Authority Energy Performance Contract	Not specified	35 years	Request for Proposals	Not specified	Not specified	Not specified	State master lease; lease	Not specified
Massachusetts Chapter 25A §11C Chapter 121B,	Building Authority Eligible Governmental	Not specified	20 years;	Request for Proposals	Commissioner of Division of Capital Asset Management approved Request for Proposals and	Not specified	Not specified	Not specified State agencies may lease energy saving systems that replace	The Commissioner of DCAM shall promulgate regulations

State	Definitions	Guarantee	Contract Term	Procurement	Authority/Approval	Bonds	Incentives	Financing	Rules
§11	body Minor Informalities Person Public Agency Responsible Responsive Offerer State Agency				contract			non-renewable fuels with renewable energy such as solar powered systems	
Kansas KSA 75-37,125 KSA 74	Federal Agency Municipality State Agency Energy Conservation Measure	Guaranteed required	30 years	Request for Proposals	Not specified	Not specified	Not specified	Lease Purchase The Kansas development finance authority is authorized to issue revenue bonds in amounts sufficient to pay the costs of energy conservation measures, as defined in K.S.A. 75-37,125,	Not specified
Florida §489.145, (state and local agencies) §1013.23 (universities and school districts)	Agency Energy, water, and wastewater efficiency and conservation measure Energy, water, or wastewater cost savings Guaranteed energy, water, and wastewater	Written guarantee is required that may include, but is not limited to the form of, a letter of credit, insurance policy, or corporate guarantee	20 years	Agency must select no fewer than three firms to receive Request for Proposals	Department of Management Services must review investment grade energy audit reports and certify that cost savings are sufficient Office of the Chief Financial Officer must review and approve contract Agency head or designee must approve contract	100 percent public construction bond	Not specified	Third Party Lease Purchase	Not specified Agencies in buildings owned or managed by DMS (<5,000 sq. ft.) must and compile a list of projects suitable for a guaranteed energy, water and wastewater performance savings contract and submit to DMS by 12/31/08. By July 1, 2009 DMS shall prioritize

State	Definitions	Guarantee	Contract Term	Procurement	Authority/Approval	Bonds	Incentives	Financing	Rules
	performance savings contract Guaranteed energy, water, and wastewater performance savings contractor Investment grade energy audit				Contracts must include an agency measurement and verification plan to monitor cost savings. For universities, the energy audit report must be reviewed by either the Department of Education or the Department of Management Services or signed and sealed by a registered professional engineer.				projects and develop a project schedule with deadlines for guaranteed energy, water and wastewater performance savings contract improvements to be made.

Appendix B. Summary of Energy Performance Contracting Activities in Case-Study States

In Appendix B, we summarize energy performance contracting activities in the 12 case study states in the state government market, organized as follows:

- **Process -** lead agency in state; maximum contract term in legislation and in practice, procurement approach
- **Program Drivers** - enabling legislation, Executive Orders
- **Targets -** quantitative goals or guidelines for state agencies to develop plans reducing energy consumption in state buildings;
- **Current Status -** status of ESPC efforts; linkages between program drivers and state ESPC activity
- **Barriers and Response Strategies** - barriers to ESPC activity based on interviews or our assessment of "best practices;" strategies undertaken to overcome or minimize barriers.

B.1.1 **California**

Process: For state agencies, the Department of General Services (DGS) is the program "champion" and is responsible for assuring that all proposed ESPC projects are cost-effective as defined by a standard analysis of life cycle costs. Projects may be implemented by either a state agency or by DGS. The state university and community college systems operate their own programs independent of the DGS program. The DGS ESCO Program in July 2007 pre-qualified 10 ESCOs and published a set of program guidelines.[53]

Drivers: Governor Schwarzenegger's Executive Order S-20-04 (also known as the *Green Building Initiative*) mandates that state agencies, departments, and other entities under the direct executive authority of the Governor, cooperate in taking measures to reduce grid-based energy purchases for state-owned buildings by 20% by 2015. Strategies include cost-effective efficiency measures and distributed generation technologies, including adoption of LEED and ENERGY STAR standards, and benchmarking of all state major buildings (completed using ENERGY STAR Portfolio Manager). The initiative also ordered the California Public Utilities Commission (CPUC) and the California Energy Commission (CEC) to support the energy efficiency target. Other entities of state government not under the Governor's direct executive authority, including the University of California, California State University, California Community Colleges, constitutional officers, legislative and judicial branches, and CPUC are requested to actively participate in this effort. The California utilities have responded to the Governor's initiative and the directives of the CPUC by making a significant amount of funding available to state facilities for benchmarking, retro-commissioning and ESPC projects.[54]

Current Status: The DGS program issued two ESPC project RFPs for state buildings in early 2008, after a hiatus of about seven years. These RFPs are the third step in a process that first benchmarked almost all state facilities and then retro-commissioned a number of large state facilities.

[53] http://www.documents.dgs.ca.gov/green/eeproj/escomap.jpg
[54] http://www.green.ca.gov/ResourcesLibrary/default.htm

Barriers: The re-start of the DGS program took almost three years of collaborative work between the DGS and the ESCO industry. The initial project RFPs issued by DGS were viewed as not very attractive by the pre-qualified ESCOs because they combined relative modest potential projects with contract lengths that many ESCOs viewed as harsh. The ESCO industry continues to work collaboratively with DGS to try to make the DGS ESPC program successful.

Table 23. California: State government facility characteristics and energy efficiency activity

Metric	Office Buildings	Universities and Colleges	Correctional Facilities	Other (e.g. Healthcare)	TOTAL
BASELINE					
Floor Area (million ft^2)	23.2	175.0	35.4	34	267.6
Energy Consumption (million MMBtu)	1.4	19.7	7	3.8	32.9
Energy Expenditure (million $)	33.7	510.0	99.9	50.5	694.1
ESPC ACTIVITY					
Number of Projects	1	8	1		10
Floor Area (million ft^2)	0.2	6.7	2.0		8.9
Project Investment (million $)	0.0	6.5	1.6		8.1
Energy Savings (million MMBtu)	0.01	1.9	0.3		2.2
Value of Energy Savings (million $)		0.07	0.29		0.36
Range of Contract terms (years)					1 – 20
OTHER EE ACTIVITY (e.g. UC/CSU-IOU Partnership, DGS-funded, Completed under SB5x)[55]					
Number of Projects					181
Floor Area (million ft^2)					5.9
Project Investment (million $)					456.1
Energy Savings (million MMBtu)					
Value of Energy Savings (million $)					28.6
TOTAL EE ACTIVITY					
Number of Projects	1	8	1		191
Floor Area (million ft^2)	0.2	6.7	2.0		14.3
Project Investment (million $)	0.0	6.5	1.6		464.1
Energy Savings (million MMBtu)	0.01	1.9	0.3		2.2
Value of Energy Savings (million $)		0.07	0.29		29.0
MARKET PENETRATION					
In terms of Floor Area					6%

B.1.2 **Colorado**

Process: As of April 2007, the agency charged with overseeing the "greening of Colorado state government" is the Governor's Energy Office headed by the Greening Government Manager. ESPC project implementation rules and procedures are set by the Department of Personnel & Administration's Office of the State Architect (DPA). Officials from the Governor's Energy

[55] Technically, projects completed under SB5x are all ESPC projects. However, they were completed in special circumstances and information about them is not available. We have data only on total project investment.

Office (GEO) have taken a leading role in the Energy Services Coalition nationally, and have worked to help a number of other states develop and implement ESPC programs. The GEO has qualified eleven ESCOs that are eligible to work in state agencies. They have developed a complete set of model documents, provide technical support services and perform ESPC feasibility studies for state agencies that have not implemented ESPC projects.

