



2019
Energy Services Coalition
Market Transformation Conference
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THE VALUE OF DATA

presented by:
Elizabeth Stuart
Lawrence Berkley National Laboratory
Dale L. Hahs
Energy Services Coalition

Scenario #1



You're at your desk working away at all the things that require your attention day to day and in walks your Governor.

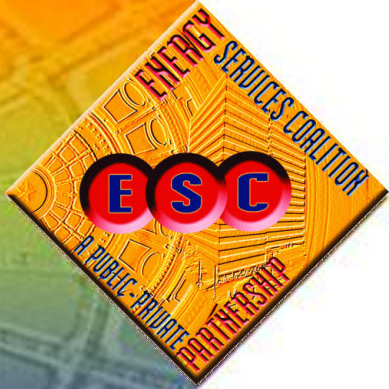
After the briefest of introductions the Governor asks, “so this performance contracting thing I keep hearing about . . . how much energy and greenhouse gases have we really saved in the last 5 years and what percent of the state’s facilities have we impacted?”

Scenario #2

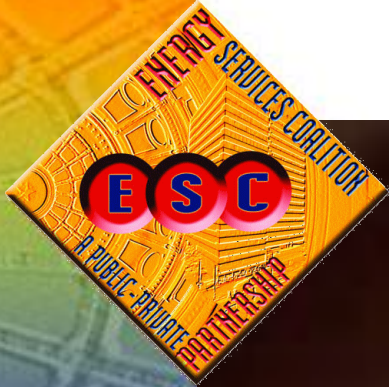


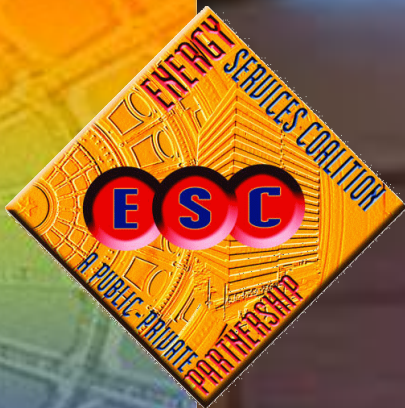
The President of your company sends you an email explaining that he has a lunch opportunity with a state legislator tomorrow and needs to know how much impact GESPC has had on utility consumption and greenhouse gas emission in the last 5 years from the work you've done. Without justification, they are thinking about shutting things down. How do you deliver impact? What do you look up? Where do you get the information?

What is Data?



This Data?

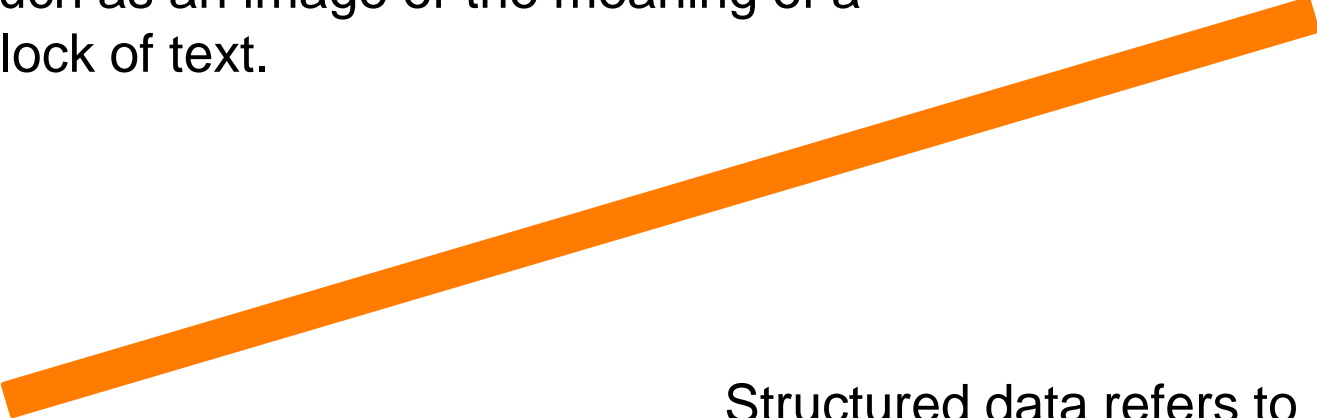




Types of Data



Unstructured data refers to information that only humans can interpret and study, such as an image or the meaning of a block of text.



Structured data refers to information that computer programs can process.

What Do You Want to Know?



- Are we more efficient than we used to be?
- How much more efficient can we be?
- When do we consume the most energy?
- What all can we fix through efficiency?
- Do these projects really work?
- Are the guarantees real?
- How much impact are we making in reduced consumption?
- How much environmental impact are we making?

How Do You Describe a Great . . .



Project?

- ✓ Size in construction dollars?
- ✓ Amount of utilities saved?
- ✓ Number of measures included?
- ✓ Future greenhouse gasses avoided?
- ✓ Square footage impacted?
- ✓ Percent of guaranteed savings achieved?
- ✓ Demonstrated persistence of savings?
- ✓ Customers problems resolved?

How Do You Describe a Great . . . Program?



- ✓ Percent of state owned portfolio impacted?
- ✓ Impact in non-state owned market sectors?
 - Cities, Counties, Schools, Community and Technical Colleges, Universities, Waste Water Treatment Facilities
- ✓ Size in construction dollars?
- ✓ Dollars of construction per capita?
- ✓ Amount of utilities saved?
- ✓ Number of measures included?
- ✓ Future greenhouse gasses avoided?
- ✓ Square footage impacted?
- ✓ Percent of guaranteed savings achieved?
- ✓ Demonstrated persistence of savings?
- ✓ Deferred maintenance reduced?

What Are We Tracking Now?



- Sponsored by US DOE, EERE, Weatherization and Intergovernmental Programs Office, ESC reached out to all 50 states, 43 participated
- Interviewed the energy office practitioners
- Analyzed and reported summary insights

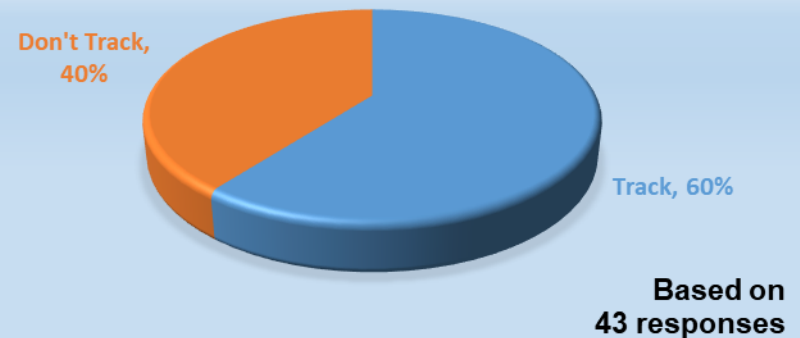
What do you think we learned?

