The Business Case for Energy Efficiency

National Action Plan for Energy Efficiency

www.epa.gov/eeactionplan

Name

Title

Company/Organization

Introduction to National Action Plan for Energy Efficiency

- **Goal:** To create a sustainable, aggressive national commitment to energy efficiency through gas and electric utilities, utility regulators, and partner organizations
- Over 60 member public-private Leadership Group developed five recommendations and commits to take action
- Additional commitments to energy efficiency (EE) – more than 120 organizations
- This briefing is part of an educational series on key Action Plan issues
- Establishing and communicating the business case for EE is a key theme of the National Action Plan

National Action Plan for Energy Efficiency Recommendations

- Recognize energy efficiency as a high-priority energy resource.
- Make a strong, long-term commitment to implement cost-effective energy efficiency as a resource.
- **Broadly communicate the benefits of and opportunities for energy efficiency.**
- Provide sufficient, timely and stable program funding to deliver energy efficiency where cost-effective.
- Modify policies to align utility incentives with the delivery of cost-effective energy efficiency and modify ratemaking practices to promote energy efficiency investments

We Are Facing Key Energy Challenges

- Energy demand is growing and not predicted to slow
- Cost of electricity generation is increasing
  - Coal prices
  - Gas prices
  - Building cleaner generation
- Volatile natural gas prices
- Grid reliability issues/concerns
- Carbon risk
- Pending large transmission and generation investments in uncertain investment world

Costs are rising and not likely to drop

Energy Efficiency Helps Address These Challenges

- **Environmental**
  - Lower greenhouse gas emissions and other pollutants
  - Lower water use
- **Economic**
  - Lower cost (about half) compared to new generation & transmission
  - Downward pressure on natural gas prices and volatility
  - Improved local economy and service to low income and seniors
- **Utility System Benefits**
  - Near-term fix with persistent, long-term benefits
  - Improved security of systems
  - Lower baseload and peak demand
  - Reduce need for “hard to site” generation & transmission assets
  - Targeted, modular, manageable
- **Risk Management**
  - Diversifies utility resource portfolios

Large Benefits from Enhanced Energy Efficiency – A Look Nationally

Large potential benefits over next 15 years from extending leading energy efficiency programs to the entire country:

- Avoid more than half of expected growth in demand – electricity and natural gas
- Save nearly $20 billion annually on energy bills.
- See more than $250 billion in net societal benefits, accounting for the cost of EE
- Avoid 30,000 MW -- 60 new 500 MW power plants
- Avoid more than 400 million tons of CO2 annually

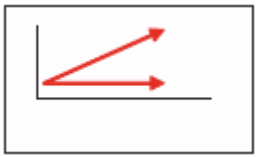
Program Cost	Electric	Natural Gas	Total
Utility Program Spending (% of utility revenue)	2.0%	0.5%	
Total Cost of Efficiency (Customer & Utility)	$35/MWh	$3/MMBtu	
Cost of Efficiency (Customer)	$15/MWh	$2/MMBtu	
Average Annual Cost of Efficiency $MM	$6,800	$1,200	
Total Cost of Efficiency (NPV, $MM)	$140,000	$25,000	$165,000
Resulting Savings	**Electric**	**Natural Gas**	**Total**
Annual Customer Savings $MM	$18,000	$5,000	$23,000
Annual Net Societal Savings ($MM)	$17,500	$5,000	$22,500
Annual Decrease in Revenue Requirement ($MM)	$22,000	$6,000	$28,000
Energy Savings	**Electric**	**Natural Gas**	**Total**
Percent of Growth Saved, Year 15	61%	52%	
Percent of Consumption Saved, Year 15	12%	5%	
Peak Load Reduction, Year 15 (Derated)	34,000 MW		
Energy Saved, Year 15	588,000 GWh	1,200 Bcf	
Energy Saved (cumulative)	9,400,000 GWh	19,000 Bcf	
Emissions Reductions	**Electric**	**Natural Gas**	**Total**
CO2 Emissions Reduction (1000 Tons), Year 15	338,000	72,000	410,000

Business Cases for EE: Summary

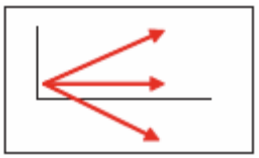
A well-designed approach to EE benefits customers, utilities and society:

- **Reduces customer bills over time**
- **Fosters financially healthy utilities**
- **Contributes to positive societal net benefits overall**

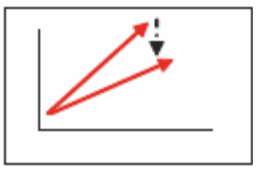
Utility Perspective



Utility Returns – No Change or Increase



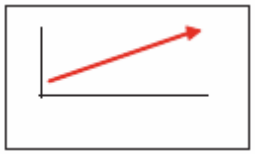
Change in Utility Earnings – Results Vary