Table 24. Colorado: State government facility characteristics and energy efficiency activity

Metric	Office Buildings	Universities and Colleges	Correctional Facilities	Other (e.g. Healthcare)	TOTAL
BASELINE					
Floor Area (million ft^2)	1.7	41.7	6.8	11.6	61.8
Energy Consumption (million MMBtu)	1.4	7.2	1.2	0.008	9.8
Energy Expenditure (million $)	15.1	102.5	17.1	8.4	143.1
ESPC ACTIVITY					
Number of Projects	3	11		7	21
Floor Area (million ft^2)					
Project Investment (million $)	13.4	28.3		19.3	60.0
Energy Savings (million MMBtu)	0.01	0.04			0.05
Value of Energy Savings (million $)	4	3.5		1.0	8.5
Range of Contract terms (years)					12 - 19
OTHER EE ACTIVITY					**NONE**
Number of Projects					
Floor Area (million ft^2)					
Project Investment (million $)					
Energy Savings (million MMBtu)					
Value of Energy Savings (million $)					
TOTAL EE ACTIVITY					
Number of Projects	3	11		7	21
Floor Area (million ft^2)	1.8	2.1			3.9
Project Investment (million $)	13.4	28.3		19.3	60.0
Energy Savings (million MMBtu)					
Value of Energy Savings (million $)	4	3.5		1.0	8.5
MARKET PENETRATION					
In terms of Floor Area					22.6%

Drivers: In 2001, Governor Bill Owens endorsed the use of performance contracting to facilitate energy demand reduction. Executive Directors of all state agencies and departments responsible for state-owned facilities were required in 2003 to investigate the feasibility for an ESPC and submit a final feasibility study to the DPA; issue an RFP for an ESPC for all buildings where it is determined that an ESPC is feasible, viable, and economically sound; and follow ESPC procedures and requirements as set by the DPA. The 2003 Executive Order also said that future utility and operational budgets should be structured so that the annual cost to support a performance contract will be supported by the utility appropriation that would otherwise be granted. While the Governor could not directly mandate actions by state institutions of higher education, they were encouraged to comply with the Executive Order. Subsequent Executive

Orders required agencies and departments to adopt LEED-EB in operating buildings and LEED-NC to design energy and resource-efficient new buildings. Agencies are also required to initiate and energy management program to monitor and manage utility costs and to report progress in meeting Executive Order requirements (by fiscal year 2011-2012, achieve at least a 20% reduction in energy consumption of state facilities below fiscal year 2005-2006 levels) annually to the governor's Energy Office.[56]

Current Status: Colorado reports that it has completed ESPC projects in four office buildings, fourteen colleges/universities, and one health care facility for a total project investment of about $49 million.

Barriers: None

B.1.3 **Florida**

Process: The lead agency for the state of Florida's energy performance contracting program is the Department of Management Services (DMS). The state of Florida enacted legislation in 1994 under §489.415 F.S. In 2001, the law was amended to establish a process for contract review and approval by the Department of Financial Services (DFS) and to allow DMS to offer technical assistance, promote and facilitate ESPC to state agencies, and assist DFS in development of model documents. The amendment also provided DFS with approval authority over all state agency ESPC contracts and leases, extended ESPC contract terms to 20 years, added additional energy conservation measures (water consumption and sewer charges) and scope of projects (e.g. new construction), clarified ,the ability of state agencies to enter into third party leases.

In December 2001, DMS issued an Invitation to Negotiate (ITN) which was used to pre-qualify ESCOs to implement ESPC projects in state facilities. In June 2002, seven ESCOs were placed on the state term contract, and each of them was assigned specific state agencies in which to implement projects. Annual contract renewals occurred until 2007 when DMS issued another ITN which resulted in the pre-qualification of 10 ESCOs. DMS also eliminated agency assignments and required agencies to conduct a review of the companies' statement of qualifications and select no less than three companies to conduct further discussions with or request proposals or public presentations regarding their qualifications and ability to provide services.

Program Drivers: Between 1994 and 2007, three ESPC projects for state agency projects have been implemented, one contract has been signed, and three Investment Grade Audits (IGAs) have been completed. These figures do not include ESPC projects that have been implemented in state universities. In July 2007, Governor Crist issued Executive Order 07-126 that established greenhouse gas emission reduction targets from current levels for state agencies and departments of 10 percent by 2012, 25 percent by 2017, and 40 percent by 2025 and directs DMS to "develop energy conservation measures and guidelines for new and existing office space where state agencies occupy more than 20,000 ft^2". The Executive Order also established the

[56] House Bill 01-1381, 2001, CRS §§24-30-2001-2004 and CRS §§ 24-75-108 and 29-4-729 and Executive Orders D 014 03; D 005 05 and D 0011 07.

Florida Government Carbon Scorecard under the Executive Office of the Governor to track and report financial savings and emission reductions in state buildings and directed all state agencies and departments to designate an individual responsible for coordinating implementation. Each state agency has been directed to conduct an assessment of energy used by agencies during FY2006-2007 to quantify GHG emissions, which is to be updated quarterly. The Executive Order also set a goal of achieving LEED-NC and LEED-EB standards for buildings owned and operated by DMS.

Table 25. Florida: State government facility characteristics and energy efficiency activity

Metric	Office Buildings	Universities and Colleges	Correctional Facilities	Other (e.g. Healthcare)	TOTAL
BASELINE					
Floor Area (million ft^2)	22.9	34.1	17.1		74.1
Energy Consumption (million MMBtu)	1.7	4.2	2.3		8.2
Energy Expenditure (million $)	42.5	93.2	43.1		178.8
ESPC ACTIVITY					
Number of Projects		2	2		4
Floor Area (million ft^2)		0.6			0.6
Project Investment (million $)		4.9	11.7		16.6
Energy Savings (million MMBtu)		0.002			0.002
Value of Energy Savings (million $)		0.07	0.48		0.55
Range of Contract terms (years)					10
OTHER EE ACTIVITY					**NONE**
Number of Projects					
Floor Area (million ft^2)					
Project Investment (million $)					
Energy Savings (million MMBtu)					
Value of Energy Savings (million $)					
TOTAL EE ACTIVITY					
Number of Projects		2	2		4
Floor Area (million ft^2)		0.6			0.6
Project Investment (million $)		4.9	11.7		16.6
Energy Savings (million MMBtu)		0.002			0.002
Value of Energy Savings (million $)		0.07	0.48		0.55
MARKET PENETRATION					
In terms of Floor Area					1%

Current status: The emphasis that Governor Crist and the Florida legislature have placed on the issue of climate change seems to have the effect of renewing interest in ESPC as a method of achieving these goals. DMS and DFS have held a workshop for state agencies and ESCOs to explain the state's revised ESPC process. The state's ITN was reissued in 2007 and expanded the list of pre-qualified ESCOs from seven to ten companies. DFS has developed a contracting checklist and process flowchart to expedite contract review and approval. There have been five ESPC projects initiated in state agencies during the past three years versus the two state agency projects that were implemented between 1994 and 2004. DFS and DMS have developed a

standardized investment grade energy audit agreement and financing and energy services agreements.

Barriers and Response Strategies: Historically, Florida was not a strong advocate of ESPC in state facilities, which may in part, have been due to limited staff resources, lack of knowledge about the benefits, as well as the fact that ESPC was not given high priority by state administrative and legislative leaders. Prior to the amendment of the state's ESPC law in 2001, the contract term was limited to 10 years, the ability to use third party financing use of third party lenders was not clear, and water conservation was not included as an eligible ECM.

Under the current administration, there has been heightened interest by the executive and legislative branches, which has been a significant catalyst to the increased use of ESPC in Florida. Florida offers a good example of the importance of high level interest in ESPC among state policymakers in overcoming ESPC implementation barriers.