Current Data Collection and Tracking



- More than half the states collect efficiency project data.

Reported GESPC Data Tracking (Q1)
(Percentages of Those Responding)



Not all states felt they had sufficient knowledge to respond to each topic

- Almost three-quarters (72%) of the states that track data use Excel or Access as GESPC data collection and storage tools. (Some simply have a list in Word)

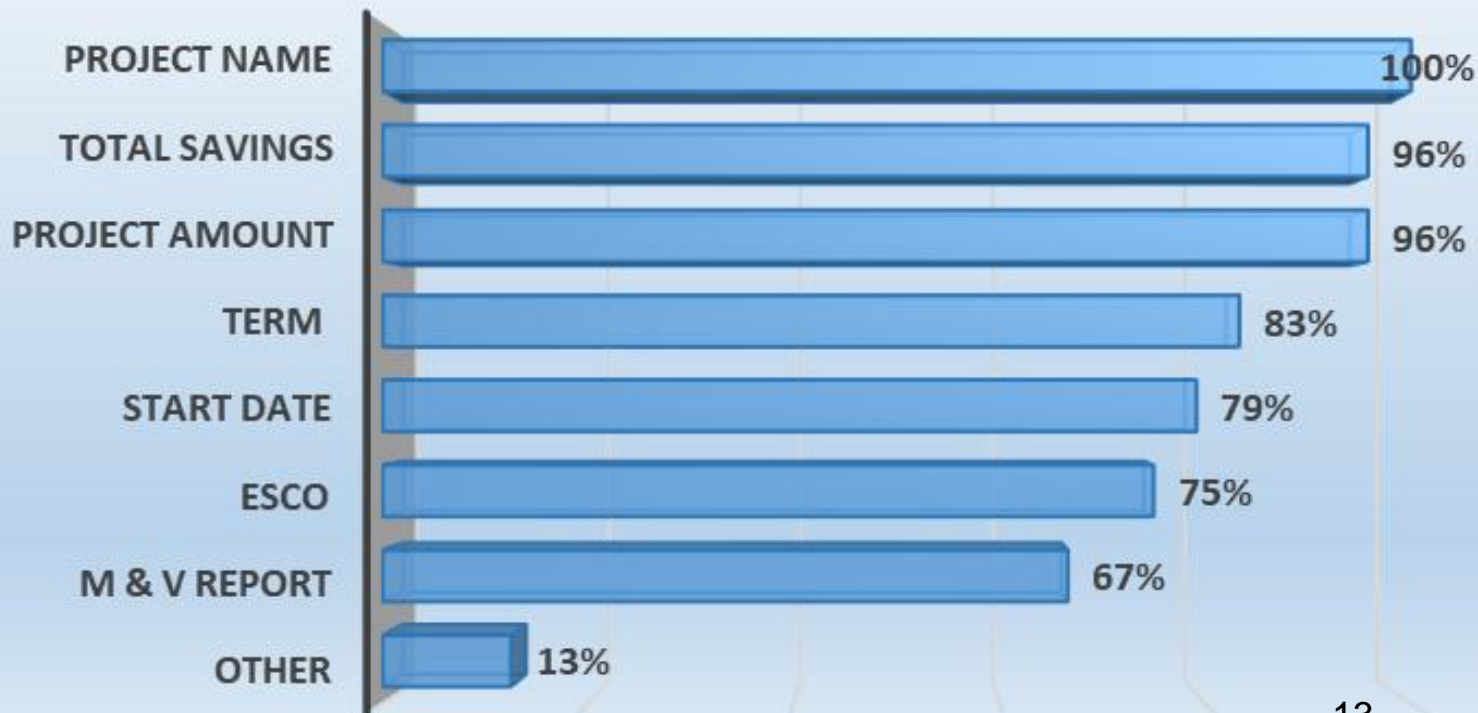
State GESPC Projects: Data Collection Practices



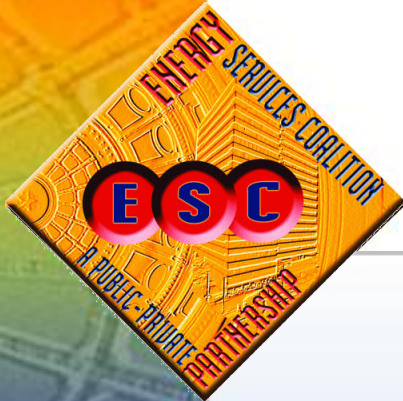
States collect limited and almost identical GESPC data points.

Data Points Collected (Q4)

(Percentages of Those Tracking)