Peak Load Growth and Associated Capital Investment – Decreases

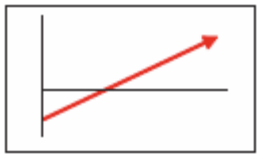
Customer Perspective

Customer Bills – Decrease

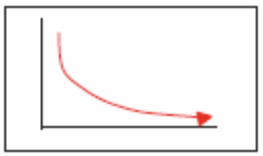


Customer Rates – Mild Increase

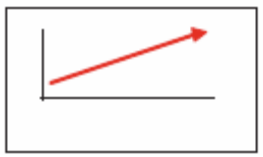
Society/Community Perspective



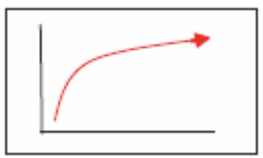
Net Resources Savings – Increases



Total Resource Cost (TRC) per Unit - Declines



Emissions and Cost Savings – Increases



Growth Offset by EE – Increases

EE Business Cases for Utilities

- Eight business cases evaluated as part of National Action Plan for Energy Efficiency
  - Isolate the impact of EE investments
  - Illustrate effect of decoupling mechanisms
  - Compare savings with and without EE over a 15-year horizon
- Business cases evaluated:
  - IOU electric and natural gas low-growth and high growth
  - IOU power plant investment in 2009 low-growth and high growth
  - Vertically-integrated utility and restructured delivery company
  - Publicly and Cooperatively owned financial structure
- Speaker insert information on your situation

EE Business Cases for Utilities

Key finding: All types of utilities can benefit from increased investment in EE

- Lower costs over time for both utilities and customers
- Positive net benefits to society – hundreds of millions of dollars in net present value
- Utility's financial health maintained while cost-effective EE programs are implemented if policies in place to address the throughput incentive

Note to Speaker: Slides 9-38 are designed to be removed without a break in flow to maximize the relevance of the Cases that are applicable to you or your audience

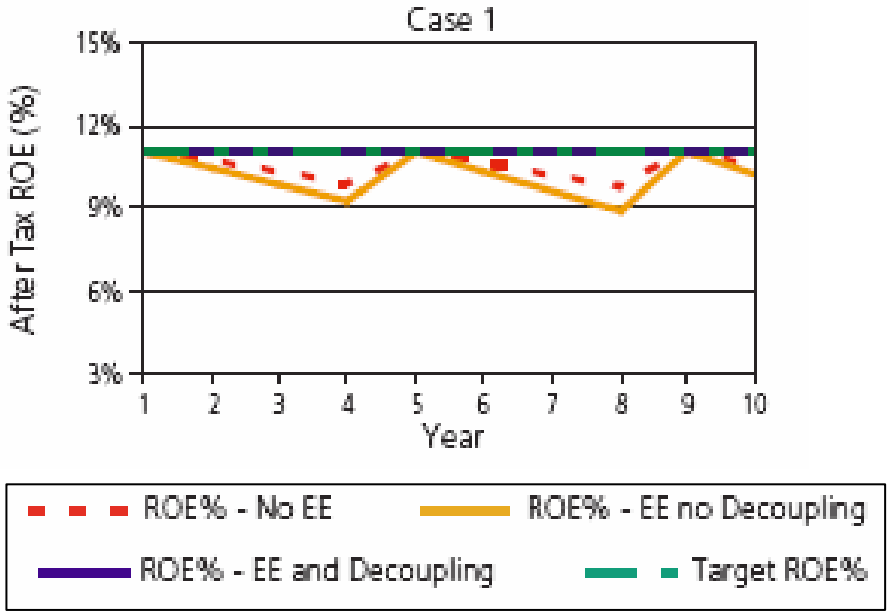
Case 1: Low-Growth Electric & Gas Utility -- Key Assumptions

- Electric utility
  - 1% sales growth rate
  - No pending power plant investment
  - Capacity long
  - Utility program spending - 2% of utility revenue
  - Total EE program costs – $35/MWh
- Natural gas utility
  - 0% sales growth rate
  - Utility program spending – 0.5% of utility revenue
  - Total EE program costs – $3/MMBtu

Case 1: Low-Growth Electric Utility
Utility Perspective

Investor-Owned Utility Return on Equity (ROE)

