

Cost-Effectiveness of Electricity Energy Efficiency Programs

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Why Energy Efficiency?

- High costs and siting issues associated with increasing supply and delivery capacity, particularly for electricity
- Concerns about energy security
- Desire to meet our climate mitigation goals



Energy Efficiency (EE) Potential

- Numerous studies suggest lots of *potential* to reduce energy consumption and save money
 - McKinsey – 23% reduction in 2020
 - National Research Council – 17-20 % reduction in 2020
 - Residential and commercial buildings (64%)
 - Industrial processes (25%)
 - Transportation (11%)
- What are the barriers that prevent us from realizing this potential?
- What are the policies that will take us to a more energy efficient future?



EE Policy Options

- Efficient Energy Pricing
 - Price CO₂ and let consumers see the price
- Efficiency Standards
 - Appliances
 - Buildings
 - Energy efficiency resource standards
- Information
 - Labels
 - Audits
 - Nudges
- Incentives
 - Rebates
 - Low interest loans
 - Tax incentives



Evaluation of Past Electricity EE Policies

- Utility energy efficiency DSM programs to promote energy efficiency (EE) have been around since 1970's
 - How much electricity do they save and at what cost?
 - Range of recent savings estimates:
 - EIA 861 annual savings in 2007: 1.8 percent national average (some utilities exceed 10 percent)
 - CEC annual savings in CA in 2005: 1.2 percent (all electricity) or 1.8 percent (Res & Com only)
 - Efficiency Vermont: 2.5 percent *incremental* savings in 2008
 - Range of recent average cost estimates
 - ACEEE (2009): 2.5 cents per kWh
 - Auffhammer , Blumstein and Fowlie (based on reevaluation of L&K): 5.1 to 14.6 cents per kWh
 - How have costs varied with level of effort/size of program?
 - Are there increasing or decreasing returns to scale?
- As we pursue new EE policies, it is important to understand the effectiveness and cost effectiveness of past efforts.

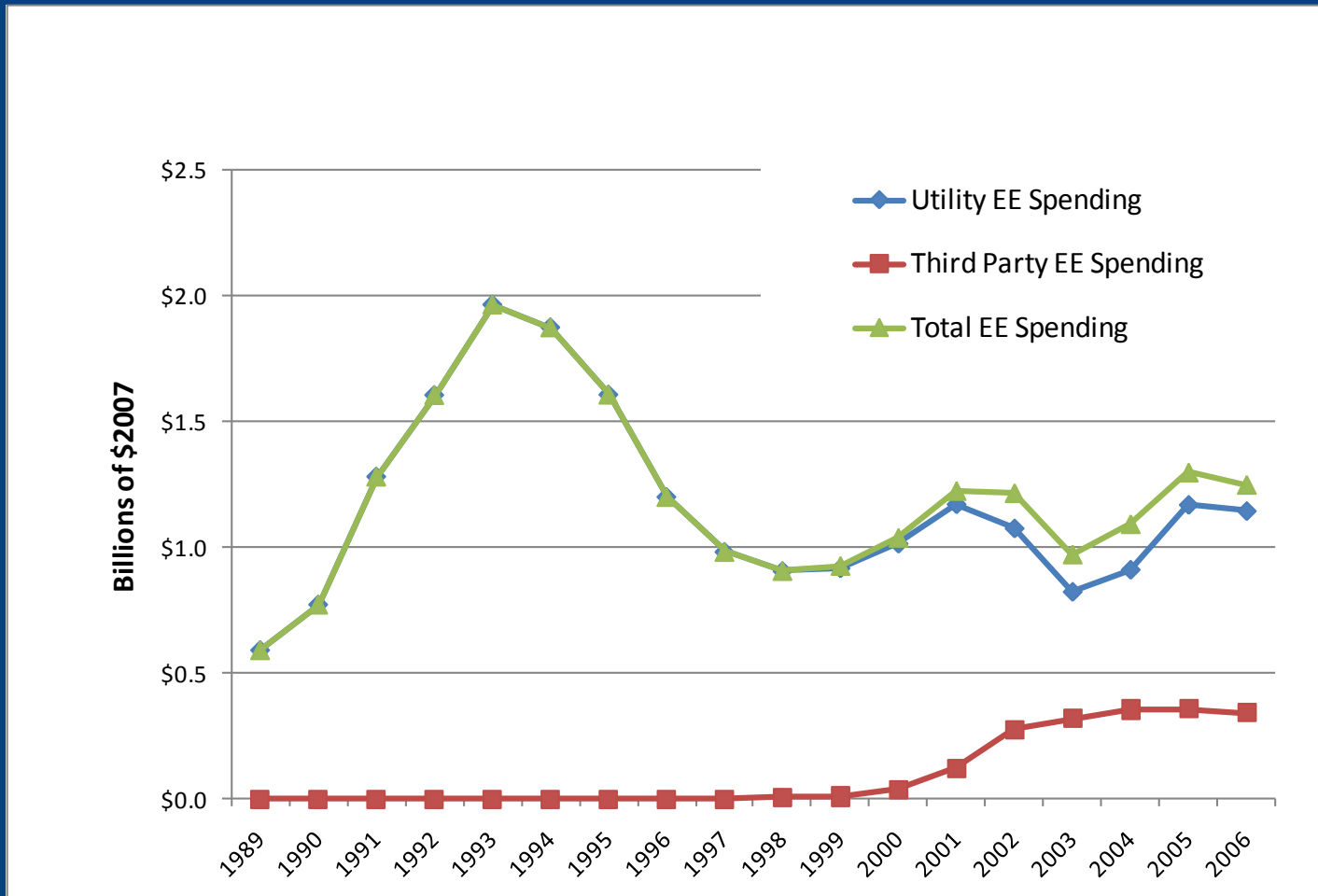


Our Approach

- Difficult part of evaluating efficiency savings is estimating baseline energy consumption and accounting for free riders (anyway savings), spillovers and rebound effect.
- Most evaluations rely on engineering methods to some degree and standard net to gross ratios to deal with free riders.
- This study uses an econometric approach to isolate the effects of current and past DSM spending on year-to-year growth in electricity demand.
 - Approach should account for free-riders, spillover and rebound
- Uses data from EIA and data we collected from relevant states on rate-payer funded EE spending.