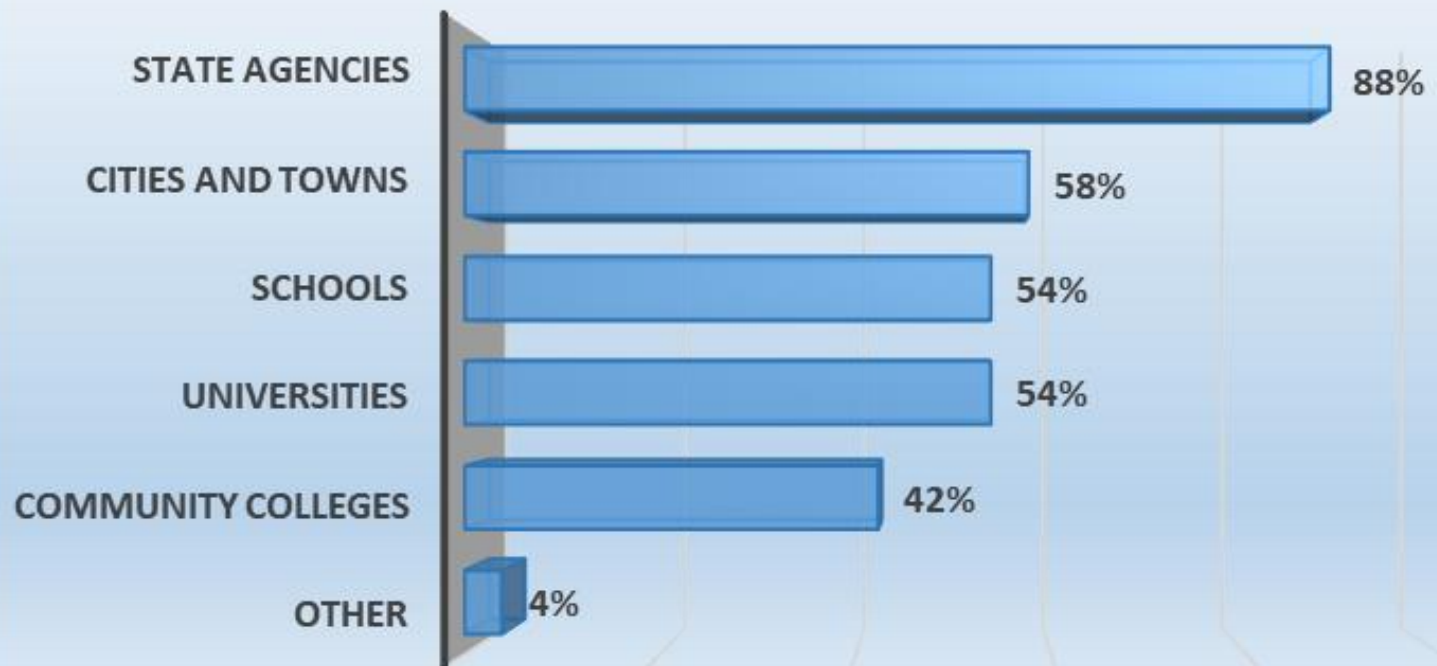


State GESPC Projects: Data Collection Practices



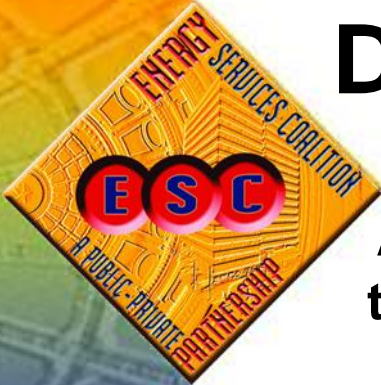
Market Segments Tracked (Q2)

(Percentages of Those Tracking)

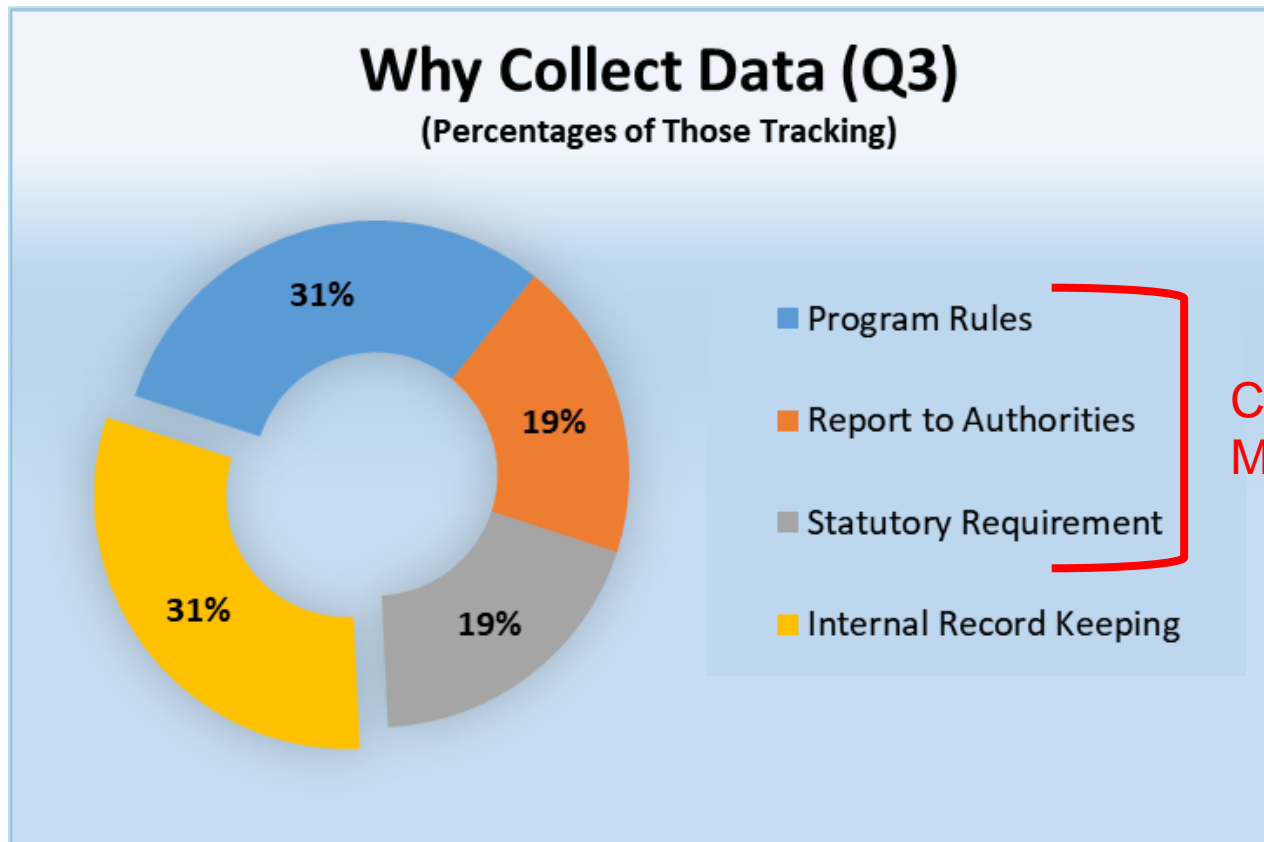


Not all states felt they had sufficient knowledge to respond to each

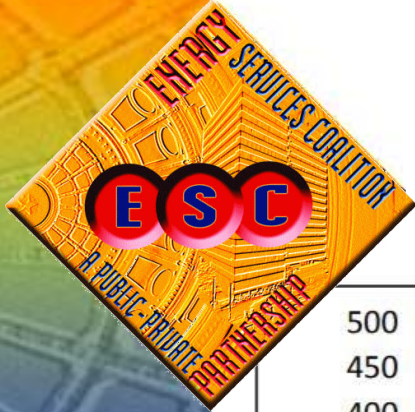
State GESPC Projects: Data Collection Motivations



Almost 70% of states collecting data do so because they have a mandate to report on GESPC projects to the Legislature or Governor's Office.

