The Utility Business Model and Energy Efficiency

Arkansas Sustainable Energy Resources Docket

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About the Regulatory Assistance Project

- RAP is a non-profit organization providing technical and educational assistance to government officials on energy and environmental issues. RAP Principals all have extensive utility regulatory experience.
  - Richard Sedano was commissioner of the Vermont Department of Public Service from 1991-2001 and is an engineer.
- Funded by foundations, the US Department Of Energy & Environmental Protection Agency. We have worked in nearly every state and 16 nations.
- Also provides educational assistance to stakeholders, utilities, advocates.

Today's Menu

- Why the utility business model is getting so much attention today
- A quantitative study led by Lawrence Berkeley National Lab helps to understand the issues and challenges
- Lessons, ideas, closing thoughts

Utility of the Future

- Service Focus
- Performance Oriented (metrics)
- Information Driven (measure)
- Carbon Metric
  - Adds to value of energy efficiency
- Continued opportunity to earn fair return
- Continued attention to reasonable rates

Information about the paper and crediting the team

- Financial Analysis of Incentive Mechanisms to Promote Energy Efficiency:
  Case Study of a Prototypical Southwest Utility
- Peter Cappers, Charles Goldman (LBNL)
- Michele Chait (E3)
- George Edgar (WECC)
- Jeff Schlegel
- Wayne Shirley (RAP)

Published March 2009 by
LBNL Environmental Energy Technologies Division
LBNL-1598E
Funded by U.S. DOE

Project Approach & Objectives

- ***Background***: Current environment is one of substantially increased interest in energy efficiency and demand response
  - Policymakers want and are proposing very aggressive demand-side savings goals in many parts of the country, while a national EE resource standard is currently in proposed federal legislation
  - Policymakers want to increase utilities' motivation to achieve these goals
- ***Goal***: Facilitate dialogue on various utility EE business models (i.e., shareholder incentive mechanisms and/or decoupling) by conducting quantitative financial analysis
- ***Approach***: Analyze impacts of various utility performance incentives and ratemaking mechanisms on stakeholders (e.g., shareholders, ratepayers) when a prototypical, vertically integrated utility based in the Southwest implements alternative energy efficiency portfolios with varying savings goals

Project Approach & Objectives (2)

- Analysis illustrates the different financial implications on stakeholders when identical levels of EE savings are achieved under different business models
- Caveats
  - We do NOT account for any potential link between the type and/or size of shareholder incentive mechanism and utility's motivation to achieve and/or increase EE goals or portfolio size
  - We do NOT analyze other potential non-financial motivators of utility behavior and support for EE (e.g., PUC orders, customer relations)
  - We do NOT perform a comparative analysis of the relative merits of utility vs. non-utility administration of energy efficiency programs

Motivations

- Advance Benefit Cost Calculator created for National Action Plan for Energy Efficiency by E3
- More complete discussion of energy efficiency business model options initiated by RAP
  - Utility business model itself seems to be a barrier to energy efficiency (&DG) deployment

Benefits Calculator is part of the NAPEE Toolkit

- **NAPEE Benefits Calculator was designed to be a relatively "simple" tool for quantitatively illustrating major policy issues associated with implementing energy efficiency**
  - **Identification of Disincentives**
    - Short-term: Lost fixed cost recovery
    - Long-term: Reduced opportunity to expand earnings
  - **Aligning incentives to improve business case**
    - Short-term: Application of decoupling
    - Long-term: Application of shareholder incentives

Traditional Regulatory Motivations Remain

- Overall impact on consumers
  - Fairness
  - Rates
  - Total Costs (average bills)
  - Acquisition of least cost resources
    - Including all cost-effective energy efficiency and other demand side resources

Attention to balance Customer and Company

- Whether and if so how to share the estimated net resource benefits from energy efficiency between customers and utility
- Key model outputs
  - Retail rates
  - Total cost (average bills)
  - Shareholder earnings
  - Return on equity