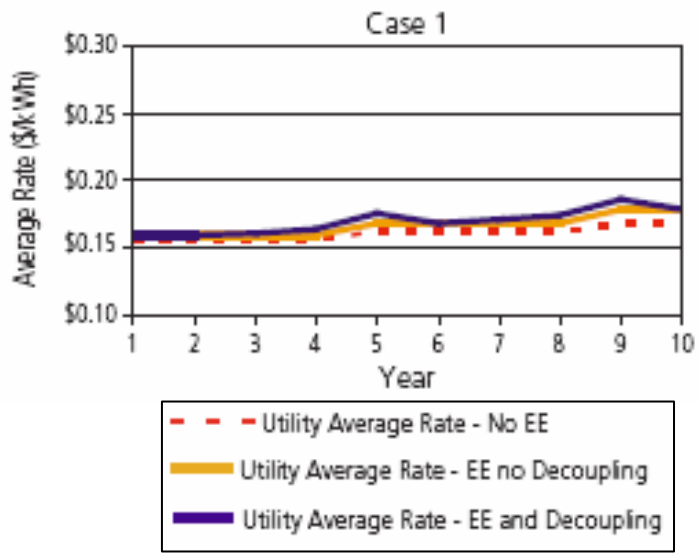
- Without EE and decoupling, the low sales drive ROE below the target return.
- Target ROE is achieved with EE and decoupling.
- Increasing EE without decoupling decreases ROE.



Case 1: Low-Growth Electric Utility
Customer Perspective

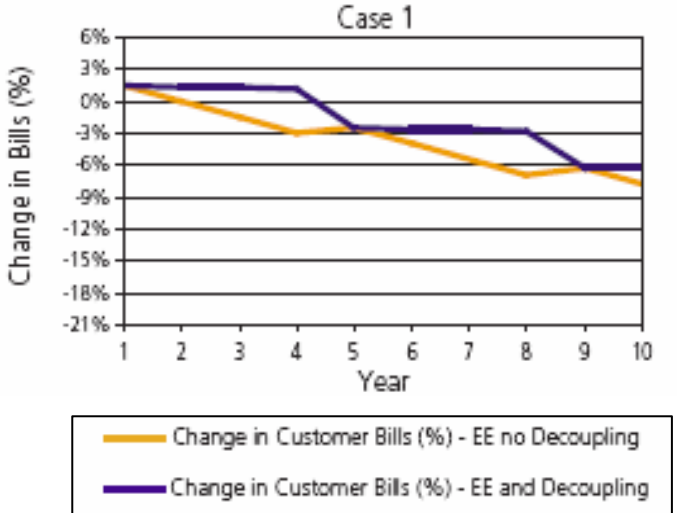
Average Rates (kWh)

- Without EE, the utility sells higher volumes than in the no EE scenarios and has slightly lower rates.
- Rates in the EE scenario increase primarily due to lower throughput;
- Rates are slightly higher in the decoupling scenario due to increase earnings to the target ROE.



Percent Change in Customer Bills

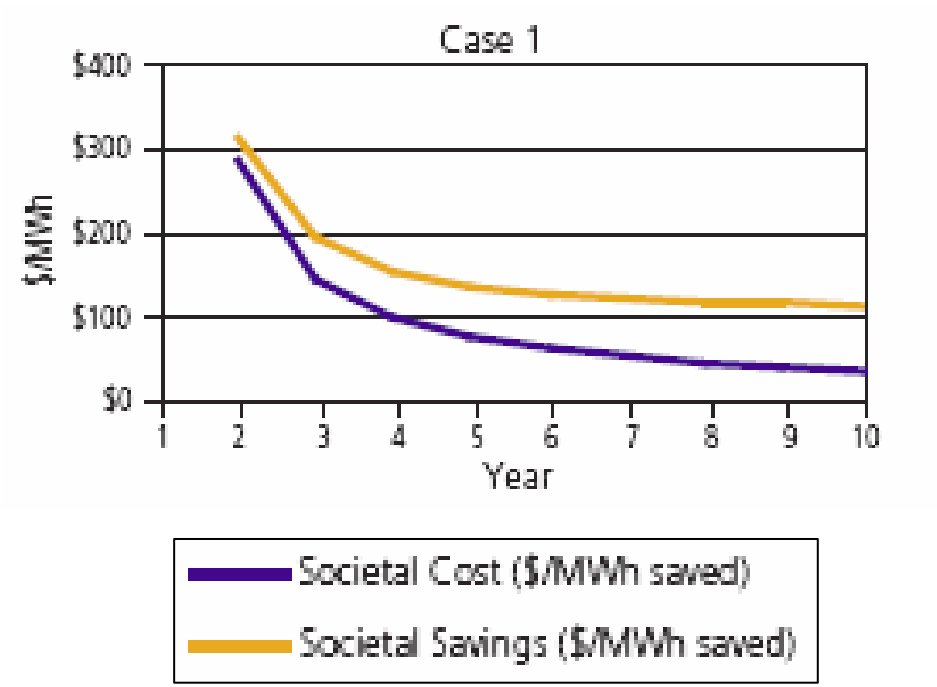
- Total customer bills with EE programs decline over time, indicating customer savings resulting from lower energy consumption.
- Rate increases through the decoupling mechanism reduce the pace of bill savings in the decoupling case.