B.1.4 **Illinois**

Process: The lead agency for ESPC in Illinois is the Department of Commerce and Economic Opportunity (DCEO). Current law limits the contract term to 10 years for state agencies except for universities which are authorized to enter into 20 year ESPC contracts. State legislation sets very minimal criteria for ESCOs to be qualified to be a provider for state facilities. Agencies are permitted to use utility and operating savings for performance guarantees. Typically a state agency or university can expect approximately seven responses from ESCOs to RFPs issued for large state projects. The state has not established a pre-qualified list of ESCOs.

Program Drivers: DCEO and its predecessor agencies which includes the state energy office, have a long history of providing technical assistance for ESPC projects to state agencies and universities. Throughout its history, DCEO has relied heavily on an outside consultant who works closely with various agencies and universities to develop and implement projects. DCEO has developed a comprehensive and standardized procurement and evaluation process, and model program documents. The support of the executive and legislative branches of state government has been variable over the last 14 years. In 1994, the Governor implemented a pilot ESPC program for seven state agencies and universities which was very successful. There was an inter-agency agreement between DCEO, the Capital Development Board (CDB) and Central Management Services (CMS) which was executed in 1995 to support the Governor's pilot program. All seven projects were financed by Certificates of Participation (COP) issued by the state. Subsequently, most other state ESPC projects have been implemented in universities. DCEO has provided a significant amount of ESPC technical assistance services to other public sector agencies in the state.

Targets: In December 2003, DCEO prepared a report to the General Assembly on the energy costs and energy efficiency at Illinois' public universities. Principal recommendations were for universities to develop campus-wide energy plans and increase the use of ESPC as a project financing mechanism. It was also recommend that the Illinois Board of Higher Education (IBHE) include energy efficiency as an objective when establishing capital budget priorities. This report recommended more cooperation between CDB, IBHE and CMS in achieving energy efficiency at Illinois' public universities.

Current Status: DCEO continues its efforts to provide assistance to state agencies and universities for ESPC projects and is currently working with five universities on ESPC projects. In addition, DCEO is working with CMS to issue an RFP for 11 correctional facilities in Illinois.

Barriers and Response Strategies: The contract term limit of 10 years for state agencies (other than universities), is a significant barrier to the scope of ESPC projects. Another barrier is the turnover rate in key state staff which has been especially high in the last five years. The primary barrier to recent efforts to issue RFPs has been disputes between CDB, CMS and DCEO regarding which agency has primary procurement authority. Illinois has very limited capital budget funds available to fund energy efficiency projects which should make ESPC an attractive financing option. However, CDB, which has capital budget authority, has historically been resistant to the concept of ESPC.

Table 26. Illinois: State government facility characteristics and energy efficiency activity

Metric	Office Buildings	Universities and Colleges	Correctional Facilities	Other (e.g. Healthcare)	TOTAL
BASELINE					
Floor Area (million ft^2)	18.1	40.7	15.6	6.1	80.3
Energy Consumption (million MMBtu)	4.4	3.8	1.7	0.6	10.4
Energy Expenditure (million $)	51.1	122	37.1	21.9	232
ESPC ACTIVITY					
Number of Projects	2	11	1	1	15
Floor Area (million ft^2)	1.1	6.5	1.0	0.3	8.9
Project Investment (million $)	4.5	48.3	1.1	0.6	54.5
Energy Savings (million MMBtu)		0.20	0.08	0.01	0.29
Value of Energy Savings (million $)	0.34	6.23			6.57
Range of Contract terms (years)					10
OTHER EE ACTIVITY					**NONE**
Number of Projects					
Floor Area (million ft^2)					
Project Investment (million $)					
Energy Savings (million MMBtu)					
Value of Energy Savings (million $)					
TOTAL EE ACTIVITY					
Number of Projects	2	11	1	1	15
Floor Area (million ft^2)	1.1	6.5	1.0	0.3	8.9
Project Investment (million $)	4.5	48.3	1.1	0.6	54.5
Energy Savings (million MMBtu)		0.20	0.08	0.01	0.29
Value of Energy Savings (million $)	0.34	6.23			6.57
MARKET PENETRATION					
In terms of Floor Area					11%

B.1.5 **Kansas**

Process: The Kansas Energy Office, which is part of the Kansas Corporation Commission (KCC), is responsible for promoting the state ESPC program, which is called the Facilities Conservation Improvement Program (FCIP). A state agency that includes the board of regents and a regent's institution may enter into a contract or lease-purchase agreement for an energy conservation measure. The agreement must be approved by the KCC. Part of the qualification process for an ESCO is the negotiation of master pricing for each phase of an ESPC (audit, engineering, construction management, etc.). Kansas believes that this negotiated master pricing facilitates the development and implementation of ESPC projects. The Energy Office also maintains a step-by-step guide to developing and implementing an ESPC on its website.[57] Under the FCIP, using master-lease purchasing authority, the Department of Administration can secure an equipment lease purchase agreement with a private financing institution. Equipment leases are available to all state agencies for conservation improvement projects. These leases are structured as fixed-rate capital leases with the length of a lease typically from ten to fifteen years although by statute the lease term may be extended up to 20 years. Project sizes start at $50,000. Security for the lease financing typically consists only of a first lien on the related project. Larger projects defined as over $5 million may be financed through a bond issue.

Drivers: Kansas Governor Sebelius has ordered that any state building construction project with a value of more than $100,000 be analyzed to determine if it can use an ESPC to reduce the need for state budget or capital expenditures. The Kansas Energy Office has taken a leading role in the Energy Services Coalition nationally, and has worked for several years to promulgate the successful “Kansas model” for ESPC programs to other states in the western US.

Current Status: The Kansas Energy Office reports that about half of the state’s total square footage of buildings has been retrofitted in the FCIP program. This appears to be the highest percentage of state facilities in the country.

Barriers: Kansas has successfully addressed two of the main barriers to ESPC. First, the Governor clearly supports ESPC so that state agency and university officials have no doubt that employing ESPC is a significant part of meeting state energy policy objectives. Second, the strategy of pre-negotiating master pricing for ESPC seems to have addressed the barrier that the development of an ESPC contract is too difficult for state agencies to manage and too cumbersome to negotiate on a company by company basis. Kansas does not appear to have clear targets for state agencies and universities to reduce energy expenditures, and the state does not have a good baseline of energy expenditures by state agencies and universities.

[57] http://kcc.ks.gov/energy/fcip/procedures.htm

Table 27. Kansas: State government facility characteristics and energy efficiency activity

Metric	Office Buildings	Universities and Colleges	Correctional Facilities	Other (e.g. Healthcare)	TOTAL
BASELINE					
Floor Area (million ft^2)	4.55	21	3.85	5.6	35
Energy Consumption (million MMBtu)					
Energy Expenditure (million $)					
ESPC ACTIVITY					
Number of Projects	2	12	9	1	24
Floor Area (million ft^2)	0.4	22.3	3.7	0.4	26.7
Project Investment (million $)	3.0	77.3	14.9	2.0	97.2
Energy Savings (million MMBtu)	0.02	0.19	0.18	0.03	0.42
Value of Energy Savings (million $)	0.2	6.1	1.7	0.2	8.2
Range of Contract terms (years)					10 - 20
OTHER EE ACTIVITY					**NONE**
Number of Projects					
Floor Area (million ft^2)					
Project Investment (million $)					
Energy Savings (million MMBtu)					
Value of Energy Savings (million $)					
TOTAL EE ACTIVITY					
Number of Projects	2	12	9	1	24
Floor Area (million ft^2)	0.4	22.3	3.7	0.4	26.7
Project Investment (million $)	3.0	77.3	14.9	2.0	97.2
Energy Savings (million MMBtu)	0.02	0.19	0.18	0.03	0.42
Value of Energy Savings (million $)	0.2	6.1	1.7	0.2	8.2
MARKET PENETRATION					
In terms of Floor Area					76%

B.1.6 **Maryland**

Process: Before issuing a request for proposals for an ESPC, departments, commissions, agencies, administrations, authorities and the university system is required to consult with the Maryland Energy Administration (MEA). MEA pre-qualifies ESCOs in conjunction with the Department of General Services (DGS), for participation in the state ESPC program. Currently there are five pre-qualified ESCOs, which are listed on the MEA website.[58] DGS issues RFPs on behalf of state agencies and the MEA helps to review responses. DGS also enters into all ESPC contracts, after they have been reviewed and approved by the MEA and the Board of Public Works, and has the power to revise or reject these contracts. State agencies can finance the costs of an ESPC through the State's Master Lease Program or by funds available in the State Agency Loan Program for small projects.[59] ESPC contracts are assessed a fee to cover DGS' costs of

[58] http://www.energy.maryland.gov/incentives/state-local/ESPC/index.asp.