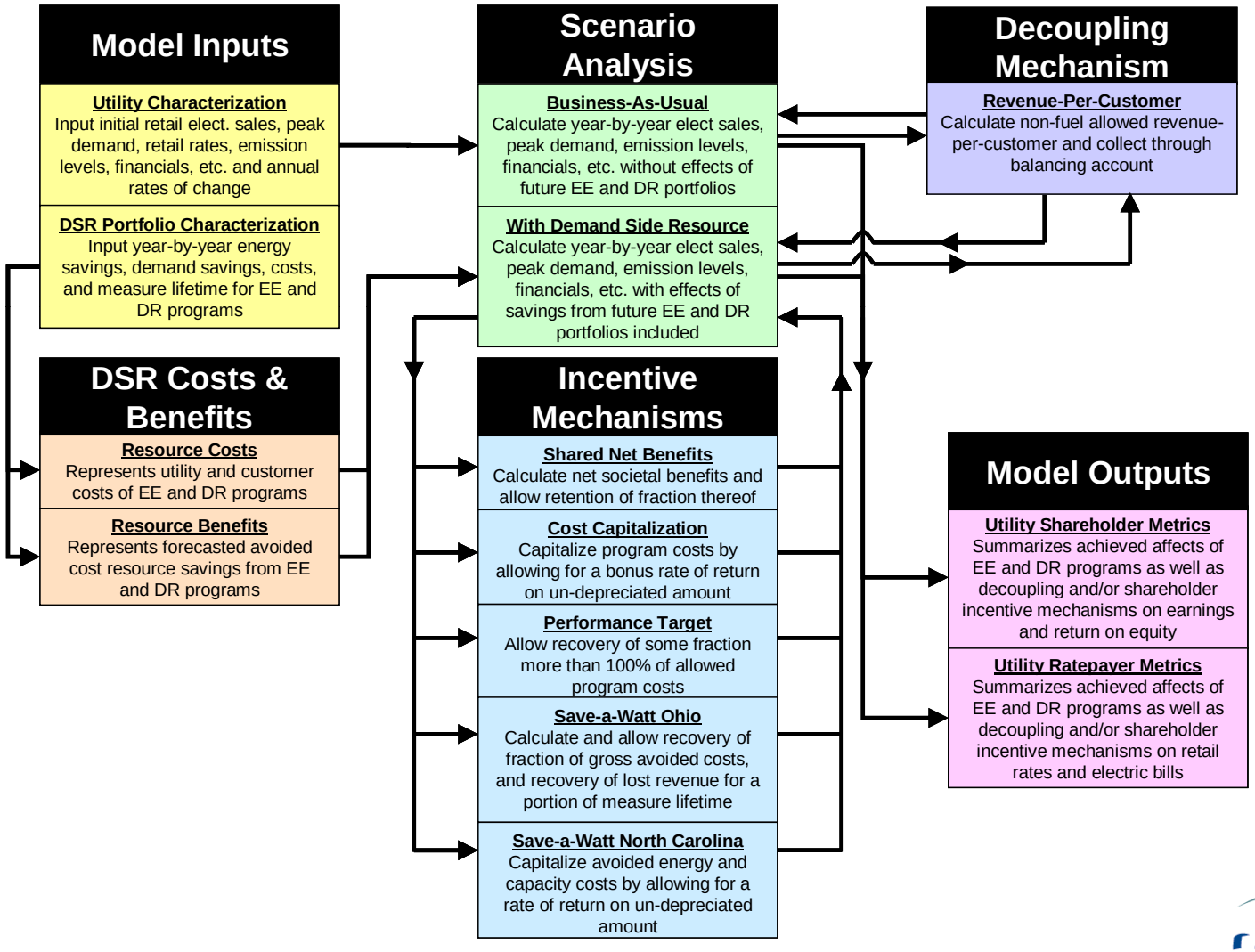
The throughput incentive and energy efficiency

- "The implementation of energy efficiency has multiple and sometimes countervailing impacts on the utility's cost of service.
- "On the one hand, the utility will incur program admin and measure incentive costs that are expensed in the year the measure is installed. However, the reduced level of sales also results in lower fuel and purchased power and deferred investment"

Other aspects of the analysis

- Construct alternative EE portfolios that represent range of savings goals, program ramp-up rates
- Explore alternative decoupling/lost revenue and/or shareholder incentive mechanisms individually and in combination:
  - Shared Net Benefits
  - Cost Capitalization
  - Bonus for Performance Target
  - Revenue Per Customer Decoupling
  - Decoupling in combination with an incentive system

LBNL Benefits Calculator Flow-Chart



Created a “super-utility” of several Southwest Utilities

- Characterized with publicly available data
  - 10-K, FERC Form 1, IRPs, EE Programs
- Made business as usual projections over a 20 year horizon
- Applied decoupling and various incentive systems
- Other dramatic changes in policy and technology not considered