Case 1: Low-Growth Electric Utility Society/Community Perspective

Net Societal Benefits

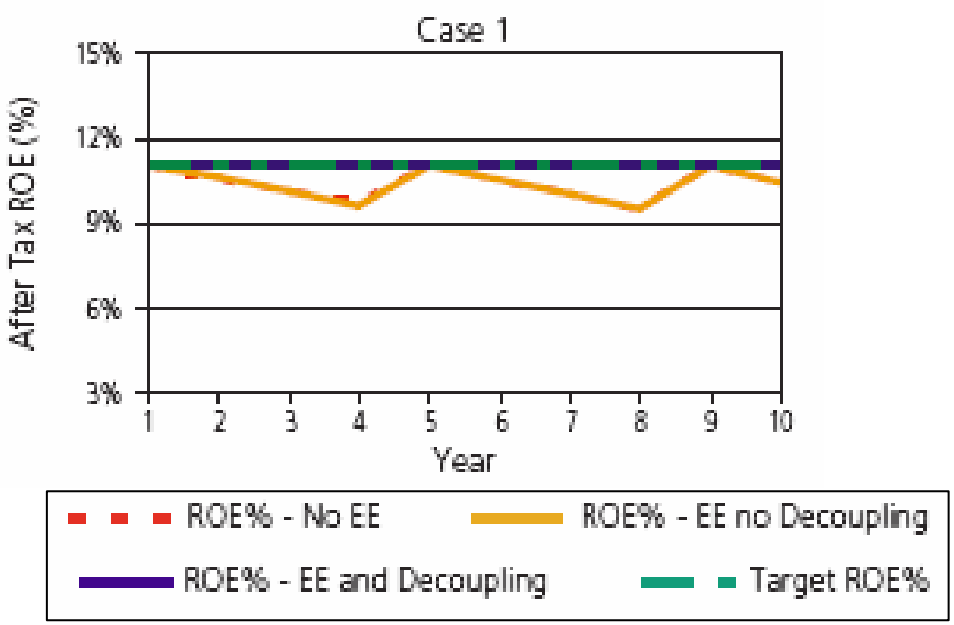
- Over time, the savings from EE exceed the annual costs.
- Societal cost and societal savings are the same, with and without decoupling.



Case 1: Low-Growth Natural Gas Utility
Utility Perspective

Investor-Owned Utility Return on Equity

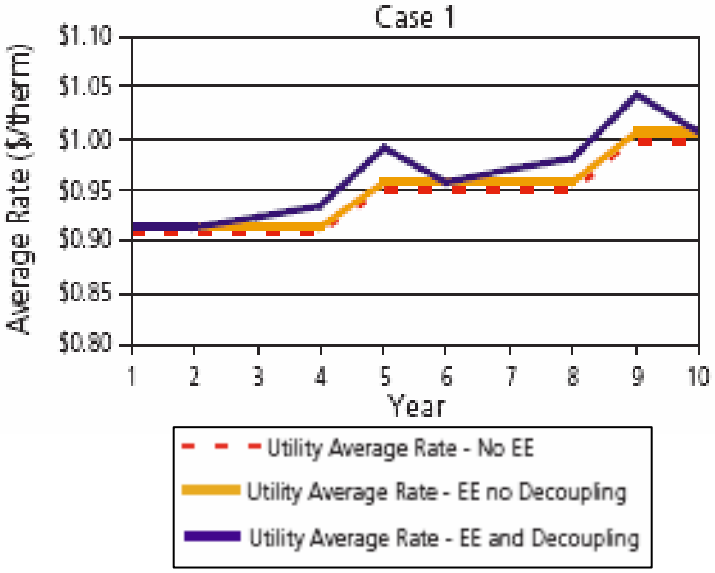
- Without EE and decoupling, the low sales result in ROE falling below the target return.
- Similarly, EE without decoupling drops utility return below target ROE.
- Target ROE is achieved with decoupling.



Case 1: Low-Growth Natural Gas Utility
Customer Perspective

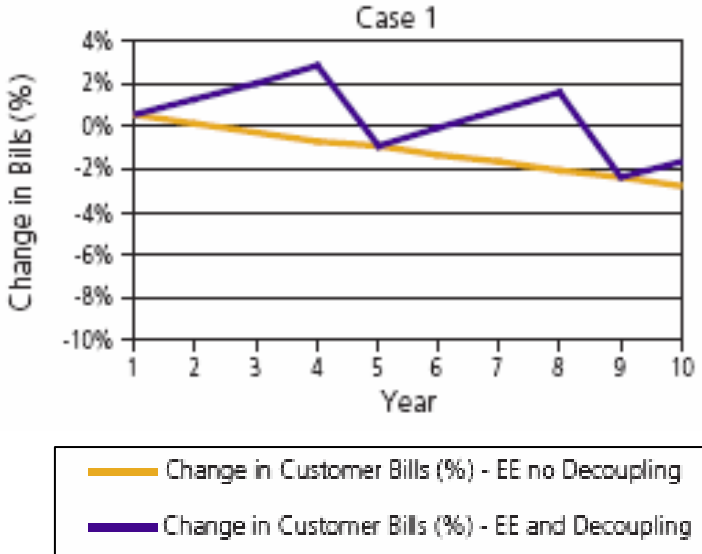
Average Rates (kWh)

- Rates increase over time because of increasing rate base and low sales growth.
- Without EE, the utility sells higher volumes and has lower rates.
- Decoupling increases rates when sales volumes are below target.