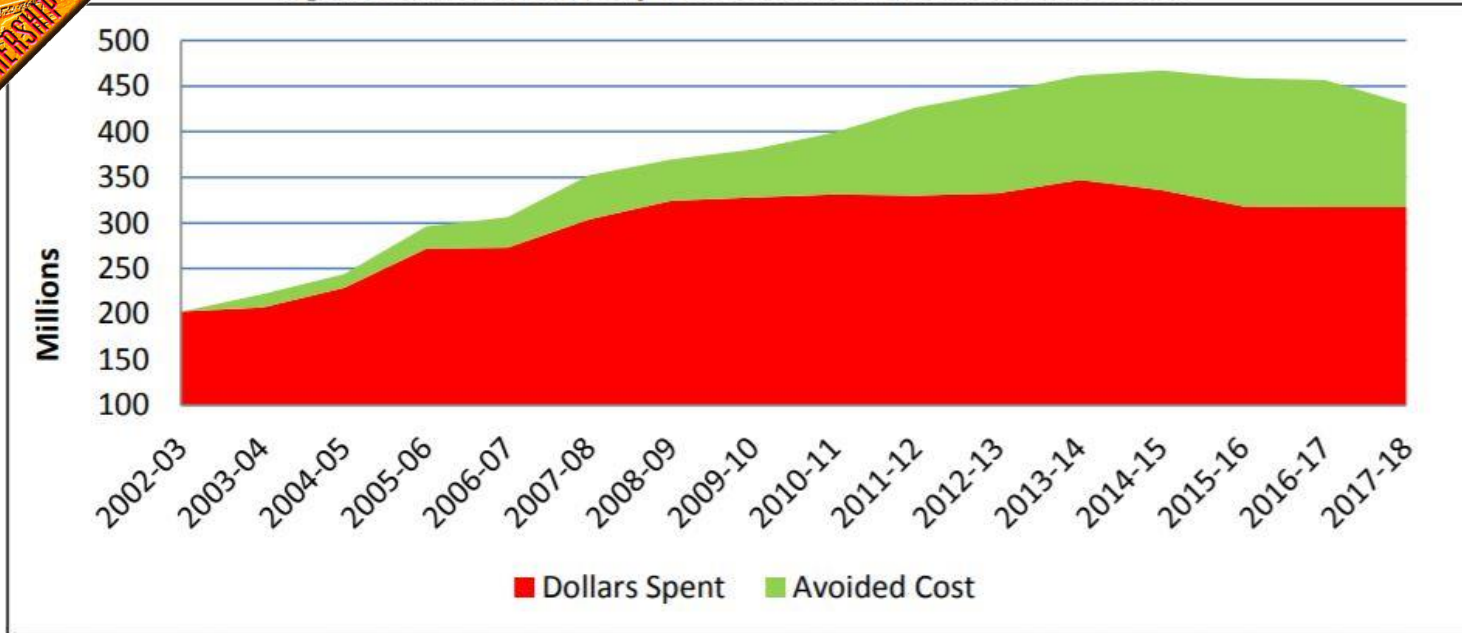


A Sample or Two



What data would you logically track to deliver this in a report?

Figure 3: Avoided Utility Cost for State Governmental Units



Avoided Utility Costs represent the amount the state agencies and universities would have paid if they had not implemented any energy efficiency retrofits or upgrades.

- ✓ Utility spend pre and post?
- ✓ Utility rates?
- ✓ Population?
- ✓ Weather?
- ✓ Total square feet?
- ✓ Facilities included?
- ✓ Projected savings by utility?₁₆
- ✓ Other?

A Sample or Two

What data would you logically track to deliver this in a report?

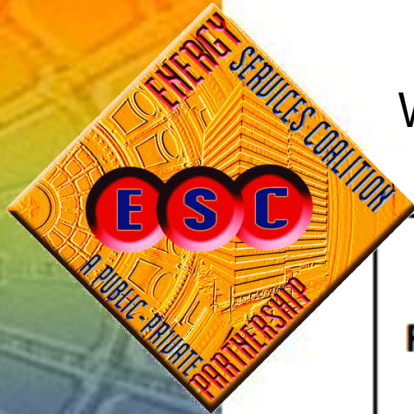


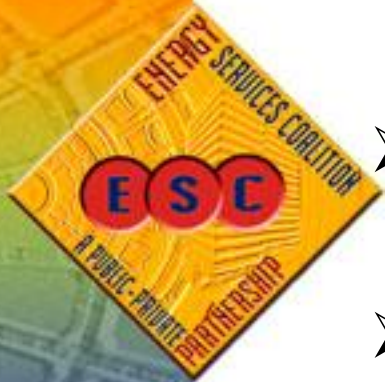
Table 8: Avoided GHG Emissions (FY03-FY18)

| Fuel Source | Cabinet Agencies (MTCO2e) | State Agency Total (MTCO2e) | System (MTCO2e) | All State Government Units (MTCO2e) |
|-------------------|---------------------------|-----------------------------|------------------|-------------------------------------|
| Electricity Usage | 518,515 | 494,640 | 1,229,109 | 1,723,750 |
| Nat Gas Usage | -6,690 | 2,803 | -207,772 | -204,969 |
| Fuel Oil Usage | 501,558 | 496,438 | 1,059,671 | 1,556,109 |
| Propane Usage | 88,757 | 87,924 | 3,230 | 91,154 |
| Total | 1,102,140 | 1,081,805 | 2,084,239 | 3,166,044 |

Negative numbers mean an increase in emissions.

Metric tons of carbon dioxide equivalent or MTCO2e is the unit of measurement in this tool. The unit "CO2e" represents an amount of a GHG whose atmospheric impact has been standardized to that of one unit mass of carbon dioxide (CO2), based on the global warming potential (GWP) of the gas.