Utility Characterization in LBNL Benefits Calculator

Physical

- Retail Sales
- Peak Demand
- Customers
- T&D Losses

Financial

- Capital Structure
- Avg. Debt Cost
- Authorized ROE
- Tax Rates

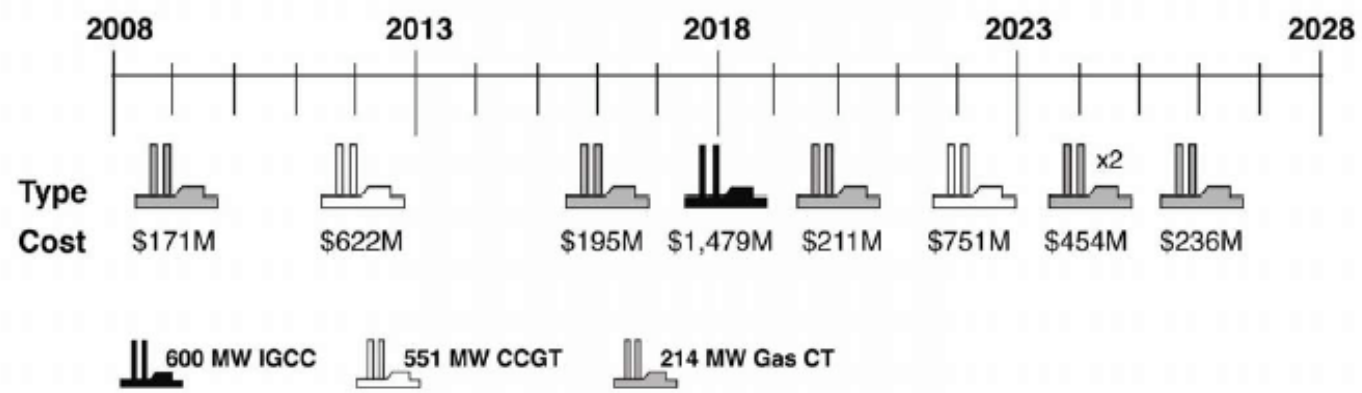
Economic

- Fuel
- Purchased Power
- O&M
- T&D CapEx
- Gen CapEx
- Rate Base

- First year values and annual growth rates required for most data categories
- Gen. CapEx plan is specified for entire analysis period
- FERC Form 1, utility annual reports and regulatory filings provide majority of data sources

Prototypical SW Utility: Revenue Requirement and Retail Rates in Business-As-Usual Case

Utility Budget Category	2008 Level ($B)	2017 Level ($B)	2027 Level ($B)	Annual Growth Rate (%)
T&D Capital Expenditure	$0.3	$0.5	$0.7	5.0%
Rate Base	$4.3	$6.7	$11.1	5.1%
Operations and Maintenance	$0.4	$0.8	$2.0	8.8%
Fuel & Purchased Power	$1.2	$2.3	$4.2	6.7%
Annual Revenue Requirement	$2.3	$4.2	$8.1	6.9%
All-In Retail Rate	*9.1 ¢/kWh*	*13.1 ¢/kWh*	*18.9 ¢/kWh*	*3.9%*



- Both fuel and non-fuel costs are growing faster than sales
- Utility unable to achieve authorized ROE of 10.75%
- Utility files biennial rate cases to mitigate earnings erosion
- IRP sets out investment schedule for large new generation plant, that EE can help defer
- Retail rates double over 20-year time horizon

Characterizing Demand Side Resources and Shareholder Incentives

DSR Portfolios

- Res. EE
- Non-Res. EE
- Res. DR
- Non-Res. DR
- Legacy EE
- Legacy DR

Savings

- Peak Energy
- Off-Peak Energy
- Peak Demand
- Avg. Lifetime

Cost

- Program Admin.
- Incentives
- Participant Measure
- Measure Replacement

Inc. Mech.

- Performance Target
- Shared Net Benefits
- Cost Capitalization
- Save-a-Watt NC
- Save-a-Watt OH

- All savings and cost values must be supplied at DSR Portfolio level on an annual basis
- Up to 30-years of annual DSR portfolios can be modeled
- Earnings basis for each incentive mechanism can be defined