Ratepayer Funded Energy Efficiency Expenditures



Average Cost Effectiveness and Percent Energy Savings (preliminary)

	Model 1	Model 1a	Model 1b
Average cost effectiveness (2007 cents per kWh)	6.4	3.7	3.4
95% confidence interval	(4.4 – 10.9)	-----	-----
Percent savings	1.1	1.9	2.1
95% confidence interval	(0.6 – 1.4)	-----	-----

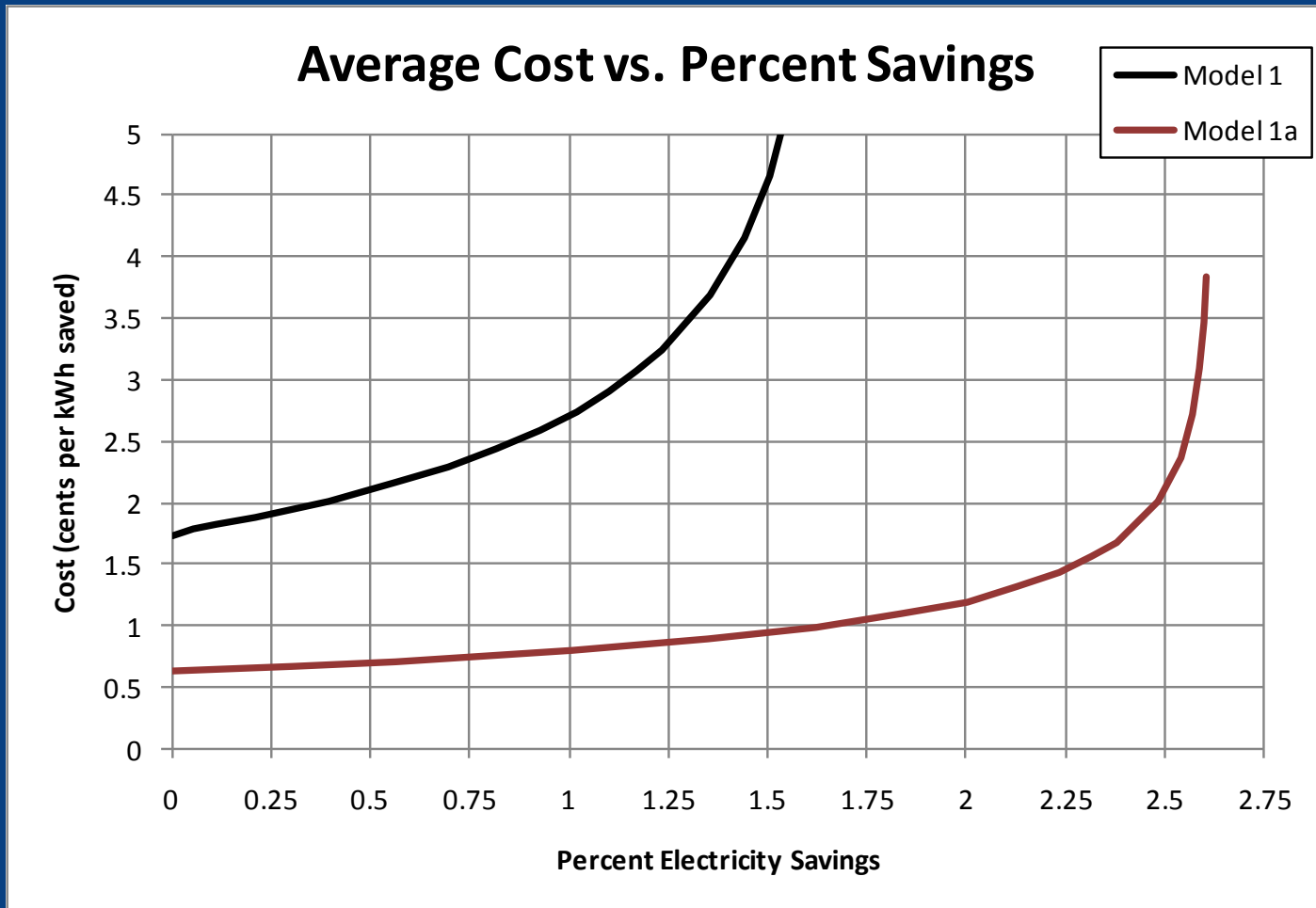
Relevant Comparisons:

National average retail electricity price in 2006: 9.1 cents

Levelized cost of energy of new baseload generation capacity: 9.0 cents

Levelized cost of energy of new peaking capacity: 13.0 cents

Percent Energy Savings and Average Cost (models 1 and 1a, preliminary)



Concluding Observations

- Past EE programs saved 1 - 2% of electricity consumption on average, which is roughly consistent with prior estimates.
- Average cost of past EE DSM programs to program funders is roughly 3.4 – 6.4 cents per kWh (2007 \$) on average. This is higher than some EE advocates and program evaluations find, but lower than prior econometric studies have found.
- Average cost is increasing and convex in percent savings.
- More research is needed to identify best performing policies and measure their effectiveness and costs.