LBNL Research



- 20 years of LBNL ESCO industry/GESPC research (1998-2019)
- ESCO market trends
- GESPC and non-GESPC project-level trends, e.g.,:
 - Investment \$, savings, ECMs, realization rates, payback times
- Project-level stats historically from LBNL/NAESCO database of over 6,500 projects
- New stats forthcoming from eProject Builder; currently has 885 projects, \$8B investment, \$15B contract guaranteed savings

LBNL Project-Level Data

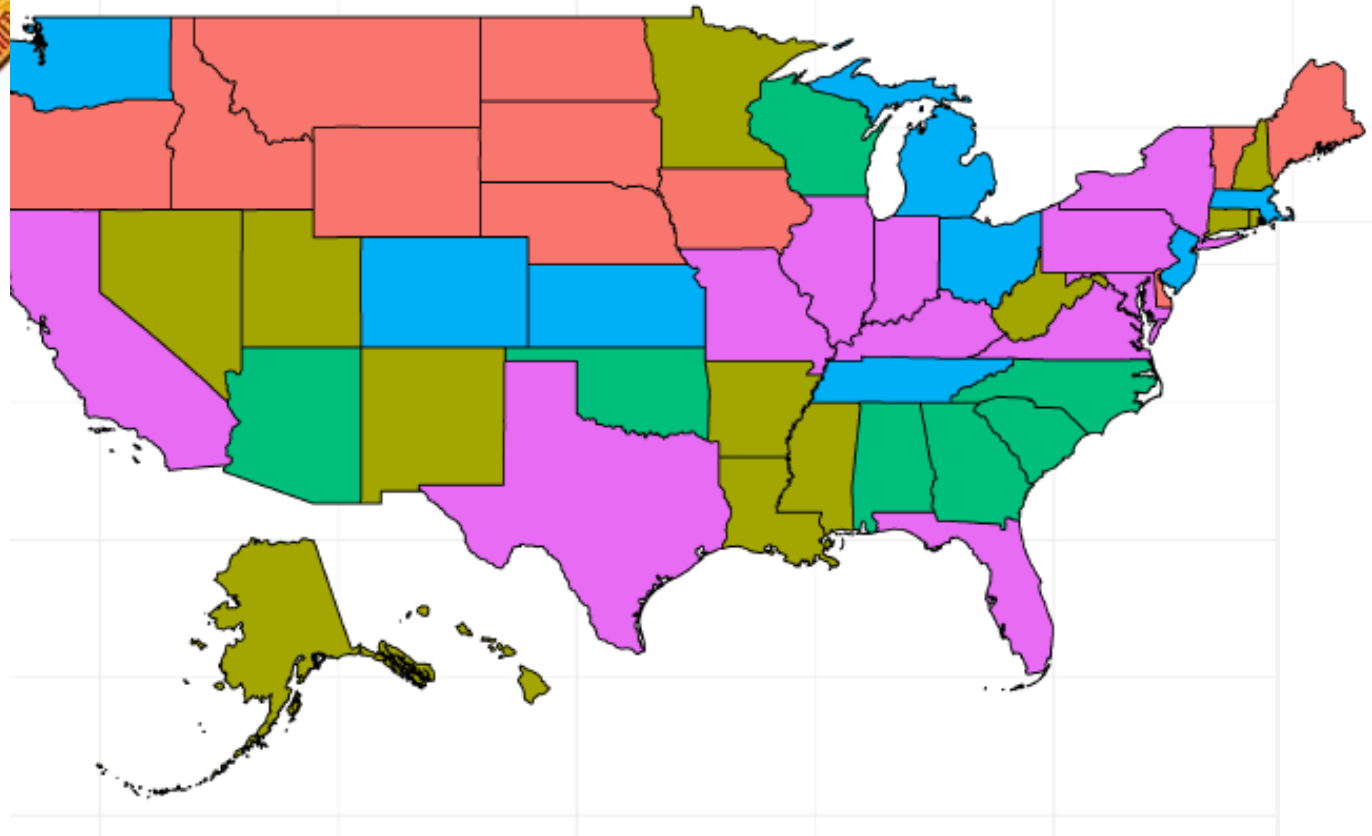


- Historic LBNL-NAESCO database
- Project-level data (table below)
- Includes ECMs implemented (but no ECM-level costs or savings)
- Also includes yes/no use of utility incentives

| | | Project count | Share of total projects |
|-------------------------|---|---------------|-------------------------|
| Key project data fields | Date completed | 5,510 | 87% |
| | Project investment levels | 4,957 | 79% |
| | Floor area | 4,204 | 67% |
| | Total energy savings (actual, guaranteed, or projected) | 3,429 | 54% |
| | Dollar value of savings | 4,385 | 69% |
| | Contract type | 5,329 | 84% |
| | Contract length | 4,587 | 73% |
| | Installed measure(s) | 5,510 | 87% |
| | Contains all key data fields | 2,649 | 42% |

What We Learn

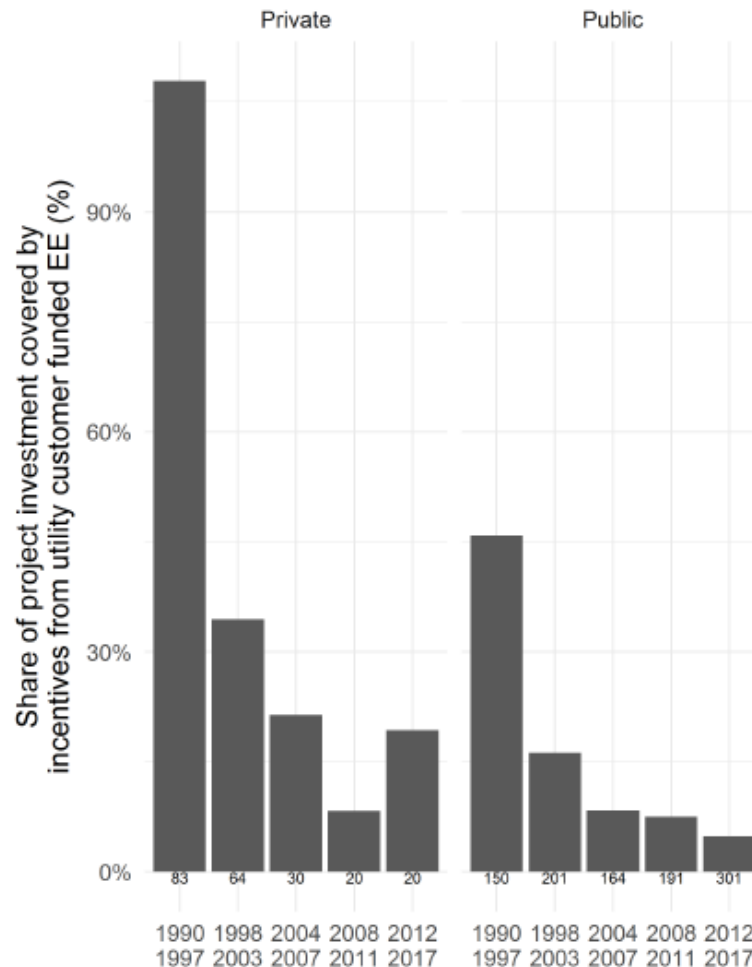
Investment levels by state for projects in the database – estimated ~20% of total ESCO market activity