Savings and Costs of Alternative Energy Efficiency Portfolios

nergy iciency ortfolio	Target % Reduction in Incr. Retail Sales	Ramp-Up Period (Years)	Lifetime Impacts				
			Peak Period Savings (GWh)	Off-Peak Period Savings (GWh)	Peak Demand Savings (Max MW)	Program Admin. Costs (¢/Lifetime kWh)	Total Resource Costs (¢/Lifetime kWh)
oderate	*0.5%/Year*	2	10,452	4,479	***226***	***1.6***	***2.6***
gnificant	*1.0%/Year*	3	19,433	8,328	***421***	***1.8***	***3.0***
gressive	*2.0%/Year*	5	34,314	14,706	***743***	***2.7***	***4.0***

nalyzed three energy efficiency portfolios with varying energy savings argets and costs to examine impacts of EE on utility shareholders, ustomers, and society

- **Assume utility delivers EE programs for 10 years**
- **Assume 11 year avg. measure lifetime for all EE portfolios**
- **Costs of Sig. and Agg. EE portfolios have higher costs than Mod. EE due to more expensive measures and higher customer incentives**

E still costs considerably less than supply-side alternatives under onsideration

Conflict Between Shareholder and "Societal" Value of EE

Energy Efficiency Portfolio	Total Resource Benefits ($B)	Total Resource Costs ($B)	Net Resource Benefits ($B)	Benefit Cost Ratio	Customer Bill Savings ($B)	Achieved After-Tax ROE
None	N/A	N/A	*N/A*	*N/A*	*N/A*	*10.43%*
Moderate	$0.67	$0.26	*$0.41*	*2.6*	*$1.10*	*10.39%*
Significant	$1.22	$0.55	*$0.67*	*2.2*	*$1.69*	*10.36%*
Aggressive	$2.06	$1.20	*$0.86*	*1.7*	*$2.37*	*10.32%*

- **Large-scale, sustained energy efficiency efforts produce significant net resource benefits and bill savings for consumers; EE portfolios are very cost-effective**
- **However, the more aggressive the EE effort, the more such efforts will conflict with shareholders' interest**
  - **Utility unable to achieve authorized earnings and ROE (10.75%) before EE is implemented as costs are growing faster than sales between rate cases**
    - Achieving deep and sustained EE savings exacerbates this problem
  - **EE defers need for future supply-side investments that generate earnings**
    - Replace them with EE investments that provide NO contribution to earnings

Decoupling and Incentives

Application of Decoupling or Shareholder Incentive Mechanisms

- **Revenue-per-Customer (RPC) Decoupling**
  - Full-decoupling of non-fuel expenses between rate cases
- **Performance Target**
  - Utility receives performance-based incentive of an additional 10% of program costs if it achieves EE portfolio goals, while program costs are expensed
- **Shared Net Benefits** (similar to approach used in CA and MN)
  - Utility retains 15% of the PV of TRC net benefits from the portfolio of EE programs, while program costs are expensed
- **Cost Capitalization** (similar to approach used in NV)
  - Utility capitalizes the annual program costs over first 5 years of the installed measures at authorized ROE (10.75%) + 500 basis points

More elaborate decoupling definition from the report

Revenue-per-customer decoupling: This mechanism fully decouples utility sales from non-fuel revenues. The actual allowed non-fuel revenue collected by the utility is the product of the average non-fuel revenue requirement per customer at the time of the last rate case and the current number of customers being served. The total non-fuel revenue collected by the utility increases as the number of customers being served changes. A balancing account is used to ensure ratepayers are either debited or credited for under- or over-collection of the authorized non-fuel revenue requirement. A full decoupling mechanism, such as this one, mitigates the potential for lost profit from any under-recovery of fixed costs through a reduction in retail sales between rate cases.

Oregon PUC Order 09-020 pg 27

"… PGE does have the ability to influence individual customers through direct contacts and referrals to the ETO. PGE is also able to affect usage in other ways, including how aggressively it pursues distributed generation and on-site solar installations; whether its supports improvements to building codes; or whether it provides timely, useful information to customers on energy efficiency programs. We expect energy efficiency and on-site power generation will have an increasing role in meeting energy needs, underscoring the need for appropriate incentives for PGE."

Some Report Findings

- Application of full RPC decoupling entirely removes short term disincentive from reduced sales between rate cases, but does not improve earnings opportunities
- Shared benefit incentive, as modeled, increases utility earnings compared with no EE case
  - Any one could if you make them rich enough

Some More Report Findings

- Energy Efficiency more likely to be a "profit center" for utility if decoupling and performance incentive are combined
  - ROE increases compared with BAU case
- Earnings increase in Aggressive EE case
  - More financial benefits to share with utility
- Incentives tied to benefits have more variable effect on cost of EE

Decoupling & Shareholder Incentives: Will they pass the "front page" test?