[59] Maryland Code Annotated § 11-101; § 12-301-303; § 14-401

post-construction project monitoring and the review of savings measurement and verification reports.

Drivers: Governor O'Malley in July 2007 announced the goal of having state facilities reduce their energy use by 15% by the year 2015. The Governor mandated implementation including the training of employees in energy efficient building operations, expanded use of ESPC, expanded use of ENERGY STAR purchasing of equipment, and expansion of the State Agency Loan Program. The Governor also mandated incorporating energy issues into the StateStat process that will help state agencies track their progress and assist in achieving the statewide energy efficiency goals. State agencies will be expected to designate energy managers, conduct energy consumption analyses, and update energy conservation plans.

Table 28. Maryland: State government facility characteristics and energy efficiency activity

Metric	Office Buildings	Universities and Colleges	Correctional Facilities	Other (e.g. Healthcare)	TOTAL
BASELINE					
Floor Area (million ft^2)	6.5				6.5
Energy Consumption (million MMBtu)					28
Energy Expenditure (million $)					250
ESPC ACTIVITY					
Number of Projects	9	7	1	4	21
Floor Area (million ft^2)	7.2	3.5		0.9	11.5
Project Investment (million $)	51.8	38.7	5.7	23.1	119.3
Energy Savings (million MMBtu)	0.124	0.010		0.138	0.272
Value of Energy Savings (million $)	2.7	0.4		1.6	4.7
Range of Contract terms (years)					6 - 15
OTHER EE ACTIVITY					**NONE**
Number of Projects					
Floor Area (million ft^2)					
Project Investment (million $)					
Energy Savings (million MMBtu)					
Value of Energy Savings (million $)					
TOTAL EE ACTIVITY					
Number of Projects	9	7	1	4	21
Floor Area (million ft^2)	7.2	3.5		0.9	11.5
Project Investment (million $)	51.8	38.7	5.7	23.1	119.3
Energy Savings (million MMBtu)	0.124	0.010		0.138	0.272
Value of Energy Savings (million $)	2.7	0.4		1.6	4.7
MARKET PENETRATION					
In terms of Floor Area					

Current Status: Maryland has done about $150 million of ESPC work in its facilities. The state is currently building a database of state facilities to track its progress in reducing state facility energy use.

Barriers: Maryland has developed and implemented a significant volume of ESPC projects. The process successfully involves the Maryland Energy Administration as the program "champion" and the state's landlord agency, the Department of General Services, as the project implementer. However, the ESPC program requirements and interpretations of key contracting terms over the tenure of an individual project appear to change too frequently leading to higher transaction costs. The state is just now assembling a database of state facilities that will allow it to track its progress in reducing energy use.

B.1.7 **Massachusetts**

Process: The Division of Capital Asset Management (DCAM) is the lead agency for ESPC projects in Massachusetts state facilities and oversees ESPC projects in state agencies from development through post-construction monitoring. The state's authorizing legislation requires the Commissioner of DCAM to award ESPC Requests for proposals and contracts and is also a party to the contract between the agency and ESCO (three party contracts). DCAM serves as the awarding authority for all ESPC projects and facilitates project procurements and implementation between ESCOs and client agencies. Former state law limited contract terms to 10 years, but allowed a maximum contract term of 20 years if cogeneration was included in the project scope, but a new law passed in the summer of 2008 allows for all projects to have a term of up to 20 years. DCAM has standardized procurement and contracting documents which are used by state agencies. Agencies separately bid tax-exempt lease financing from bankers on the state's master list of qualified financing vendors. Utility incentives, grants, and sometimes bonds are also combined into project financing.

Program Drivers: In 2007, Governor Patrick issued Executive Order (EO) 484 which established the Leading by Example Council to oversee and coordinate effort at state agencies and universities to reduce their environmental impact; reduce GHG from state operations by 25% by FY 2012, 40% by 2020 and 80% by 2050 from FY 2002 levels and reduce overall energy consumption at state owned and leased buildings by 20% by FY 2012 and 35% by 2020 over FY 2004 levels as measured on a BTU/ft^2 basis. EO 484 had a number of provisions that directly affect energy management in MA state agencies:

- Renewable energy use - EO 484 directs agencies to procure 15% of annual electricity consumption from renewable sources by 2012 and 30% by 2020 from the MA Renewable Portfolio Standard.
- Clean Energy Committee - The EO establishes a Clean Energy Committee to work with designated agency Program Coordinators to coordinate agency energy activities, and the tracking and reporting of all requested energy consumption data to the Committee and Council. The Committee is to submit an annual report to the Governor on the results of energy conservation actions undertaken by the agency during the prior fiscal year, the environmental and economic impacts of such actions and recommendations for future energy actions.
- ESPC and Project Financing - The EO also directs that recommendations for financing energy projects in state facilities be made without requiring significant infusion of state funding and that DCAM should seek to implement ESPC projects at all applicable state facilities with floor area greater than 100,000 ft^2.

DCAM does provides technical services including engineering studies, facility assessments, performs and manages ESPC procurement and contracting, conducts third party commissioning, provides onsite engineering, oversees construction, establishes baseline M&V and baseline standards and monitors M&V reporting which are submitted to DCAM and the state agency on a quarterly basis.

Table 29. Massachusetts: State Government facility characteristics and energy efficiency activity

Metric	Office Buildings	Universities and Colleges	Correctional Facilities	Other (e.g. Healthcare)	TOTAL
BASELINE					
Floor Area (million ft^2)	9.9	27.9	8.6	17.3	63.7
Energy Consumption (million MMBtu)	0.8	4.9	1.7	2.1	9.5
Energy Expenditure (million $)	31.5	76.2	14.2	33.5	155.5
ESPC ACTIVITY					
Number of Projects	3	20	6	9	38
Floor Area (million ft^2)	1.5	23.9	5.5	3.2	34.1
Project Investment (million $)	4.4	112.2	76.2	16.2	209.1
Energy Savings (million MMBtu)					
Value of Energy Savings (million $)	1.9	15.6	4.6	1.9	24.2
Range of Contract terms (years)					10 - 20
OTHER EE ACTIVITY					
Number of Projects	3	18	8	7	36
Floor Area (million ft^2)	1.8	10.7	2.0	1.6	16.1
Project Investment (million $)	5.1	9.3	11.4	1.4	27.2
Energy Savings (million MMBtu)					
Value of Energy Savings (million $)	0.6	1.9	1.5	0.2	4.1
TOTAL EE ACTIVITY					
Number of Projects	6	38	14	16	74
Floor Area (million ft^2)	3.3	34.6	7.5	4.8	50.2
Project Investment (million $)	9.5	121.5	87.6	17.6	236.3
Energy Savings (million MMBtu)					
Value of Energy Savings (million $)	2.5	17.5	6.1	2.1	28.3
MARKET PENETRATION					
In terms of Floor Area					47%

Current status: In 2007, DCAM modified its ESPC process to an ESCO-financed program where repayment is tied to measured project performance after construction is completed. They have also instituted more stringent auditing requirements and standardized M&V.