Percent Change in Customer Bills

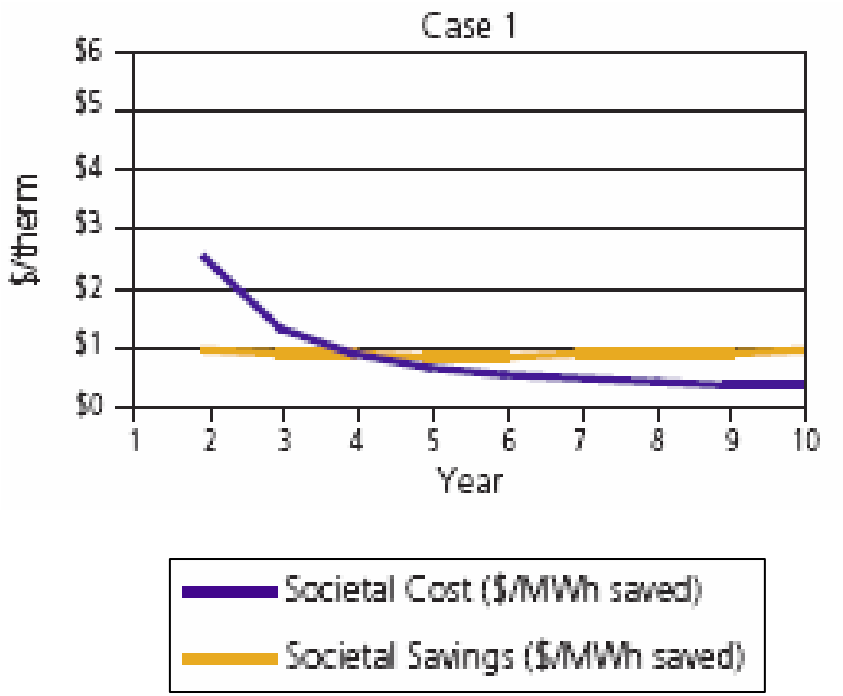
- Total customer bills with EE decline over time, indicating customer savings resulting from lower energy consumption.
- Customer utility bills initially increase slightly with decoupling as rates are increased to hold ROE at the target level and spending increases on EE



Case 1: Low-Growth Natural Gas Utility Society/Community Perspective

Delivered Costs and Benefits of EE

- Over time, the savings from EE exceed the annual costs.
- Societal cost and societal savings are the same, with and without decoupling.



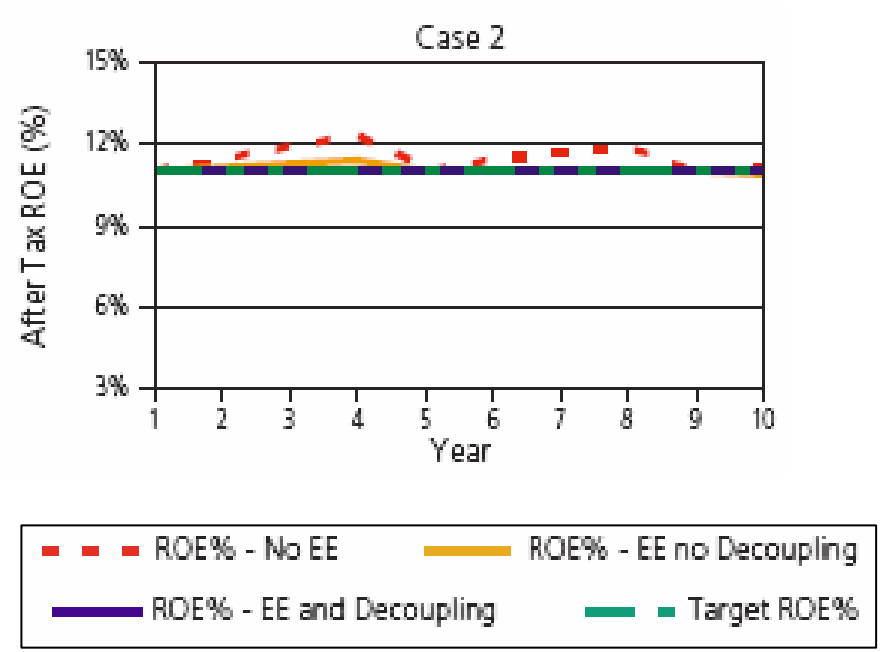
Case 2: High-Growth Electric & Gas Utility -- Key Assumptions