SW Utility Analysis

Incentive Mechanism	Ratepayer Share of Net Resource Benefits			Fixed Cost Recovery and Pre-Tax Incentive as % of Program Cost		
	Mod. EE	Sig. EE	Agg. EE	Mod. EE	Sig. EE	Agg. EE
Performance Target	90%	88%	79%	26%	25%	23%
Cost Capitalization	90%	89%	80%	24%	23%	21%
Shared Net Benefits	75%	75%	74%	62%	51%	28%

- **Model can produce common metrics used by stakeholders to assess:**
  - **Sharing of resource benefits among parties?**
  - **How much does lost revenue recovery and/or shareholder incentive mechanisms increase EE program costs?**

Shareholder Incentive Mechanisms that Improve ROE by 20 Basis Points: Design

SW Utility Analysis	Performance Target	Cost Capitalization	Shared Net Benefits
Earnings Basis	***% of Program Cost***	***ROE Bonus***	***Utility % of Net Benefits***
Original Design	*10%*	*500*	*15%*
Mod. EE	46%	4,970	21%
Sig. EE	25%	2,700	14%
Agg. EE	12%	1,300	14%

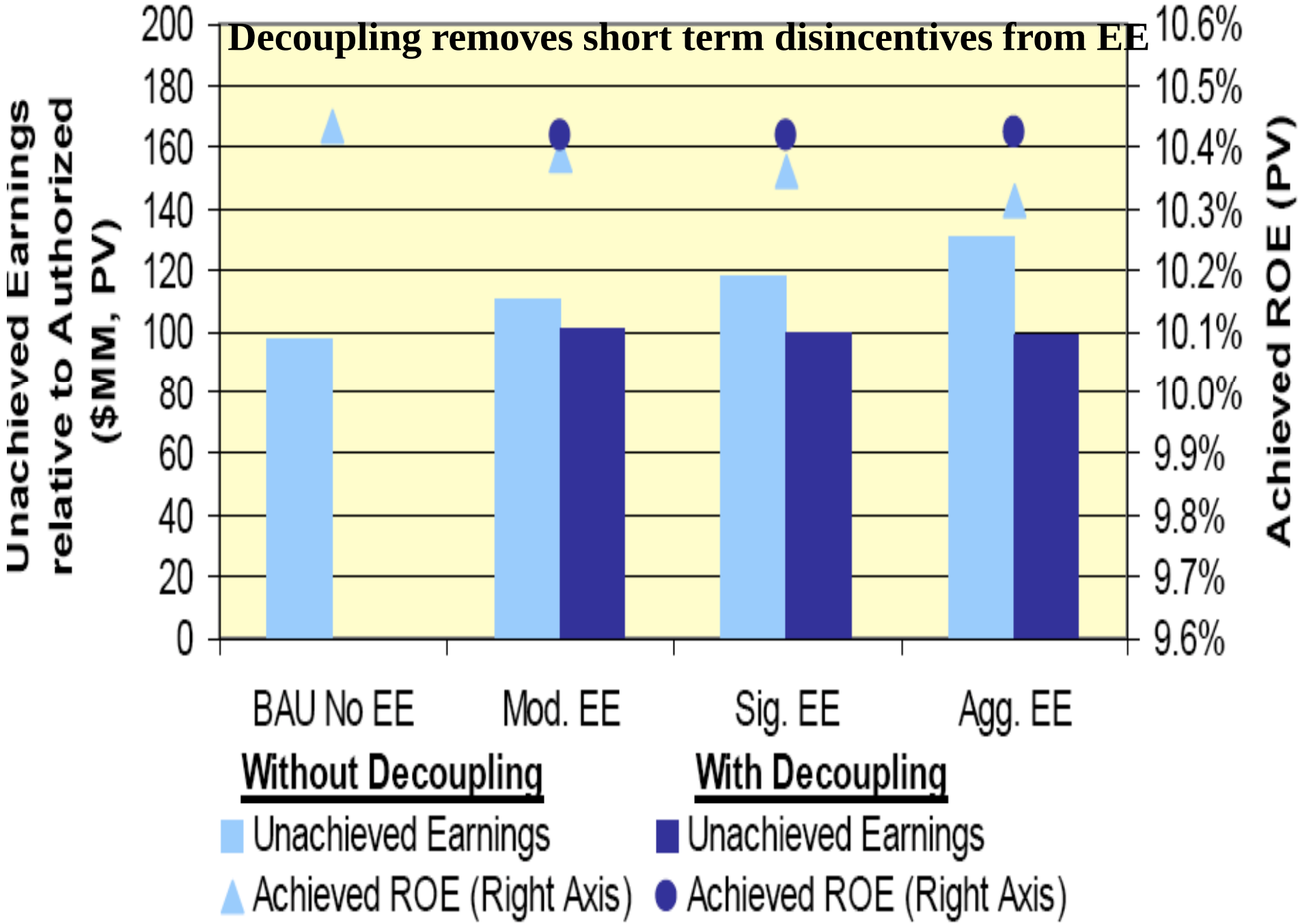
- **Establish earnings target for utility that achieves specified EE goals (e.g. 20 basis point increase in ROE)**
  - **Use LBNL Benefits Calculator to analyze earnings basis for each shareholder incentive mechanism to achieve specific increase in utility's ROE**
- **With this approach, all incentive mechanisms produce identical contributions to shareholder wealth**
  - **Facilitates comparison of stability of incentive mechanisms and cost to ratepayers for EE portfolios at various savings levels**