Investment levels (million \$2016) 1-50 50-150 150-250 250-500 > 500

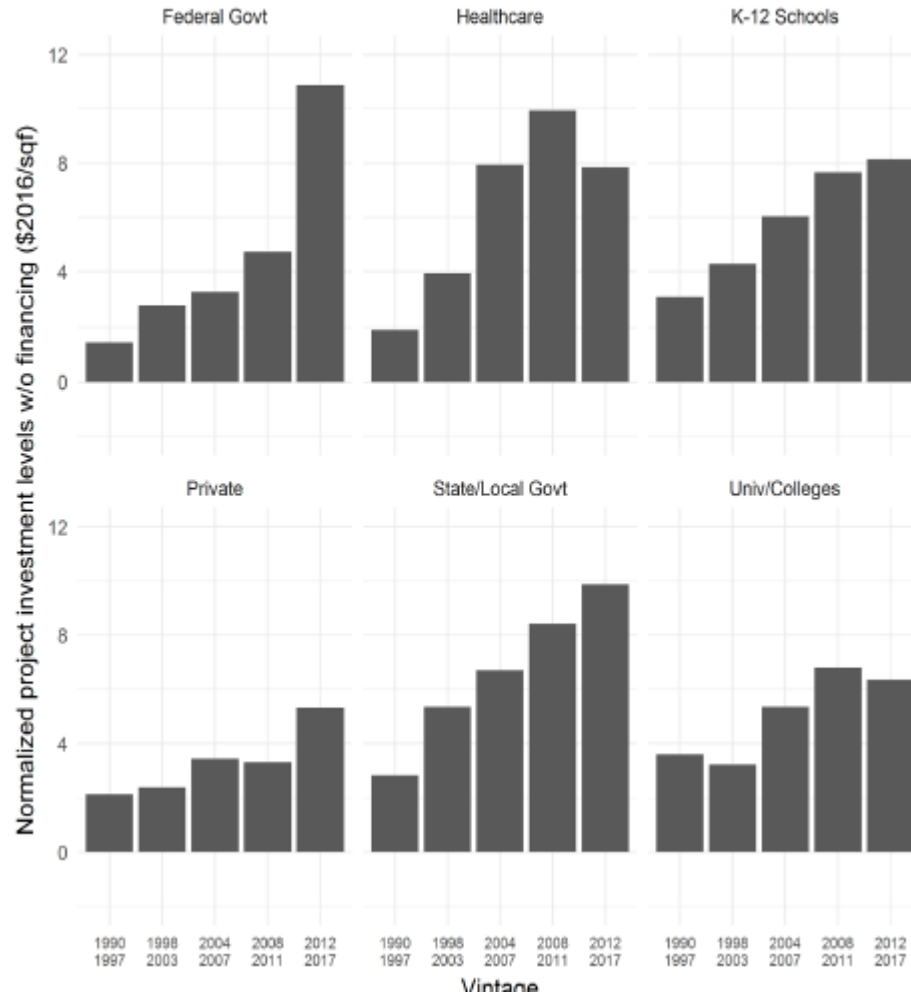
What We Learn

Decline in contribution of utility incentives to project investment



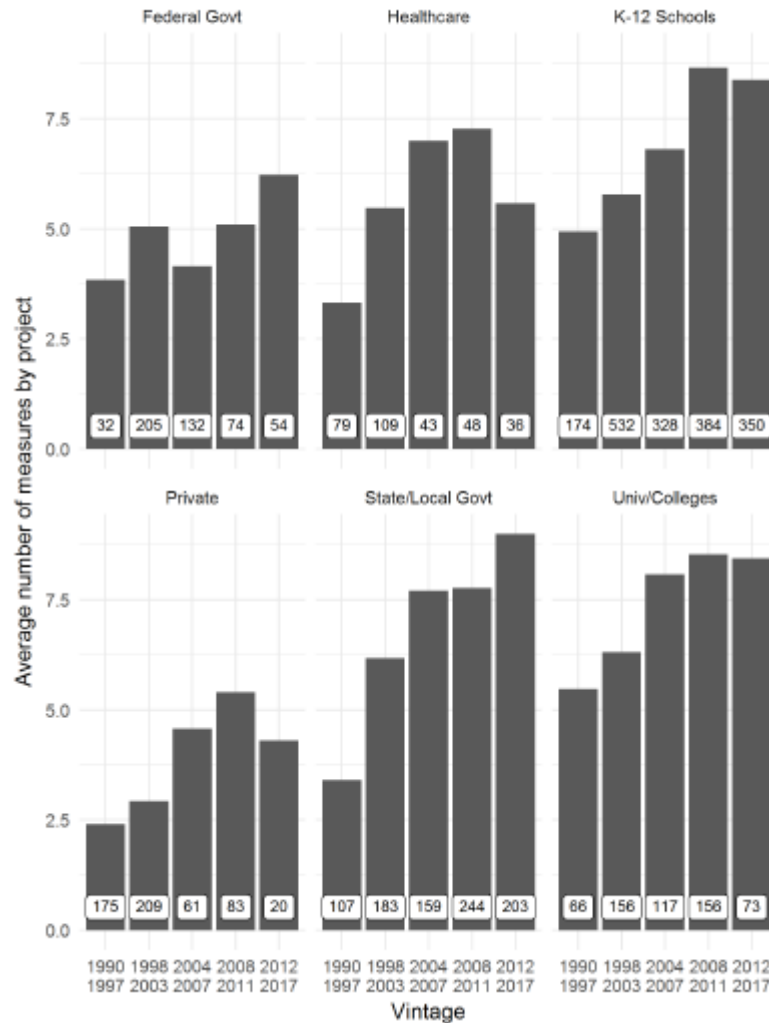
What We Learn

Investment levels per sq. ft. have increased over time



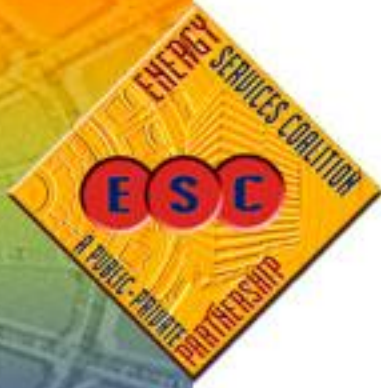
What We Learn

Projects are becoming more comprehensive -- increased number of ECMs installed per project



