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Auditing for Energy Efficiency

Carmen Best
California Public Utilities
Commission

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Auditing for Energy Efficiency - TERMINOLOGY

**Customer Audit =
Customer Audit**

Identify savings
potential

Conducted as part
of a program

**Program Audit =
Ex Post Evaluation**

Assess the
success of the
program or
technologies

Conducted on a
single program or
measure

**Portfolio Audit =
Fiscal Audit & Cost
Effectiveness
Review**

Ensure
expenditures are
prudent and
benefits are
greater than costs

Conducted at the
utility (program
administrator)
portfolio level



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Customer Audits

Audits have been around since the beginning of energy efficiency:

- Can be a full program, or single step as part of a program
- Can be used in any sector (domestic or commercial)
- Allow the customer and the utility to identify potential for savings
- Target interventions in the short term and develop long term plans
- Identify funding sources (utility rebates, loans, external financing) to meet the goals



AUDIT is the ENTRY POINT



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Customer Audit Principles

Standard or
Customized
Method?

Stranded
Opportunity?

Business
Case &
Partnership?

Who will do it
& will it
perform?

- Purpose
 - Identify electric and demand potential
 - Estimate cost
 - Propose a plan
- Comprehensiveness
 - “Integrated” audit
 - Measure/technology specific audit
- Customer Engagement
 - Identify benefits to the customer
 - Agree on path forward
- Expected Outcome
 - Implement
 - Measure and verify



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Estimating Savings and Measurement and Verification

- Define the existing condition or code (baseline)
 - If custom: developed by on-site + desk review
 - If standardized (deemed): **defined by program administrator** (may require regulator approval) can be **automated** or online
- Define the intervention & calculate
 - If comprehensive all of the interventions, their interactions, and **full system analysis** needed to calculate savings
 - If standardized the intervention is usually **based on pre-defined technologies** replacing existing technologies
- Documentation is provided to customer, utility, regulator
 - Enables evaluation (sample basis) or measurement and verification after the intervention
 - Aggregate with other projects to understand full resource



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Context in California for Evaluation

- CPUC was given responsibility for conducting evaluation in the 2006-2008 program period; prior to this conducted by IOUs
- CPUC and IOUs develop a joint plan for evaluation, measurement and verification (EM&V) *(since 2010 decision)*
 - Evaluation plan has to be ready shortly after programs are planned for implementation *(since 2013 decision)*
- Historically evaluation has been funded as a percentage of the total energy efficiency portfolio expenditures.

2006-2008	2010-2012	2013-2014
8%	4%	4%
\$152 million	\$125 Million	\$58 million

Evaluation Plans available to the public at:
www.energydataweb.com/cpuc

Final Evaluation Reports for CA:
www.calmac.org



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Evaluation Objectives:

Assessing program impacts

- Evaluate progress against savings goals adopted by the Commission
- Assessing cost effectiveness of investments
- Updating savings estimates for future program cycles
- Improving accuracy of demand forecast

Improving program efficacy

- Improving program processes and implementation
- Developing feedback on new programs or measures

Providing market feedback

- Assessing the potential for remaining energy savings
- Monitoring changing market conditions



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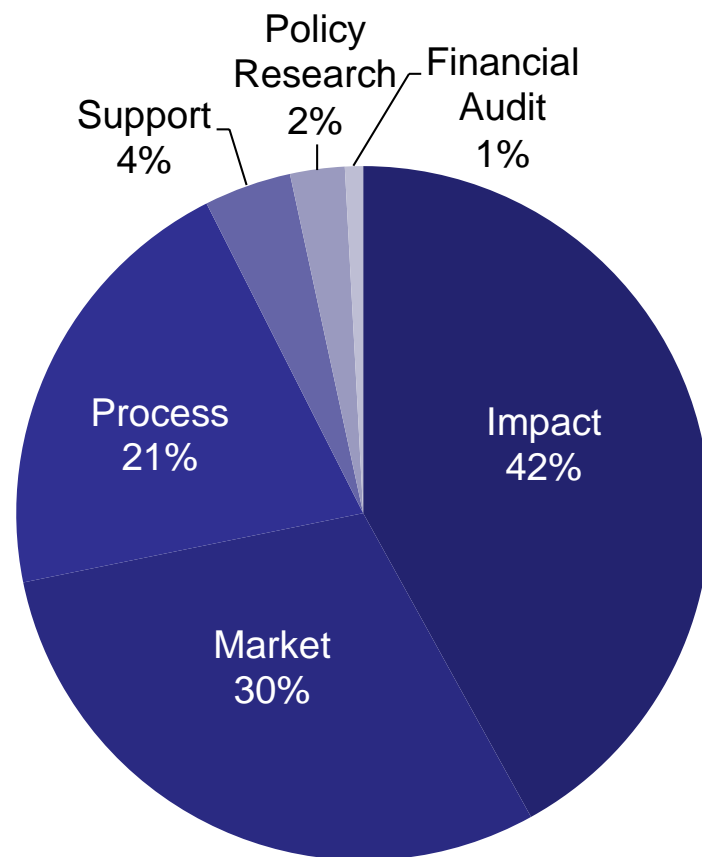