Other Uses of the Benefit Cost Calculator

- Super-utility in Kansas at the request of the KCC (report to be written)
- Analysis of Duke's Energy Efficiency and earnings proposal (known as Save-A-Watt)
- Analysis of Massachusetts super-utility underway
- Application to several specific utilities
- So far not applied to Electric Co-ops, munis

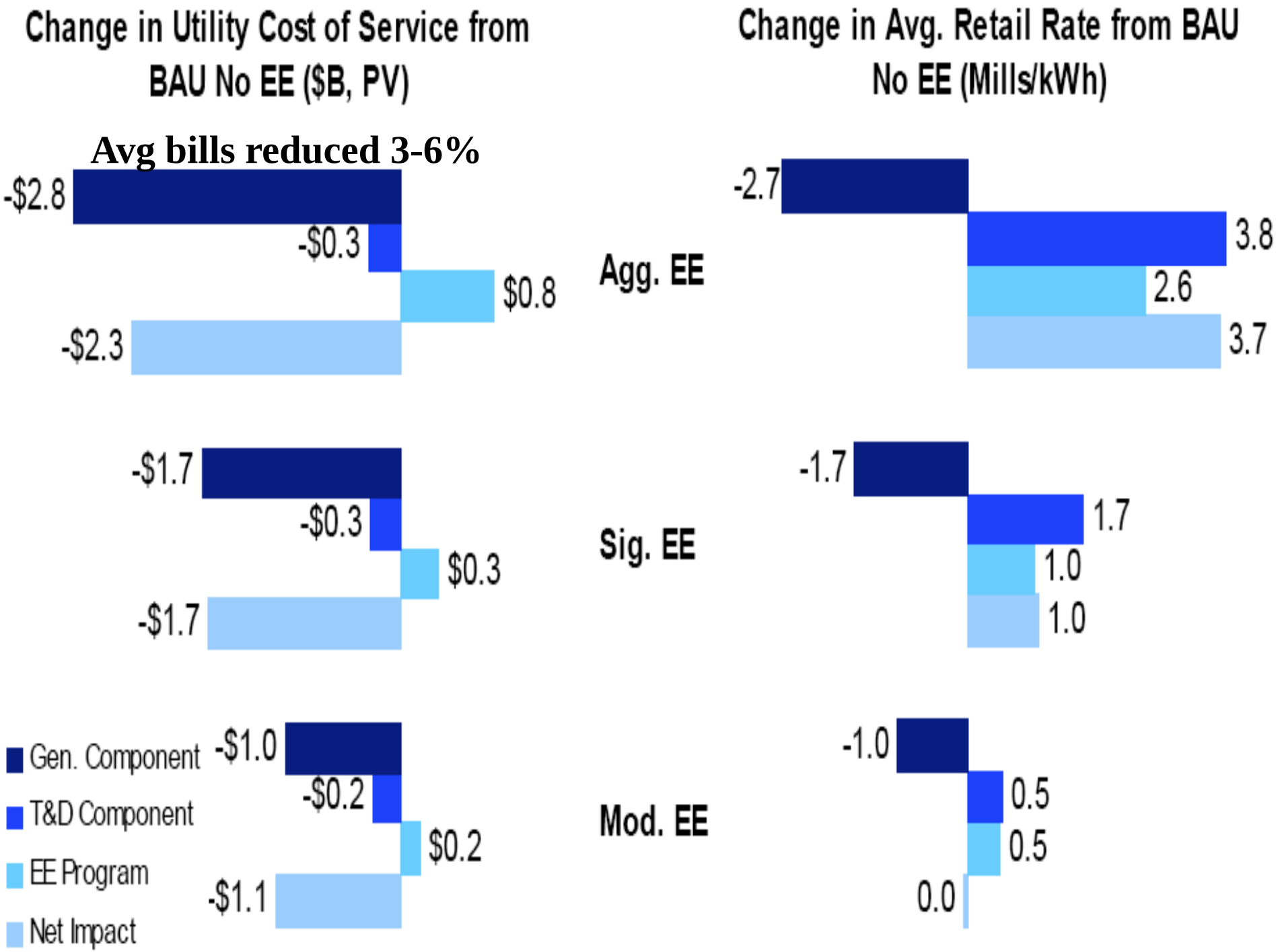
Key Issue

- ROE is diminished by energy efficiency in traditional regulation, all else equal
  - If energy efficiency is important, or the #1 resource option due to its cost and risk mitigation features, policy must reconcile this conflict or else consumers will pay more in long run because…
  - If EE hurts the utility finances, utility will be prone to do just what is required, and EE staff will not be the best, nor will they be rewarded for success


Decoupling removes short term disincentives from EE
Unachieved Earnings relative to Authorized ($MM, PV)
Achieved ROE (PV)
200
180
160
140
120
100
80
60
40
20
0
10.6%
10.5%
10.4%
10.3%
10.2%
10.1%
10.0%
9.9%
9.8%
9.7%
9.6%
BAU No EE
Mod. EE
Sig. EE
Agg. EE
Without Decoupling
Unachieved Earnings
Achieved ROE (Right Axis)
With Decoupling
Unachieved Earnings
Achieved ROE (Right Axis)

Key Issue

- Rates and Bills
- Energy Efficiency saves system costs
  - Beneficial to economy
- Energy efficiency adds a cost, and, importantly, reduces sales
  - Result potentially in higher rates
  - Significant EE: ~ 1mill/kWh over 20 years
  - Aggressive EE: ~ 4 mill/kWh over 20 years


Change in Utility Cost of Service from BAU No EE ($B, PV)
Avg bills reduced 3-6%
Change in Avg. Retail Rate from BAU No EE (Mills/kWh)
-$2.8
-$0.3
$0.8
-$2.3
Agg. EE
-2.7
3.8
2.6
3.7
-$1.7
-$0.3
$0.3
-$1.7
Sig. EE
-1.7
1.7
1.0
1.0
-$1.0
-$0.2
$0.2
-$1.1
Mod. EE
-1.0
0.5
0.5
0.0
Gen. Component
T&D Component
EE Program
Net Impact