Barriers and Response Strategies: In attempting to eliminate project uncertainties and problems associated with measures that are implemented on equipment that does not work, DCAM requires ESCOs to determine existing conditions during the audit that may affect the project. ESCO representatives have argued that this may expand the cost (and schedule) for

project design. ESCOs are also not afforded the protection of upfront payments but have protections in place for changes in scope and baseline conditions (e.g., ESCOs are allowed to submit change orders for compensation for undiscovered field conditions). DCAM's proposed process premises all of the ESCO payments on the satisfaction of an M&V plan, although it does allow for the consideration of assigned payments directly to the ESCo's lender, which is the federal model. ESCO representatives have also argued that proposed project finance provisions may limit the competition for future projects to a few large companies and may limit participation by smaller local ESCOS.

B.1.8 **Missouri**

Process: The lead agency for ESPC in Missouri is the Office of Administration, Division of Facilities Management, Design and Construction (OA/FMDC). OA/FMDC provides ESPC project management to all state agencies except for the Departments of Transportation, Conservation, and the state universities. The emphasis of the state's economic analysis of ESPC projects has been on energy savings. Contract terms are limited to 15 years by statute for ESPC projects, although the OA/FMDC Energy Management Office (EMO) has elected to limit ESPC projects to 10 years. The EMO of OA/FMDC has an extensive list of pre-qualified ESCOs and has used a centralized RFP program for state ESPC projects. Almost all of their state agency ESPC projects were developed over the last four years.

Program Drivers: OA/FMDC EMO provides technical leadership to the state agencies operational support, along with a comprehensive ESPC program for state agencies. They have also provided extensive technical support to both the design and operations sections in OA/FMDC and played a major role in the management of the projects.

Targets: For the 3500 buildings and sites which OA/FMDC EMO focused ESPC efforts, they estimated that 70% of the total floor area of those buildings had been retrofitted using ESPC. Note: This excludes public universities which in Missouri are operated separately from State Facilities.

Current Status: OA/FMDC EMO is currently in the implementation phase of the ESPC projects with approximately 75% of the work complete. OA/FMDC EMO are in the process of developing benchmarks of the building's utility consumption data along with interfaces to the energy intensive facility's building automation systems, that will allow for monitoring operational conditions in order to retro-commission the operational sequences. OA/FMDC EMO will continue energy conservation efforts through design reviews, operational technical assistance, and operational monitoring of the utility consumption and building automation systems providing retro-commissioning of the operational sequences. OA/FMDC EMO will continue the ESPC process on remaining facilities, and may implement some Energy Conservation Measures (ECM) that were not implemented in the first round of ESPC's due to the 10 year energy savings limit.

Barriers and Response Strategies: The administrative choice to limit ESPC projects contract terms to 10 years has been a significant barrier to project scope. OA/FMDC's plans to revisit the unimplemented ECM's would reduce the barrier to the ESPC project's scope of work. The

extremely small EMO staff has an extraordinary work load due to the significant number of projects they are required to manage.

Table 30. Missouri: State government facility characteristics and energy efficiency activity

Metric	Office Buildings	Universities and Colleges	Correctional Facilities	Other (e.g. Healthcare)	TOTAL
BASELINE					
Floor Area (million ft^2)	14.8	N/A	9.60	4.40	28.8
Energy Consumption (million MMBtu)	Data being collected				
Energy Expenditure (million $)	29	N/A	23	18	70
ESPC ACTIVITY					
Number of Projects	8	2	5	4	19
Floor Area (million ft^2)	4.8	3.1	8.4	3.5	19.9
Project Investment (million $)	39.9	0.0	45.8	17.4	103.1
Energy Savings (million MMBtu)	0.364	0.000	0.188	0.056	0.608
Value of Energy Savings (million $)	7.4	1.2	4.7	1.0	14.3
Range of Contract terms (years)					10 - 15
OTHER EE ACTIVITY					**NONE**
Number of Projects					
Floor Area (million ft^2)					
Project Investment (million $)					
Energy Savings (million MMBtu)					
Value of Energy Savings (million $)					
TOTAL EE ACTIVITY					
Number of Projects	8	2	5	4	19
Floor Area (million ft^2)	4.8	3.1	8.4	3.5	19.9
Project Investment (million $)	39.9	0.0	45.8	17.4	103.1
Energy Savings (million MMBtu)	0.364	0.000	0.188	0.056	0.608
Value of Energy Savings (million $)	7.4	1.2	4.7	1.0	14.3
MARKET PENETRATION					
In terms of Floor Area					

B.1.9 **New York**

Process: State agencies and universities can develop and implement ESPC projects through an RFP process as defined in state law. State departments, agencies, boards, commissions, offices, divisions, municipalities, and port authorities, have their own approval power. An agency "may enter into a lease of such real property to which it holds title or which is under its administrative jurisdiction as is necessary for such construction or operation, with an energy performance contractor, for the same length of time as the term of such energy performance contract."[60] New York has two programs for state facilities that operate in parallel. The first is the Envest program operated by the New York State Energy Research and Development Authority (NYSERDA),

[60] New York Laws: Energy (5.)

which has implemented about 20 projects during the last eight years. The second program, operated by the New York Power Authority (NYPA), has a streamlined project contracting and low-cost financing process.[61] NYPA operates its own financing program, using its substantial bonding authority.

Table 31. New York: State government facility characteristics and energy efficiency activity

Metric	Office Buildings	Universities and Colleges	Correctional Facilities	Other (e.g. Healthcare)	TOTAL
BASELINE					
Floor Area (million ft^2)	25.8	107.5	38.7	43	215
Energy Consumption (million MMBtu)	6.9	26.9	9.5	9.7	53.1
Energy Expenditure (million $)	90.8	218.7	78.2	82.8	470.6
ESPC ACTIVITY					
Number of Projects	8	7	4	1	20
Floor Area (million ft^2)	22.2	19.8	3.5	1.0	46.5
Project Investment (million $)	21.8	55.6	8.8	8.5	94.8
Energy Savings (million MMBtu)	0.04	0.32			0.36
Value of Energy Savings (million $)	0.99	4.90			5.89
Range of Contract terms (years)					1 - 17
OTHER EE ACTIVITY (e.g. NYPA, NYSERDA)					
Number of Projects					141
Floor Area (million ft^2)					
Project Investment (million $)	58.5	93.7	4	15.2	171.5
Energy Savings (million MMBtu)	0.17	0.15	0.46	0.13	0.92
Value of Energy Savings (million $)	5.7	12.8	0.7	1	20.3
TOTAL EE ACTIVITY					
Number of Projects	8	7	4	1	161
Floor Area (million ft^2)	22.2	19.8	3.5	1	46.5
Project Investment (million $)	80.3	149.3	12.8	23.7	266.3
Energy Savings (million MMBtu)	0.21	0.47	0.46	0.13	1.28
Value of Energy Savings (million $)	6.69	17.7	0.7	1	26.19
MARKET PENETRATION					
In terms of Floor Area					22%

Program Drivers and Targets: Three successive New York Governors (Pataki, Spitzer and Paterson) have issued and/or reaffirmed Executive Order 111 during the past few years that have mandated the development of agency energy efficiency plans, the establishment of an energy use baseline for the state, and annual reporting on agency progress toward meeting the goal of 35% energy use reduction by 2010 (from a 1990 baseline). Governor Spitzer issued and Governor Paterson affirmed Executive Order 142, which sets a goal of reducing overall state energy use by

[61] NYPA is a state entity that is similar to the Bonneville Power Authority or the Tennessee Valley Authority: it owns generating plants, transmits power to local municipal and cooperative utilities, and sells power directly to large industrial and public sector customers.

15% by the year 2015. This "15 by 15" goal has been translated by the state Public Service Commission into an Energy Efficiency Performance Standard (EEPS), which applies to all regulated energy suppliers in the state. New York also has an aggressive Renewables Portfolio Standard and an Executive order mandating that state agencies undertake programs to increase their use of sustainable resources. Finally, New York is participating in the Regional Greenhouse Gas Initiative (RGGI), a compact of ten states in the Northeast that are beginning a carbon cap-and-trade system in advance of expected federal mandates.