What We Learn

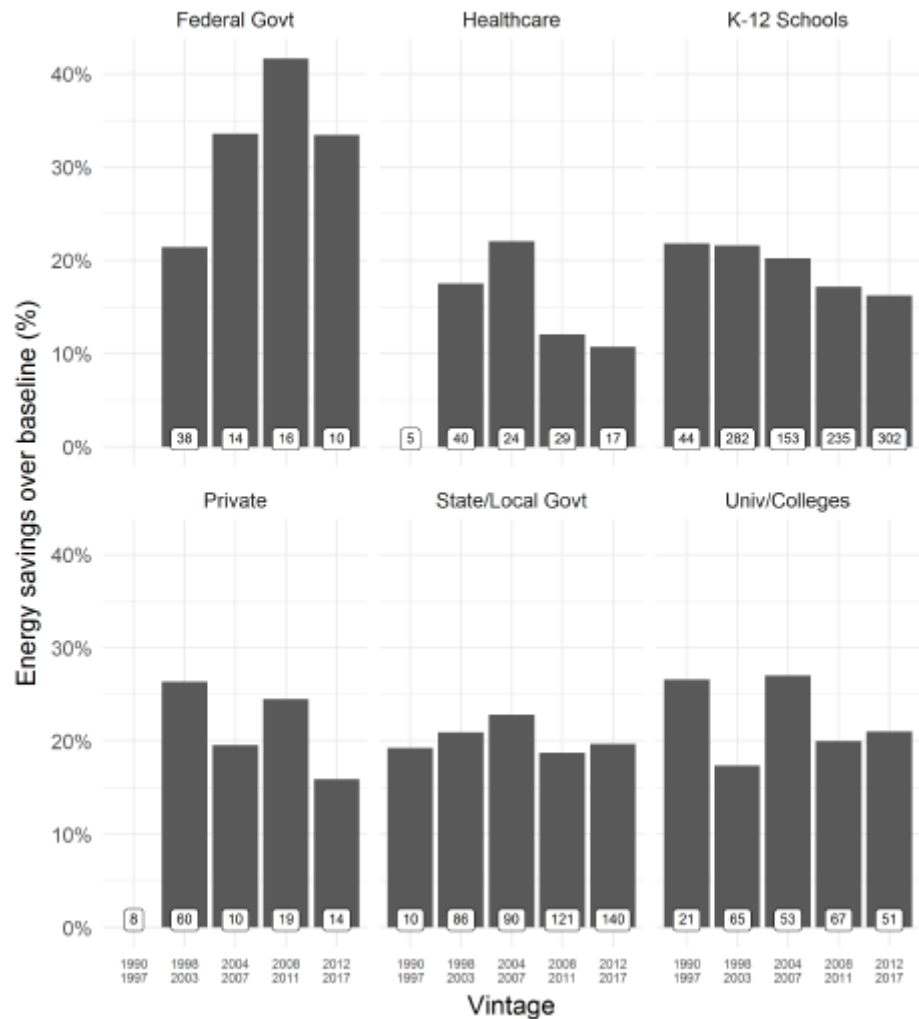
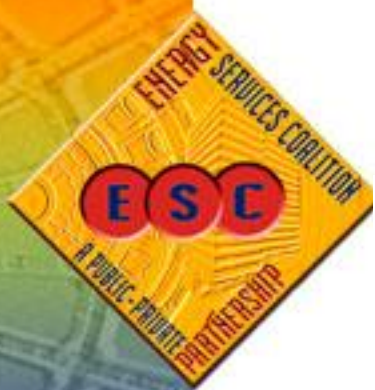
Median simple payback time on projects increasing



| | Federal Govt | State/Local Govt | Healthcare | Private Comm./ Indust. | K-12 Schools | University/ Colleges |
|-----------|--------------|------------------|------------|------------------------|--------------|----------------------|
| 1990-1997 | 5.0 | 4.2 | 4.2 | 3.7 | 8.4 | 5.0 |
| 1998-2003 | 7.3 | 7.7 | 4.6 | 3.9 | 8.4 | 6.5 |
| 2004-2007 | 8.6 | 8.0 | 7.4 | 5.3 | 10.0 | 8.7 |
| 2008-2011 | 11.9 | 10.7 | 9.2 | 9.3 | 11.7 | 10.1 |
| 2012-2017 | 12.9 | 12.5 | 8.5 | 8.2 | 13.2 | 11.4 |

What We Learn

Yet annual utility bill savings have been relatively steady (~20%) in recent years