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2013-2014: Evaluation Resource Allocation

- Allocations started with
 - 4% of sector budgets and
 - adjusted based on various needs
 - Admin and cross cutting costs covered
- Sector-level evaluation plans have internal prioritization based on budgets and timing
 - Prioritization will be ongoing within budget cap and with “uncertain measure” needs
 - Plan maintains the comprehensive “list” of needs for impact, process and market
 - Address grid planning timelines as well as ESPI feedback timing

2013-2014 Evaluation Plan Budget





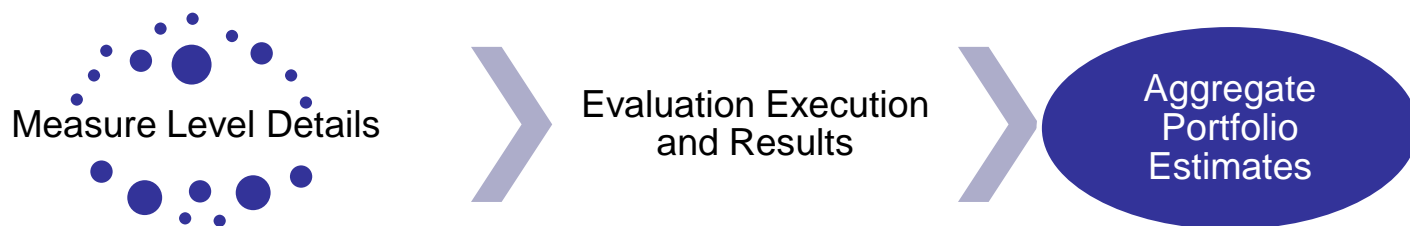
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Basic Impact Evaluation Execution

- Disaggregated planning and execution leads to final outputs



- Impact evaluation evaluations are prioritized by:
 - Relative effect on the portfolio (i.e. >1% of portfolio = High Impact Measure)
 - Uncertainty of the measure performance or parameters (i.e. high uncertainty = higher priority)
 - Ability to affect certainty with evaluation and field research
- Field results are tied on a one-to-one basis with savings claims
 - Studies use claims to define sample plans and identify high impact measures
 - Results come “back” to the claims as updates and are archived in a final dataset