Current Status: NYSERDA and NYPA have done about 56 ESPC projects. In addition, NYPA has done about 83 non-ESPC projects in state facilities, primarily single technology lighting projects.

B.1.10 **Pennsylvania**

Process: The lead agency is the Department of General Services (DGS). They are permitted to use utility and operating savings for performance guarantees and may pay for up to 15% of the project cost with capital funds. While current law authorizes a 15 year contract term, initially, the maximum contract term was 10 years for the first few projects. Pennsylvania requires ESCOs to be qualified or re-qualified every three years to be a provider for state facilities. From the pool of qualified ESCOs, DGS invites ESCOs to provide an Expression of Interest (EOI) for an agency's project and selects three ESCOs from the respondents to receive the agency's RFP.

Program Drivers: The Commonwealth of Pennsylvania enacted legislation authorizing ESPC projects for all public agencies in 1998 and amended in 2003 as provided for in *73 P. S. §§ 1646.1 – 1646.7* of the Pennsylvania Statutes. The PA Department of Environmental Protection took the lead in 1999 by hiring consultants who worked closely with various agencies to develop comprehensive and standardized program procedures, a set of model program documents, and train state agency staff. The executive and legislative branches have been very supportive of the ESPC program. The current Governor's Executive Order 2004-12, backed by close monitoring of program progress by the governor's office and DGS, have been very important to agency participation, especially in the university sector.

Targets: Agencies are required to file annual plans for reducing energy consumption in their facilities and ESPC projects have become a cornerstone strategy for achieving those energy reductions.

Current Status: The PA DGS has hired dedicated staff to run the ESPC program as it has grown in scope and size. This staff is primarily administrative with technical support provided by engineers from the Facilities Engineering Institute at Penn State and consultants. The state is planning to charge a program administration fee to projects to cover the program costs of consultant support, which for the first eight years of the program were paid for from the state budget. While rough estimates of savings potential for the state utility budget have been made, DGS is collecting and maintaining ESPC project data including location, floor area, project cost, source of financing, contract terms, guaranteed and achieved savings, and net savings.

Barriers and Response Strategies: Prior to the legislation being amended, the contract term limit of 10 years was a significant barrier to project scope. In the early years of the program, there were some delays in financing approvals, but the fact that the state had a legally approved and standardized financing agreement was a critical factor in the approval process. The state has continued to refine and improve their process to accommodate smaller projects and the momentum of a critical mass of good projects has been the most effective marketing tool in moving other agencies to implement projects. Another barrier was the turnover in key staff within DGS, which required ongoing program support and training from consultants. The lack of staff was overcome by using expert technical consultants to actively participate in and manage parts of the procurement evaluation process. The barrier of waiting for appropriated capital funds to implement energy-related projects was overcome by the governor emphasizing to agencies that ESPC was the option of first resort for such projects. Having the Governor's office and DGS as program champions has played an important role in overcoming barriers as they have arisen. The state actively consults with ESCOs on how the program can be improved and has been responsive to ESCO input.

Table 32. Pennsylvania: State government facility characteristics and energy efficiency activity

Metric	Office Buildings	Universities and Colleges	Correctional Facilities	Other (e.g. Healthcare)	TOTAL
BASELINE					
Floor Area (million ft^2)	57.3	26.5	15.1	9.8	108.7
Energy Consumption (million MMBtu)	4.4	3	1.7	0.6	9.6
Energy Expenditure (million $)	65.5	40.1	26.2	10.9	142.6
ESPC ACTIVITY					
Number of Projects	10	12	7	8	37
Floor Area (million ft^2)	4.3	11.6	2.2	2.2	20.3
Project Investment (million $)	58.3	60.6	75.1	18.9	212.8
Energy Savings (million MMBtu)		0.09	0.00		0.09
Value of Energy Savings (million $)	4.1	6.9	4.7	2.3	18.0
Range of Contract terms (years)					1 - 15
OTHER EE ACTIVITY					**NONE**
Number of Projects					
Floor Area (million ft^2)					
Project Investment (million $)					
Energy Savings (million MMBtu)					
Value of Energy Savings (million $)					
TOTAL EE ACTIVITY					
Number of Projects	10	12	7	8	37
Floor Area (million ft^2)	4.3	11.6	2.2	2.2	20.3
Project Investment (million $)	58.3	60.6	75.1	18.9	212.8
Energy Savings (million MMBtu)		0.09	0.00		0.09
Value of Energy Savings (million $)	4.1	6.9	4.7	2.3	18.0
MARKET PENETRATION					
In terms of Floor Area					19%

B.1.11 **Texas**

Process: The Texas State Energy Conservation Office (SECO) helps to facilitate ESPC projects for state agencies, state higher education facilities, local governments, and school districts.[62] An ESPC for an existing buildings or facilities may be financed:

- under a tax-exempt lease/purchase contract that has a term not to exceed 20 years including a lease/purchase contract under the master equipment lease purchase program administered by the Texas Public Finance Authority;
- with the proceeds of bonds; or
- under a contract with the provider of the energy or water conservation measures that has a term not to exceed the lesser of 20 years from the final date of installation or the average useful life of the energy or water conservation or usage measures.

Texas also has a revolving loan fund called the Loan Star Fund that will finance ESPC projects.

Table 33. Texas: State government facility characteristics and energy efficiency activity

Metric	Office Buildings	Universities and Colleges	Correctional Facilities	Other (e.g. Healthcare)	TOTAL
BASELINE					
Floor Area (million ft^2)		114.4		36.1	150.5
Energy Consumption (million MMBtu)		6.9			6.9
Energy Expenditure (million $)					276
ESPC ACTIVITY					
Number of Projects	2	10		4	16
Floor Area (million ft^2)	0.2	12.8		6.5	19.6
Project Investment (million $)	3.0	69.0		45.1	117.0
Energy Savings (million MMBtu)		0.5		0.2	0.7
Value of Energy Savings (million $)	0.1	6.0		1.8	7.9
Range of Contract terms (years)					10 - 15
OTHER EE ACTIVITY (e.g. LoanSTAR)					
Number of Projects					60
Floor Area (million ft^2)					
Project Investment (million $)	20.7	103.2		37.8	161.7
Energy Savings (million MMBtu)	0.11	0.17		0.16	0.44
Value of Energy Savings (million $)	4	22.7		5.6	32.3
TOTAL EE ACTIVITY					
Number of Projects	2	10		4	76
Floor Area (million ft^2)	0.2	12.8		6.5	19.6
Project Investment (million $)	23.7	172.2		82.9	278.7
Energy Savings (million MMBtu)	0.11	0.67		0.36	1.14
Value of Energy Savings (million $)	4.1	28.7		7.4	40.2
MARKET PENETRATION					
In terms of Floor Area					13%

[62] SECO publishes a comprehensive set of ESPC project guidelines and other resources on its website at http://www.seco.cpa.state.tx.us/sa_pc.htm.

Drivers: Texas Senate Bill 5 (SB5) and Senate Bill 12 (SB12), enacted by the 77th and 80th Texas legislatures contain new energy-efficiency measures that are designed to decrease electric consumption while improving air quality. In order to comply with the new SB12 requirements, all political subdivisions in the 41 urban and surrounding non-attainment counties in Texas are required to implement all cost-effective energy-efficiency measures to reduce electric consumption by existing facilities; adopt a goal of reducing electric consumption by 5 percent a year for 6 years, beginning September 1, 2007; and report annually to the State Energy Conservation Office.

Current Status: Texas has completed about $161 million of ESPC projects, about 85% of which are in university and health care facilities.