- Electric utility:
  - 5% sales growth rate
  - No pending power plant investment
  - Utility program spending – 2% of utility revenue
  - Total EE program costs – $35/MWh
- Natural gas utility:
  - 2% sales growth rate
  - Utility program spending – 0.5% of utility revenue
  - Total EE program costs – $3/MMBtu

Case 2: High-Growth Electric Utility
Utility Perspective

Investor-Owned Utility Return on Equity (ROE)

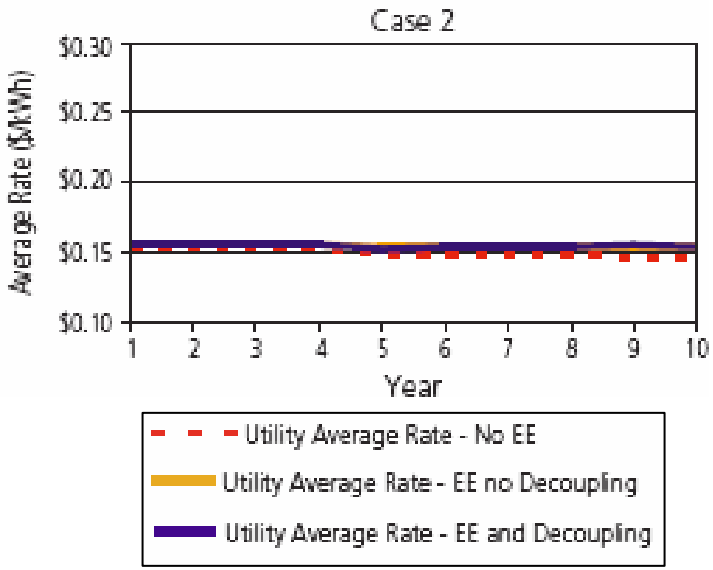
- With high load growth, without decoupling, the utility achieves greater than the target ROE until rates are adjusted.
- With EE, sales and earnings are reduced, reducing ROE.



Case 2: High-Growth Electric Utility
Customer Perspective

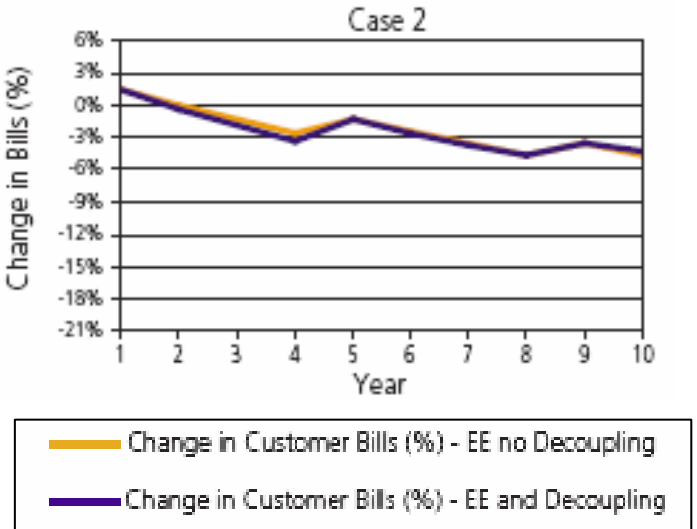
Average Rates (kWh)

- Without EE, the utility sells higher volumes and has slightly lower rates.
- Decoupling does not have a great impact in this case because the ROE is near target levels without any rate adjustments.



Percent Change in Customer Bills

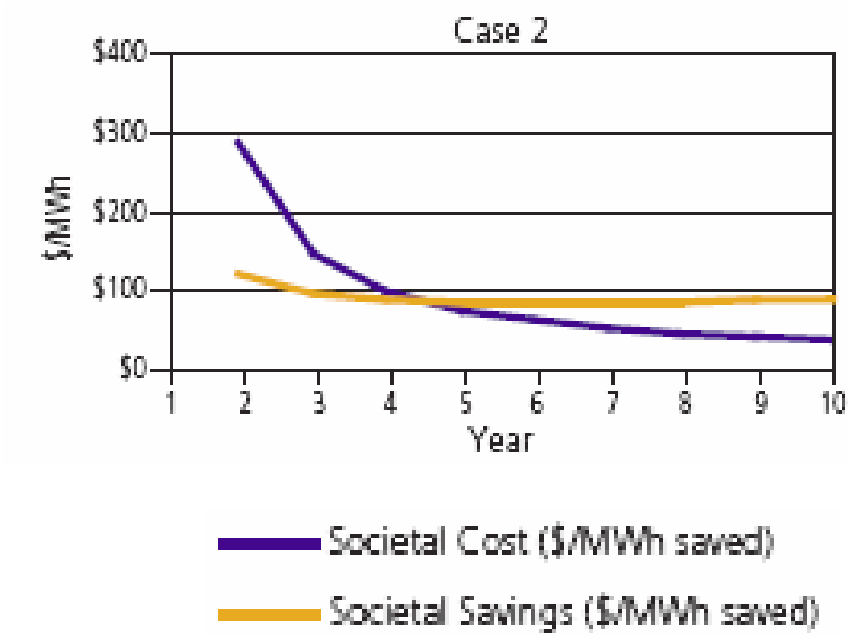
- Total customer bills with EE decline over time, indicating customer savings resulting from lower energy consumption.