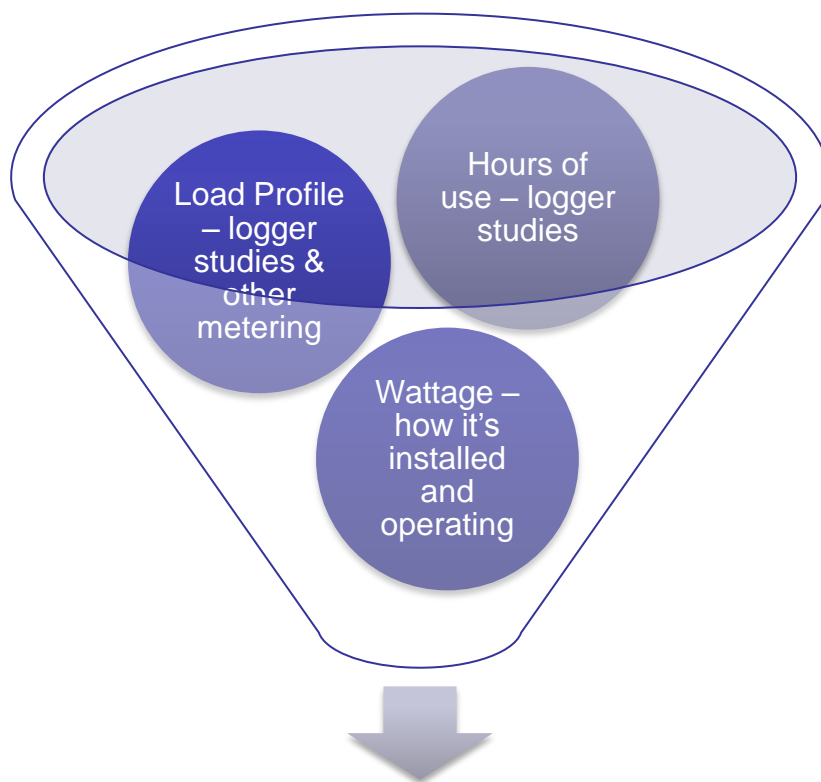


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Field evaluation consists of...



Other methods:

- Billing analysis
- Custom analysis
- Shelf surveys
- Phone surveys
- Market assessment

How do we use it?

- Update savings estimates
- Resource planning
- Goals and potential

How did the technologies and processes perform in the field and against a counterfactual baseline?



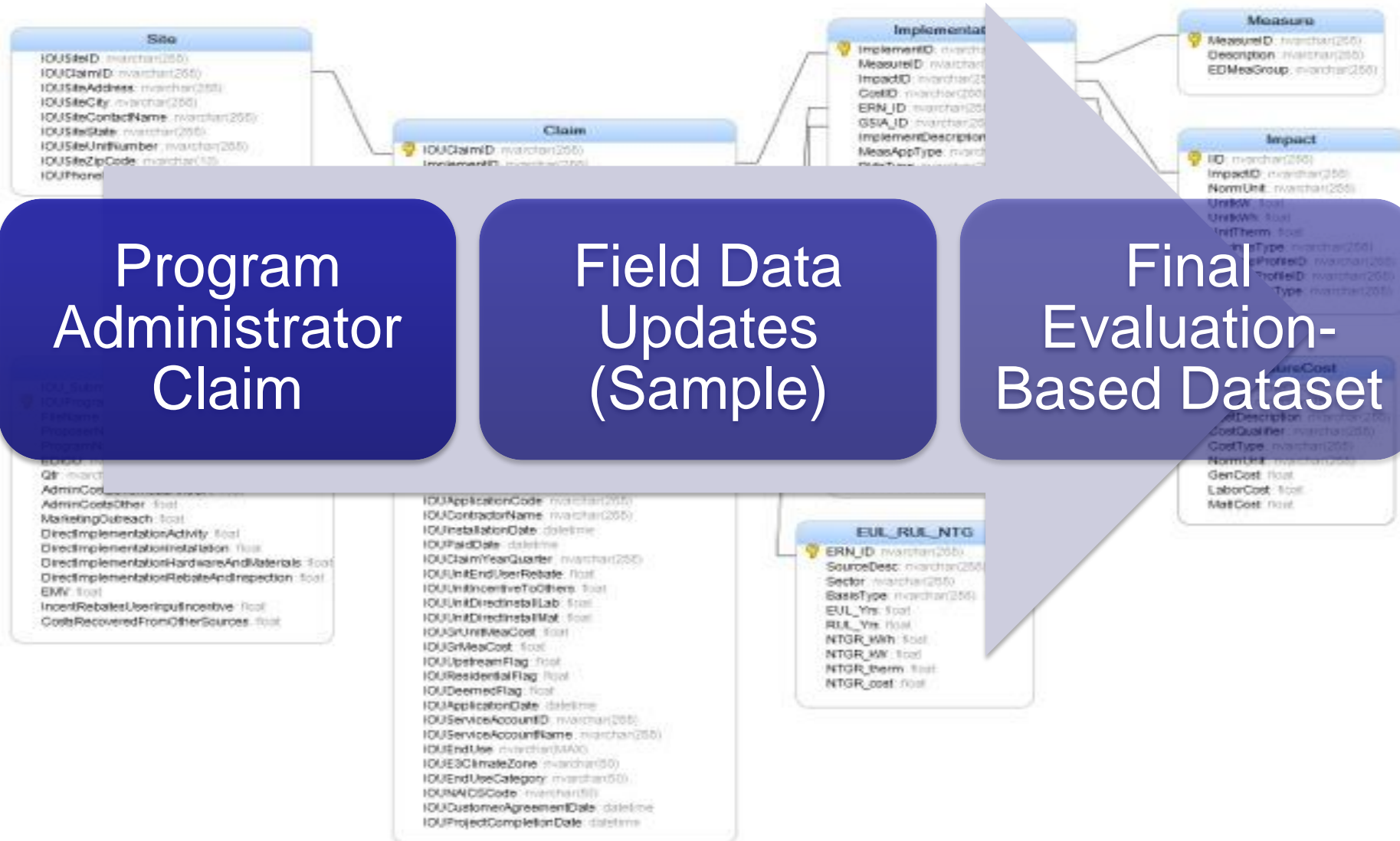
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**That simple exercise is extremely
data intensive and data rich:**