Barriers: LoanSTAR got authority to finance ESPC in 2001 and the original program had a four-year payback requirement. However, the existence of the LoanSTAR Fund, designed to facilitate large ESPC and other energy efficiency projects, may have delayed some projects because state agency managers feel they have fulfilled the mandates if they get a project on the LoanSTAR multi-year waiting list and did not feel pressured to use other available sources of project funding. The state has been working for about two years to assemble a comprehensive database of energy use in state facilities, which should be very helpful in enforcing the legislative energy efficiency mandates.

B.1.12 **Washington**

Process: The Washington Department of General Administration (GA) is the lead agency for energy performance contracting projects in state agencies. The authorizing legislation under RCW 39.35C.020 directs all state agencies to implement cost effective energy conservation improvements. The statute which was first enacted in 1986 and most recently amended in 2001, requires that each state agency undertake an energy audit and to implement energy projects using ESPC as the preferred method for completing audits and implementing projects.

GA is directed to provide technical support to agencies including procurement of ESPC projects and reviewing verification procedures for energy savings. The Washington Department of General Administration is allowed to recover any costs incurred in providing assistance from the state agency. Under RCW 43.41.170 state agencies that implement energy conservation projects are allowed to retain the resulting cost savings for other purposes, including further energy conservation. The GA uses a Request for Qualifications (RFQ) in the procurement of ESPC projects and has a model RFQ available on their website.[63] The GA also can assist agencies in obtaining low-interest financing through the state treasurer's office.

Program Drivers: Given the strength of Washington's ESPC law in identifying ESPC as the preferred method of implementing energy projects, GA estimated that they have probably reached every state agency, including community colleges. The state uses the capital budgeting process to evaluate the opportunity to implement projects using ESPC. GA has established a dedicated energy team that includes a program manager, analyst, statewide energy engineers, and building commissioning, green building and LEED resource staff. They have a list of six ESCO

[63] http://www.ga.wa.gov/EAS/ESPC/municipal.htm

partners, have posted numerous case studies on their website and maintain a list of ESPC projects implemented in all public agencies. GA has quantified the GHG emission reductions from 1986 through October 2006. In 2002 and 2005 Governor Gary Locke respectively issued Executive Orders 02-03 and 05-01 to establish sustainability and efficiency goals for state agencies. The first order also directed the office of Financial Management to designate a Sustainability Coordinator and Sustainability Advisory Council to assist and advise state agencies on how to make state operations more sustainable. EO 05-01 directed state agencies to reduce energy purchases by 10% from FY 2003 and report total energy use to GA by September 1 of each year. In October 2006, GA published the *Sustainability Progress Report* which quantified an 8.5% reduction in energy use on a per square foot basis over 2003 levels of consumption.

Current Status: GA reported that they currently have five state agencies and university projects that have signed agreements or are in construction.

Barriers: None mentioned.

Table 34. Washington: State government facility characteristics and energy efficiency

Metric	Office Buildings	Universities and Colleges	Correctional Facilities	Other (e.g. Healthcare)	TOTAL
BASELINE					
Floor Area (million ft^2)					
Energy Consumption (million MMBtu)					
Energy Expenditure (million $)					
ESPC ACTIVITY					
Number of Projects	5	4	1		10
Floor Area (million ft^2)	1.1	4.0	1.0		6.1
Project Investment (million $)	12.5	18.5	0.8		31.9
Energy Savings (million MMBtu)	0.08	0.12	0.03		0.23
Value of Energy Savings (million $)	0.29	0.68			0.97
Range of Contract terms (years)					5 - 20
OTHER EE ACTIVITY					**NONE**
Number of Projects					
Floor Area (million ft^2)					
Project Investment (million $)					
Energy Savings (million MMBtu)					
Value of Energy Savings (million $)					
TOTAL EE ACTIVITY					
Number of Projects	5	4	1		10
Floor Area (million ft^2)	1.1	4.0	1.0		6.1
Project Investment (million $)	12.5	18.5	0.8		31.9
Energy Savings (million MMBtu)	0.08	0.12	0.03		0.23
Value of Energy Savings (million $)	0.29	0.68			0.97
MARKET PENETRATION					
In terms of Floor Area					
In terms of Other Metrics (Specify if available)					

Appendix C. Comparison of ESPC project characteristics among 12 case study states

In Appendix C, we compare ESPC project characteristics among the 12 case study states. Meaningful comparison of project results across these states is hindered by small sample size in some states (i.e., CO and FL) and data reporting and availability issues (e.g. only 48% of projects provided energy savings and 58% of projects provided economic savings data).

Floor Area

In Figure 3, we compare the distribution of floor area of facilities where ESPC projects are completed across various case study states and also the median project floor area for each state. In seven states (CA, IL, KS, MA, PA, TX, and WA) universities account for more than half of project floor area for projects in the LBNL/NAESCO database. In contrast, universities account for less than 30% of project floor area in MD and MO. Office facilities in MD and corrections facilities in MO account for a substantial portion of the floor area - 48% and 42%, respectively. Median project floor area is highest in Texas (1.6M ft^2) followed by Colorado (1.2M ft^2) and lowest in California (0.3M ft^2). For seven states that had data for at least five projects each, the median floor area per project ranged from 0.5 to 1M ft^2.

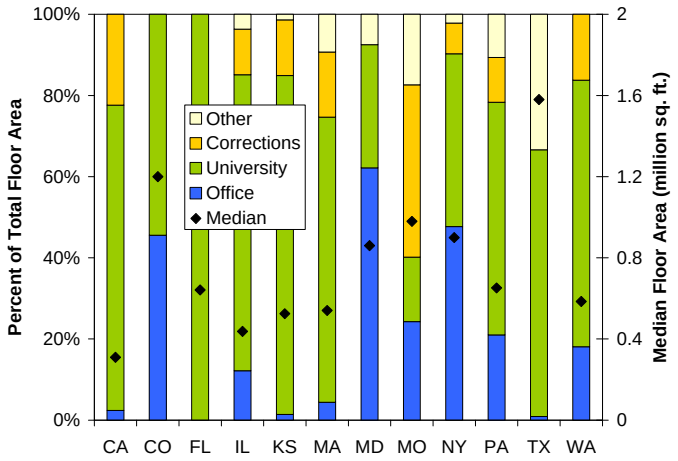

Figure 3. Project floor area in case study states

In Table 35, we compare the distribution of floor area per project among the four facility types. Median floor area per project is highest for universities and lowest for office buildings. In case of correctional and other (i.e. healthcare, etc.) facilities, floor area per project is comparable.

Table 35. Floor area of projects by facility type in 12 case study states

Facility Type	N	Total (million ft^2)	Median Project (million ft^2/)
Corrections	31	27.3	0.7
Offices	41	44.7	0.4
Other	21	17.9	0.8
Universities	81	117.2	1.1
TOTAL	*174*	*207.1*	

Note: The average floor area per ESPC project in office buildings is skewed due to the presence of an outlier - an office facility in New York with floor are 20 million ft^2. If this facility is excluded then the average floor area for office buildings in the 12 case study states is 0.6 million ft^2.

Contract Terms

For all states except PA, IL, MA, and MO, the median contract length of completed ESPC projects is less than the maximum contract term as per the legislation or administrative decision (See Table 36). In other words, at least half of the ESPC projects implemented in these four states (PA, IL, MA, and MO) are ensuring that the maximum contract term is used. In contrast, in CO, FL, KS, NY, TX, and WA, state agencies and ESCOs do not appear to have completed any ESPC projects that take full advantage of the maximum allowable contract terms.

Table 36. Comparison of actual project contract term vs. contract terms specified in legislation

State	N	Median Contract Length (Years)	Range in Contract Length (Years)	Maximum ESPC Contract Term in Legislation (Years)
CA	6	3	1 – 20	Administrative decision - 7 years
CO	2	16	12 – 19	25
FL	3	10	10	20
IL	11	10	10	10 years; 20 years for universities
KS	19	15	10 – 20	30
MA	7	10	10 – 20	20 years
MD	18	13	6 – 15	15
MO	4	13	10 – 15	15 (legislation), 10 (administrative decision)
NY	18	10	1 – 17	35
PA	34	15	1 – 15	15
TX	13	15	10 – 15	20
WA	7	15	5 – 20	State financing terms - 30 years

Note: Shaded cells = Data for at least 5 projects is available.