Case 2: High-Growth Electric Utility
Society/Community Perspective

Net Societal Benefits

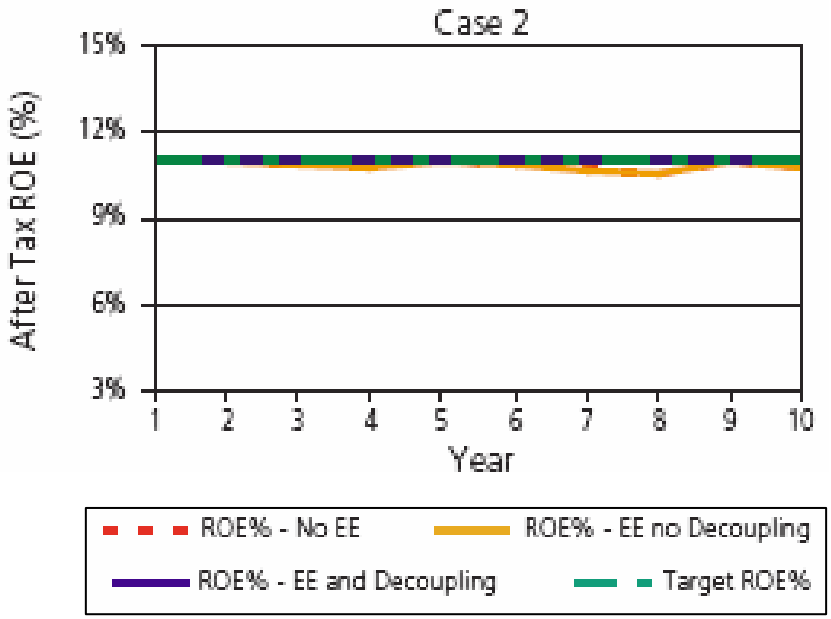
- Over time, the savings from EE exceed the annual costs.
- Societal cost and societal savings are the same, with and without decoupling.



Case 2: High-Growth Natural Gas Utility
Utility Perspective

Investor-Owned Utility Return on Equity

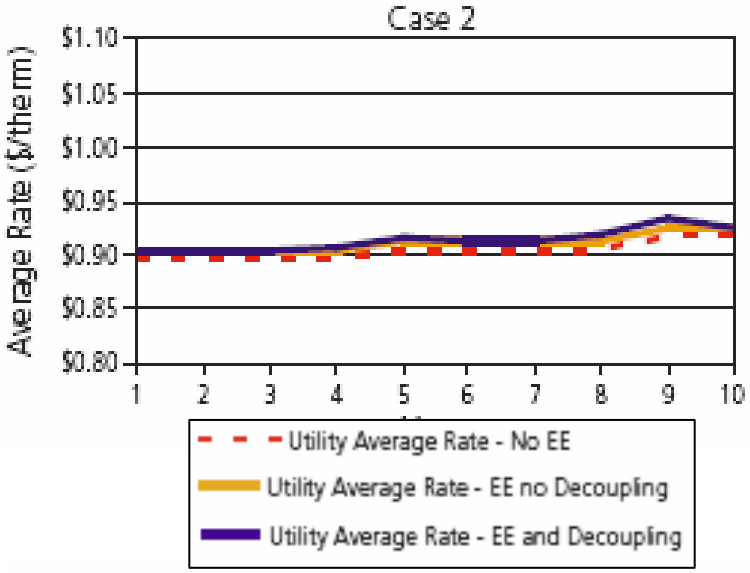
- With high load growth, EE has less impact on total sales and earnings.
- The utility achieves close to its target ROE in the early years, although without decoupling, ROE falls slightly in later years as EE reduces sales over time.