- Site specific customer information;
- Parameter specific savings claims and field-based updates
- Time horizons for savings impacts
- Cost data
- Metrics of program influence
- Defined a counterfactual for every project

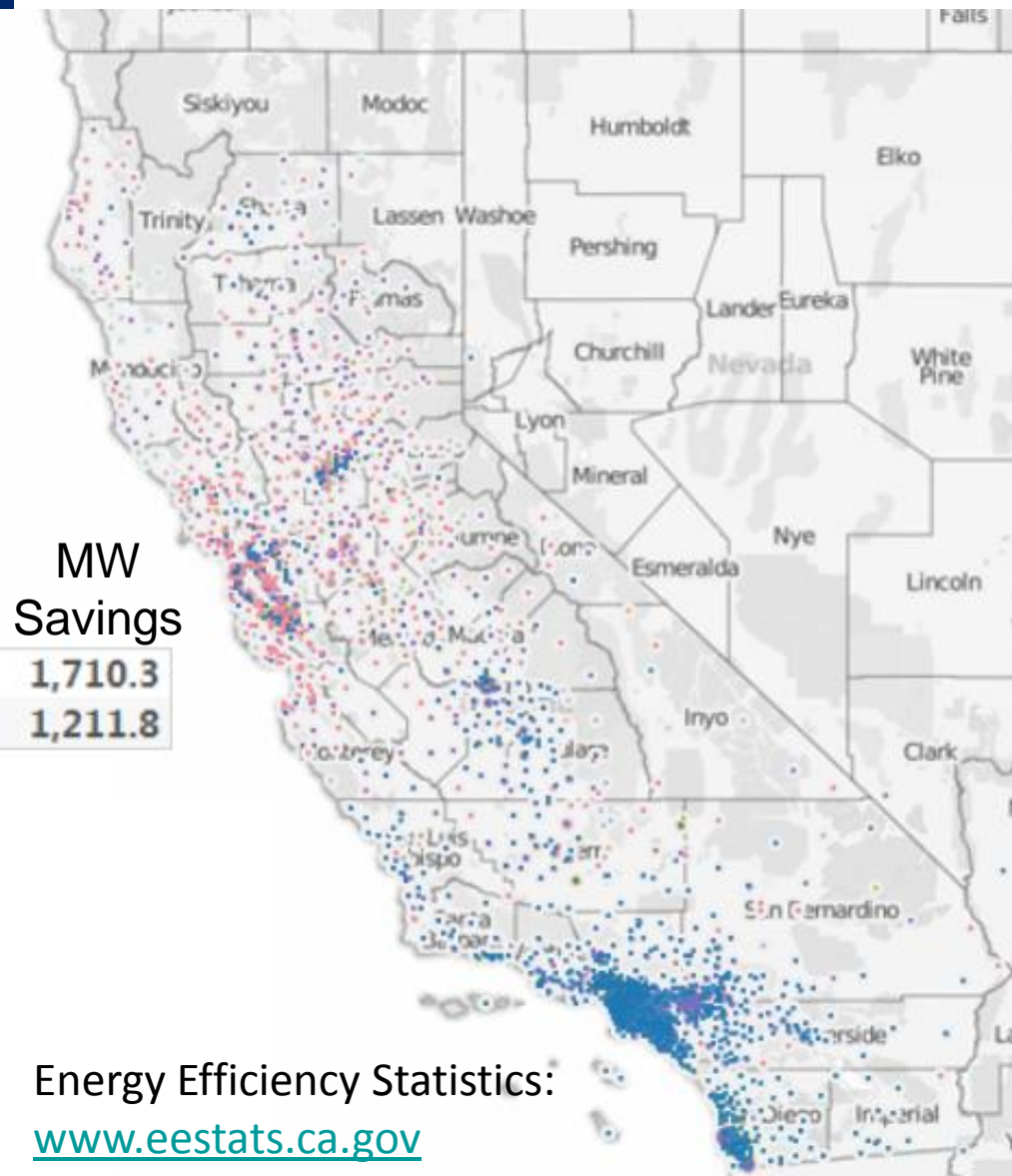




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Data is revolutionizing:

- ✓ Identification of potential and targeting of efforts
- ✓ Customer value
- ✓ Tracking performance
- ✓ Evaluation
- ✓ Sharing results with stakeholders and the public



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Keeping Evaluation Relevant and Respected

- **Focus on YOUR mandate for evaluation**
 - Feedback to continue to improve programs and
 - Assess the value of the investments
 - Assess the resource for procurement planning
- **Generate timely information for program implementers, stakeholders and policy makers**
 - Provide opportunities to engage in the evaluation planning process as appropriate
 - Design and complete studies in to inform decision making processes
- **Develop reporting and data outputs that allow a wide audience access to the information**
 - Build anticipation and expectation that information from evaluation will be timely, reliable and actionable



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Portfolio Level Analysis and Reporting

- **Three core questions:**
 - Did the utility meet the savings goals set by the Commission?
 - Were the activities, on the whole, Cost Effective?
 - Was the spending prudent and in compliance with rules?
- **The answers to these questions illustrate “compliance”**
 - A penalty or reward may or may not be assessed (depending on policy)
 - Of interest to stakeholders, decision makers, and politicians
- **The outputs of the full aggregated dataset is the foundation for updating:**
 - Goals and Potential for the next cycle
 - Updates/true-up to the California Energy Commission’s demand forecast



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Did the utility meet the savings goals?

- **The Commission sets the savings goals for each utility**
 - Savings are modeled in a comprehensive goals and potential study
 - The Commission adopts the goal in the course of approving the portfolio of activities – this is the “promise” of the utility
 - Utilities have the freedom to meet the goal by shifting spending, programs, and interventions based on market conditions
- **Explicit rules about what is “in and out” of the goal**
 - Program savings from mainstream and low income programs
 - Code and Standards advocacy at the Energy Commission
 - Incremental or base savings
- **Currently there is no penalty for not meeting savings goals; except public embarrassment**
 - Goals and Potential for the next cycle
 - Updates/true-up to the California Energy Commission’s demand forecast