Project Costs

Investment levels in ESPC projects can provide some insights regarding the extent of ESPC activity and possibly the type of measures installed. High project costs (especially, when normalized with respect to floor space) suggests that more capital-intensive measures (e.g., HVAC equipment) are included in ESPC projects or that more comprehensive projects that target multiple end uses are being undertaken.

Figure 4 suggests that the distribution of investment among facility types varies substantially among the 12 case study states. At a state level, the median project costs ranges between $1.2M in California and $5.7M in Maryland. Universities account for more than 50% of investment in all states except PA, MD, and FL. Corrections facilities account for more than 50% of investment in FL, while offices account for 43% of investment in MD. In three states - TX, MD, and MO - other facilities (i.e., healthcare) account for a substantial portion of the investment ranging from 39% in TX to ~18% for MO and MD.

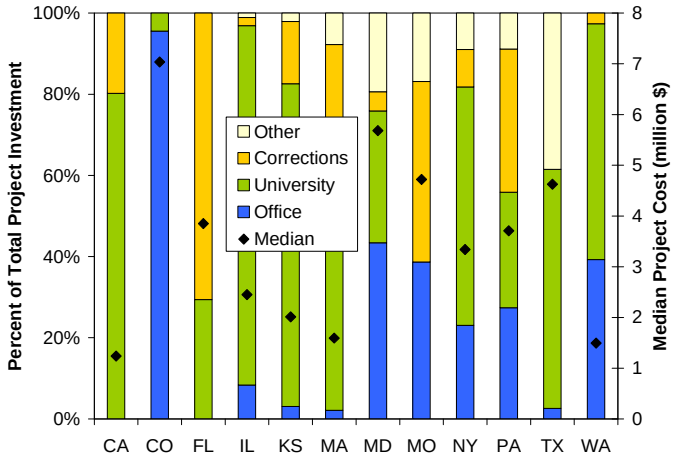

Figure 4. ESPC Project costs in case study states

Comparison by facility type in the 12 case study states indicates that investment per project is higher in universities and correctional facilities as compared with office buildings and other facilities (e.g. healthcare) [see Table 37].

Table 37. ESPC Project costs by type of state facility in case study states

Facility Type	**N**	**Total** (million $)	**Median Project Cost** (million $)
Corrections	35	241.8	3.5
Offices	46	212.7	2.4
Other	31	131.8	1.7
Universities	88	492.2	3.1
TOTAL	*200*	*1078.4*	

However, office buildings and other facilities appear to have higher project investment when normalized by floor area as compared with universities and corrections facilities (see Table 38).

Table 38. Investment intensity of ESPC projects by facility types in case study states

Facility Type	**N**	**Median Investment Intensity** ($/ft^2)
Corrections	30	4.7
Offices	37	6.4
Other	20	6
Universities	73	3.8

Focusing only on states that provided project cost and floor area data for at least 5 projects, we find that PA and TX have the highest investment intensity ($6/ft^2), followed by MA, MO and WA ($5.2 -5.8/ft^2) [see Table 39]. Median investment intensity ranges between $3.5 and 4.5/ft^2 in IL, KS, MD, and NY, while CA has the lowest median investment intensity at $2/ft^2.

Table 39. Investment intensity of ESPC projects in case study states

State	N	Median ($/ft^2)
CA	6	2.1
CO	2	4
FL	1	1
IL	10	4.7
KS	23	4
MA	33	4.8
MD	9	4.4
MO	14	5.2
NY	19	3.8
PA	22	6.6

Note: For CO and FL, median investment intensity cannot be estimated because data for only one project each was available.

Annual Energy Savings

In this section, we summarize the annual energy savings from state government market ESPC projects in the 12 case study states. Types of fuels used in the facilities and measures installed vary substantially across projects. For the sake of comparison, we convert savings from all types of fuels (e.g. electricity, natural gas, fuel oil) into common energy unit -- million Btu (MMBtu).[64] The annual energy savings reported in the LBNL/NAESCO database represent the average value of the actual savings observed in each year since the project was completed.[65]

Unlike floor area and project investments, data on annual energy savings from projects was available for only ~50% of the projects. In only two states (MO and KS) was data available for more than 10 projects. The median annual energy savings/ft^2 is highest for other (e.g. healthcare, etc.) facilities and lowest for universities.

Table 40. Annual energy savings intensity for ESPC projects by type of facility in 12 case study states

Facility Type	N	Median Energy Savings Intensity (MMBtu/ft^2)
Offices	24	0.033
Universities	38	0.025
Corrections	16	0.038
Other	8	0.041

There is substantial variation in the median energy savings intensity across the 12 case study states. Texas and Illinois have substantially higher (> 0.06 MMBtu/ft^2) median energy savings intensity as compared with MA, MD, MO, NY, and PA where it ranges from 0.013 to 0.023 MMBtu/ft^2.

[64] 1 MMBtu is equivalent to 293 kWh.

[65] The actual savings in each year may vary depending on the measures installed and the operation of the facility.

Table 41. Annual energy savings intensity for ESPC projects in 12 case study states

State	N	Median (MMBtu/ft^2)
TX	6	0.080
IL	6	0.065
KS	17	0.043
WA	7	0.040
CA	7	0.029
NY	9	0.024
PA	5	0.023
MO	14	0.022
MD	7	0.019
MA	6	0.013

Note: For CO and FL, median annual energy savings intensity cannot be estimated because data for only one project each was available.

Annual Dollar Savings from ESPC Projects

The economic value of energy savings to the customer doing an ESPC project depends primarily on two factors – the amount of energy saved over the lifetime of the project and the cost of fuel and electricity. Median annual dollar savings normalized by floor area is similar across all four facility types in the 12 case study states. When compared across the states, dollar savings/ft^2 is highest for PA ($0.80/ft^2) followed by NY and TX and lower among KS, MA, MD, and MO (range from $0.42 - 0.52/ft^2).

Table 42. Annual dollar savings/ft^2 for ESPC projects in 12 case study states

State	N	Average ($/ft^2)	Median ($/ft^2)
MA	33	0.88	0.70
KS	23	0.52	0.40
MO	15	0.55	0.50
PA	15	1.08	0.80
TX	8	1.44	0.65
NY	7	0.70	0.60
MD	6	0.80	0.65

Note: For CA, IL, CO, WA, and FL, economic savings intensity could not be estimated because data was available for less than 5 projects in each state.

Simple Payback Time

Cost-effectiveness can be evaluated using various metrics such as simple payback time (SPT), benefit-cost ratio (BCR), and net benefits. We report simple payback times defined as turnkey project costs divided by the dollar value of annual savings. SPT does not explicitly account for the time value of money or the economic lifetime of project measures; thus it provides a more limited economic metric than net benefits or BCR. Typically, projects with short paybacks are more easily justified because their benefits are more obvious to decision makers. Longer payback projects may be economical investments involving equipment replacement and modernization; however, benefits are realized over a longer period.

Among the eight states (IL, KS, MA, MD, MO, NY, PA, and TX) that provided sufficient data for at least five projects, the median simple payback time ranges from 6 to 10 years. The variability in project economics across all 12 case study states is small.

Table 43. Simple payback period of state government projects in 12 case study states

State	**N**	**Average (years)**	**Median (years)**
CA	3	37	7
CO	1	13	13
FL	2	13	13
IL	9	7	6
KS	22	13	10
MA	33	7	7
MD	6	17	10
MO	15	12	10
NY	7	8	7
PA	24	8	8
TX	8	11	9
WA	2	15	15