Key Issue

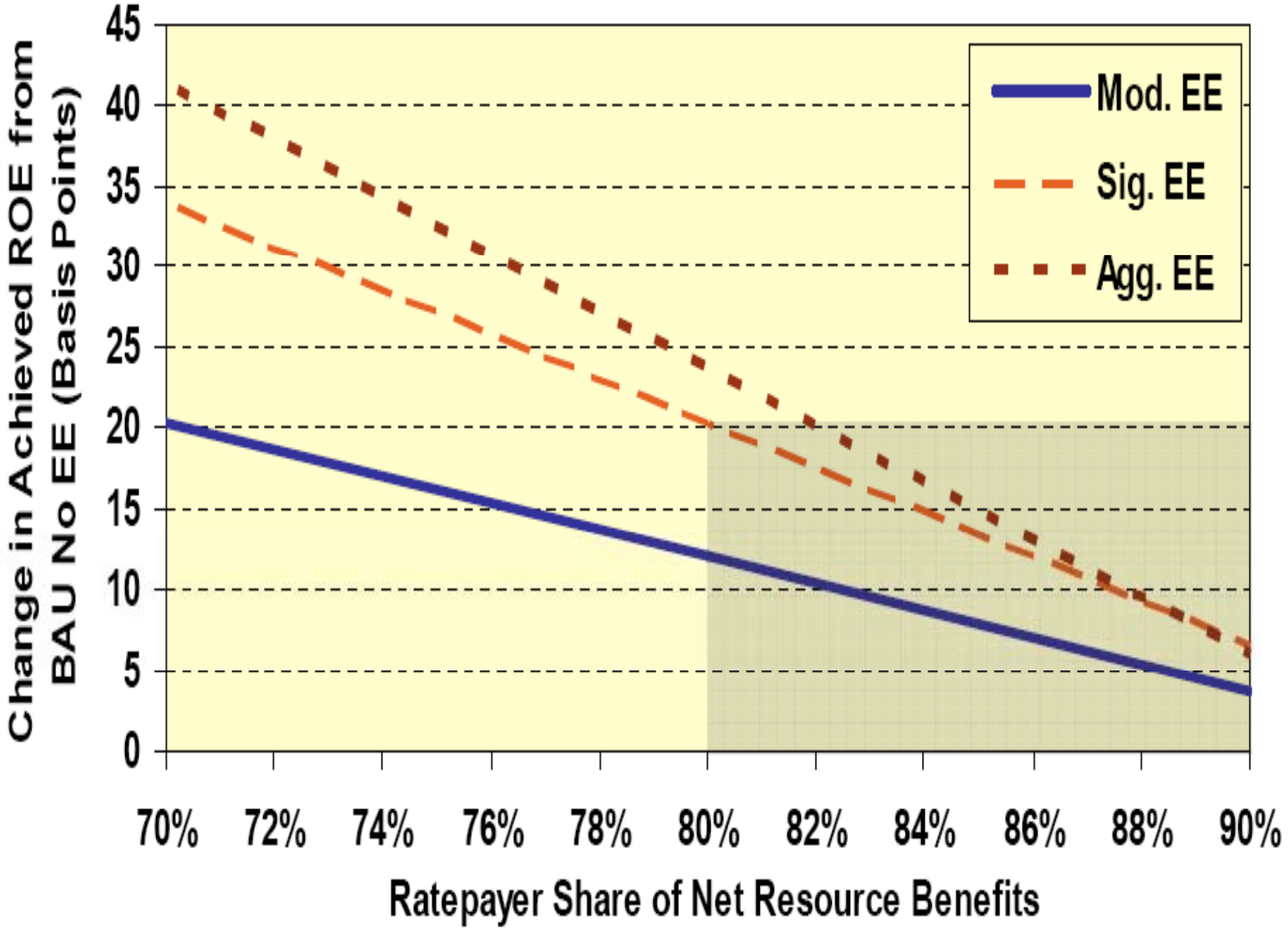
- Sharing benefits of energy efficiency
  - Overall balance between consumer and shareholder is an important “front page” test
  - More sharing to shareholder may be appropriate at higher levels of savings to address deeper hit to earnings
  - More sharing may also be more justifiable after some period of sustained performance

Targeted Design for Shareholder Incentive Mechanisms

- Illustrative example: PUC decides EE shareholder incentive mechanism should provide "fair share of benefits" to ratepayers and opportunity for a significant reward to utility for superior performance:
  - Ratepayers retain 80% of net resource benefits
  - Utility shareholders have opportunity to see after-tax ROE increase by at most 20 basis points
- Approach provides implicit determination by a PUC of "how much is enough":
  - To motivate utility managers to achieve superior performance
  - To gain support of customer and other stakeholder groups for utility EE business model by putting upper bounds on financial and rate impacts

Designing an incentive plan: Study finds…

- Savings pie has to be big enough to divide to get a meaningful earnings bump,
  - Moderate EE is not enough
  - Enough savings in Significant and Aggressive cases


Change in Achieved ROE from BAU No EE (Basis Points)
45
40
35
30
25
20
15
10
5
0
Mod. EE
Sig. EE
Agg. EE
70%
72%
74%
76%
78%
80%
82%
84%
86%
88%
90%
Ratepayer Share of Net Resource Benefits

Key Issue

- Public interest concerns will bound what is realistic to pay for incentives
  - Limits on earnings (front page test, again) will bound incentive levels
  - 3rd party test – if utility demand excessive incentives, 3rd party administration is always available alternative
    - Decoupling appropriate even with 3rd party or mandated resource standard to motivate cooperation

Last Words

- Success will balance distinct interests in pursuit of public interest
- Incentives are best if they reward (defined) superior performance
- Earnings potential may grow if savings targets and public benefit also grow

Where to find the report:

www.raponline.org/Pubs/LBNL_EE_Incentives_030309_FINALv11_MainReport.pdf

You can just go to raponline.org and search our publications for “energy efficiency”

Thanks for your attention

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- http://www.raponline.org
- RAP Mission: ***RAP is committed to fostering regulatory policies for the electric industry that encourage economic efficiency, protect environmental quality, assure system reliability, and allocate system benefits fairly to all customers.***