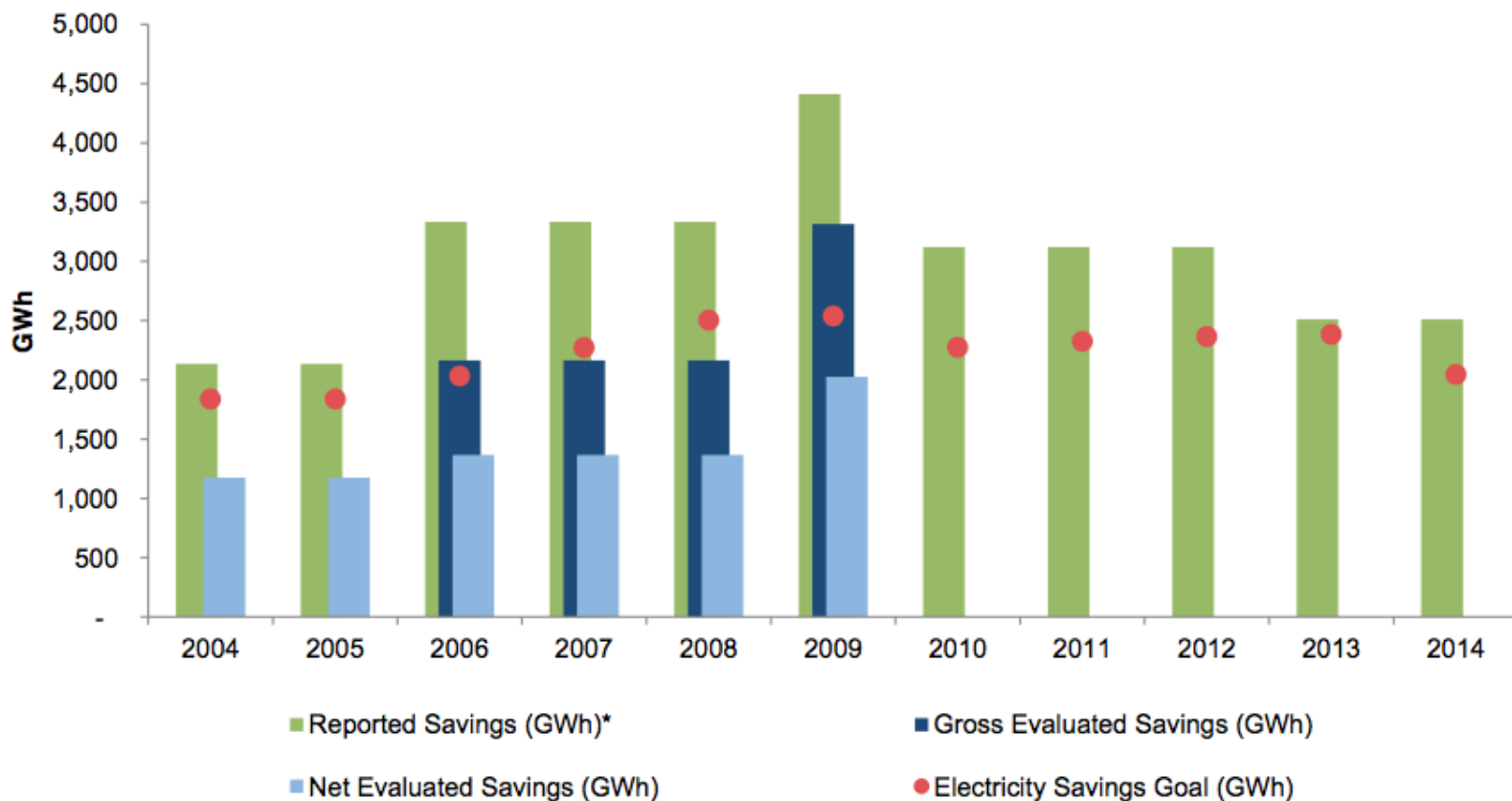
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2004-2014 Savings vs. Goals

2004-14 Reported and Evaluated Savings



* 2004-05 reported savings are net; 2006-12 are gross; 2013-14 are projected



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Was the spending prudent and in compliance with rules?

- **Annual audits are required in the authorization**
 - CPUC auditors conduct the audits
 - Auditors focus on specific “problem areas” & general review
- **The Commission adopts the reporting rules and IOUs follow via their internal accounting processes**
 - The audits ensure the expenditures are prudent
 - Ensure that administrative cost caps are followed (10%)

CHALLENGE:
THE PORTFOLIOS ARE HUGE
AUDITORS ARE FEW

Penalties have been assessed based on audits



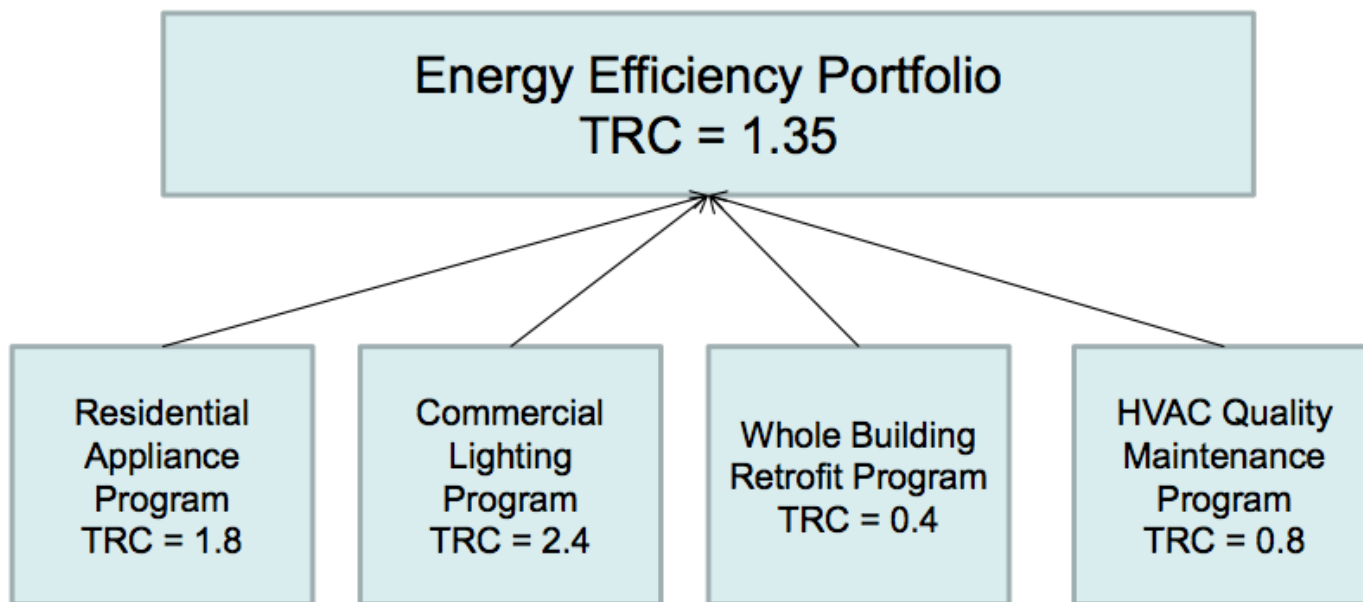
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Were the activities, on the whole, Cost Effective?