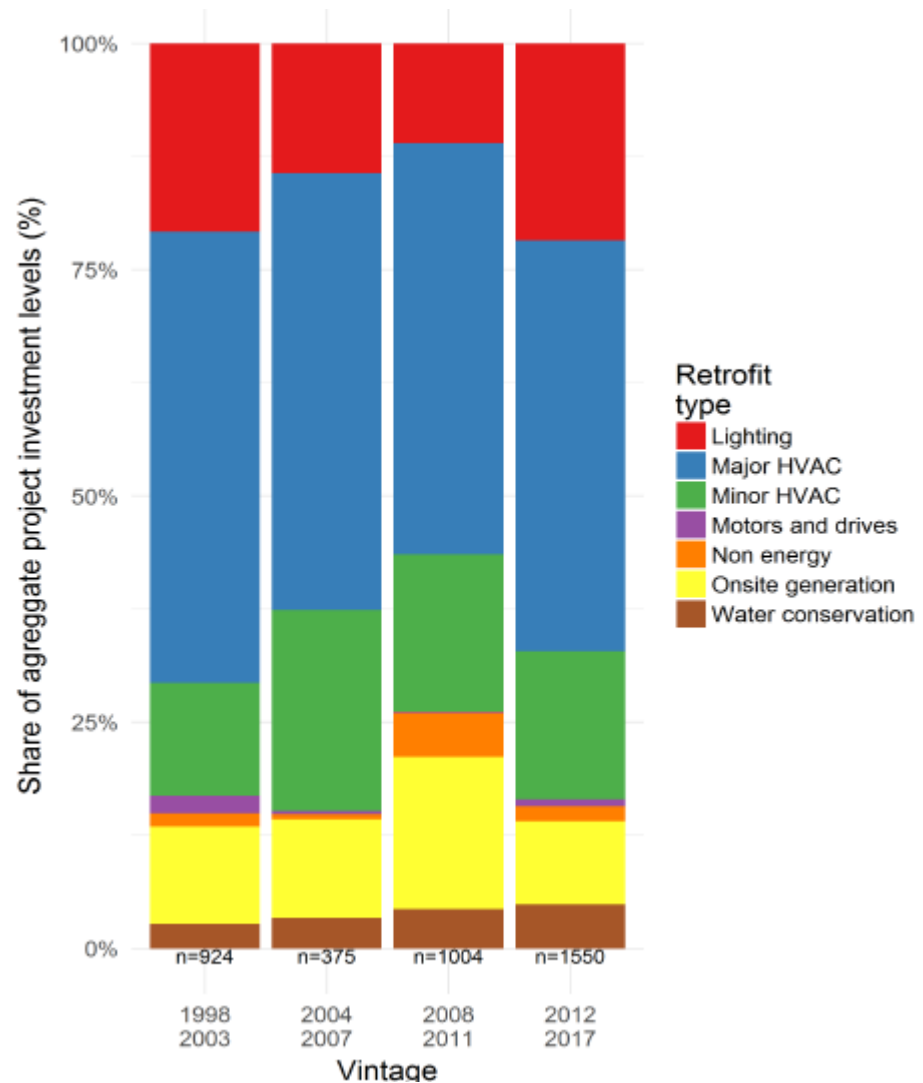
What We Learn

Non-energy savings are significant in K-12 and federal



ePB – What We Learn

Share of investment \$ for energy and non-energy ECMs



Source: eProject Builder database, 2018

ePB – What We Learn

Example of a lighting ECM analysis that a user can do for their own projects



| Project Name | ECM Description | Project Floor Area | ECM Implem. Price | Estimated Annual Cost Savings | Contract Term | ECM Simple Payback Time | % of Impl Price saved annually | Total Estim. Contract Savings |
|----------------|-----------------|--------------------|-------------------|-------------------------------|---------------|-------------------------|--------------------------------|-------------------------------|
| Example proj 1 | Lighting | 250,000 | \$ 70,000 | \$ 20,462 | 12 | 6.9 | 29% | \$ 245,544 |
| Example proj 1 | Lighting | 250,000 | \$ 15,000 | \$ 1,972 | 12 | 15.3 | 13% | \$ 23,664 |
| Example proj 1 | Lighting | 250,000 | \$ 6,000 | \$ 1,521 | 12 | 8.3 | 25% | \$ 18,252 |
| Example proj 2 | Ext. Lighting | 2,000 | \$ 104,000 | \$ 3,200 | 1 | 20.0 | 3% | \$ 3,200 |
| Example proj 2 | Cupola Light. | 2,000 | \$ 4,112 | \$ 5,712 | 1 | 3.1 | 24% | \$ 5,712 |
| Example proj 3 | Lighting | 275,000 | \$ 2,300 | \$ 22,194 | 12 | 15.0 | 15% | \$ 266,328 |
| Example proj 3 | Lighting | 275,000 | \$ 5,041 | \$ 22,931 | 12 | 13.1 | 8% | \$ 275,172 |

ePB – How is My Project Doing?



Cumulative M&V report for a project in ePB

| PERFORMANCE PERIOD M&V SUMMARY GUARANTEED AND VERIFIED COST SAVINGS | | | | | |
|--|-------------------------------|--------------------------------|------------------------------|--|--------------|
| Implementation Period (Year 0) | (a) | (b) | (c) | (d)=(c)-(b) | Status |
| | Estimated Cost Savings | Guaranteed Cost Savings | Verified Cost Savings | Variance in Implementation Period Cost Savings | |
| | \$60,001 | \$60,000 | \$60,000 | | Approved |
| Performance Period (Year) | (e) | (f) | (g) | (h)=(g)-(f) | |
| | Estimated Annual Cost Savings | Guaranteed Annual Cost Savings | Verified Annual Cost Savings | Variance in Annual Cost Savings | |
| 1 | \$670,287 | \$633,421 | \$716,051 | \$82,630 | Approved |
| 2 | \$683,693 | \$646,090 | \$681,700 | \$35,610 | Approved |
| 3 | \$697,367 | \$659,011 | \$655,362 | \$-3,649 | Pre-Approval |
| 4 | \$711,314 | \$672,192 | | | |
| 5 | \$725,540 | \$685,635 | | | |
| 6 | \$740,051 | \$699,348 | | | |
| 7 | \$754,852 | \$713,335 | | | |
| 8 | \$769,949 | \$727,602 | | | |
| 9 | \$785,348 | \$742,154 | | | |
| 10 | \$801,055 | \$756,997 | | | |
| 11 | \$817,076 | \$772,137 | | | |
| 12 | \$833,418 | \$787,580 | | | |
| 13 | \$850,086 | \$803,331 | | | |
| 14 | \$867,088 | \$819,398 | | | |

ePB – My Project Portfolio

What M&V options are being used in my projects?



| ECM Technology | Option A | Option B | Option C | Option D | Other |
|---------------------------------|----------|----------|----------|----------|-------|
| Appliance/Plug Load Reductions | 14 | 2 | | | |
| Energy Management Systems | 59 | 4 | 11 | 4 | 3 |
| Building Envelope Modifications | 37 | | 2 | 1 | 4 |
| Chiller Plant Improvements | 8 | 3 | | | |
| Commissioning | 3 | | 5 | | 2 |
| Future/Other ECMs | 14 | | | | 5 |
| HVAC | 46 | 6 | 20 | 4 | 5 |
| Lighting Improvements | 118 | 3 | 8 | 2 | 9 |
| Water and Sewer Conservation | 49 | 4 | | 2 | 2 |

Source: eProject Builder training database, 2019

Coming Soon!!

Simple, Secure Web Based User
Friendly, Electronic File Cabinet

What do you want in it?

- ✓ Project Name
- ✓
- ✓
- ✓
- ✓
- ✓
- ✓
- ✓
- ✓
- ✓
- ✓
- ✓

Thank you!



Elizabeth Stuart
Lawrence Berkley National Laboratory
estuart@lbl.gov

Dale L. Hahs
Energy Services Coalition
dhahs@energyservicescoalition.org