CPUC determines EE cost-effectiveness at the portfolio-level and on a “net” basis



*Example TRCs are illustrative



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Cost Effectiveness Analysis Addresses Key Questions

Cost Tests	Key Questions	Summary Approaches
TRC Total Resource Cost	What are the program impacts to the participants and program administrator?	Comparison of program administrator and customer costs to utility resource savings
PAC Program Administrator Cost Test	What are the program impacts to the program administrator?	Comparison of program administrator costs to supply side resource costs
PCT Participant Cost Test	Will the participants benefit over the measure life?	Comparison of costs and benefits of the customer installing the measure
RIM Ratepayer Impact Measure	Will utility rates increase?	Comparison of administrator costs and utility bill reductions to supply side resource costs
SCT Societal Cost Test	Is the utility, state, or nation better off as a whole?	Comparison of society's costs of energy efficiency to resource savings and non-energy costs and benefits



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Summary of Costs and Benefits in Each Method

Component	TRC	PAC	PCT	RIM
Administrative costs	Cost	Cost		Cost
Avoided costs of supplying energy	Benefit	Benefit		Benefit
Bill reductions			Benefit	
Capital cost to participant	Cost		Cost	
Capital cost to utility	Cost	Cost		
Environmental benefits (GHG only)	Benefit		Benefit	Benefit
Incentives paid		Cost		Cost
Increased supply cost	Cost	Cost		Cost

Calculations are replicated in public tools to enable common analysis



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Benefits Calculations are Based On and Compared Against Avoided Costs

- Energy
- Ancillary Services
- Renewable Portfolio Standard
- Greenhouse Gas
- Generation Capacity
- Transmission & Distribution Capacity





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For More Information

Title	Weblink
Audit Programs in California (program implementation plans)	http://eestats.cpuc.ca.gov/Views/Documents.aspx?ReportType=PIP
Energy Efficiency Evaluation Reports since 1990's searchable database	http://calmac.org/search.asp
Online Audit tool – Example PG&E	http://www.pge.com/en/myhome/saveenergymoney/analyzer/index.page
Methods for calculating savings (EPA technical support materials)	http://www.epa.gov/statelocalclimate/state/activities/measuring-savings.html
California Energy Efficiency Evaluation Framework and California Energy Efficiency Evaluation Protocols	http://www.cpuc.ca.gov/PUC/energy/Energy+Efficiency/EM+and+V/
DOE Uniform Methods Project – Energy Efficiency Evaluation Methods	http://energy.gov/eere/about-us/initiatives-and-projects/uniform-methods-project-determining-energy-efficiency-progr-0
2006-2008 Energy Efficiency Summary Report – California Public Utilities Commission	http://www.cpuc.ca.gov/PUC/energy/Energy+Efficiency/EM+and+V/2006-2008+Energy+Efficiency+Evaluation+Report.htm
California Goals and Potential Study	http://www.cpuc.ca.gov/PUC/energy/Energy+Efficiency/Energy+Efficiency+Goals+and+Potential+Studies.htm
CPUC Policy Manual v.5 for Cost Effectiveness and Reporting Rules	http://www.cpuc.ca.gov/NR/rdonlyres/7E3A4773-6D35-4D21-A7A2-9895C1E04A01/0/EEPolicyManualV5forPDF.pdf