Case 2: High-Growth Natural Gas Utility
Customer Perspective

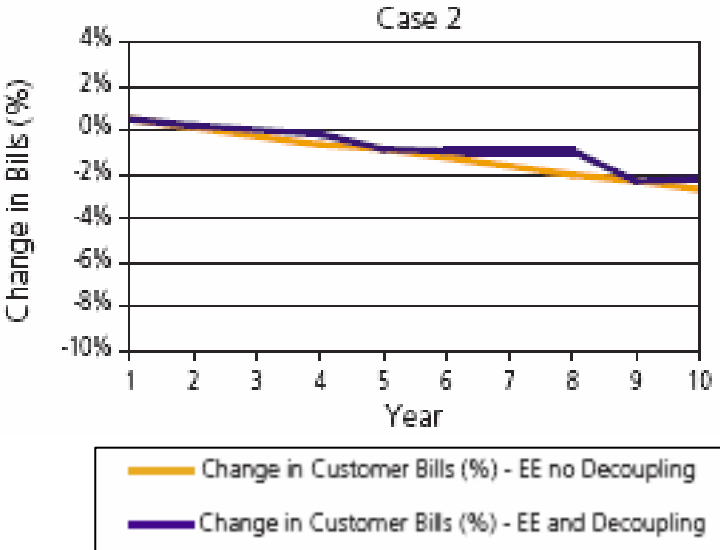
Average Rates (kWh)

- Without EE, the utility sells higher volumes and has lower rates.
- EE increases rates slightly in later years by reducing sales volumes.



Percent Change in Customer Bills

- Customer utility bills with EE reflect the more limited impact of EE programs on rate profile.
- Total customer bills decline over time, indicating customer savings resulting from lower energy consumption.



Case 2: High-Growth Natural Gas Utility
Society/Community Perspective

Delivered Costs and Benefits of EE

- Over time, the savings from EE exceed the annual costs.
- Societal cost and societal savings are the same, with and without decoupling.

Case 3: Low-Growth with Electric Power Plant Deferral -- Key Assumptions

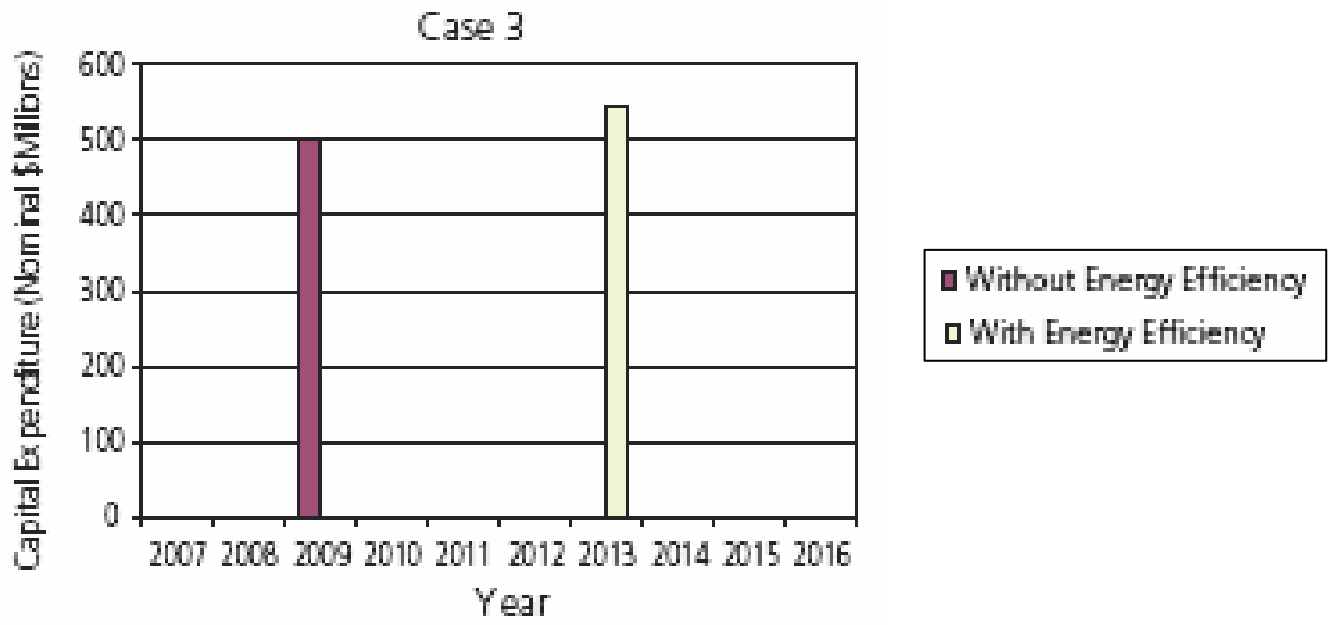
- 1% sales growth rate
- Utility program spending – 2% of utility revenue
- Total EE program costs – $35/MWh
- 75% of energy savings on peak
- 50% growth related generation capacity saved
- 50% growth related capital expenditures saved

Case 3: Power Plant Deferral with Low-Growth

- 2009 power plant deferred to 2013.
- Results in present value savings of $36 million over the 3 years the project was deferred.
- Increase in rates from EE programs is **significantly less** than the rate increase that occurs after the new power plant investment is made, leading to **lower customer bills**.
- Customer bill savings are greatest during the years that the plant is deferred.

Case 3: Power Plant Deferral Length with Low-Growth

Comparison of Power Plant Investment Timing - Electric Utility

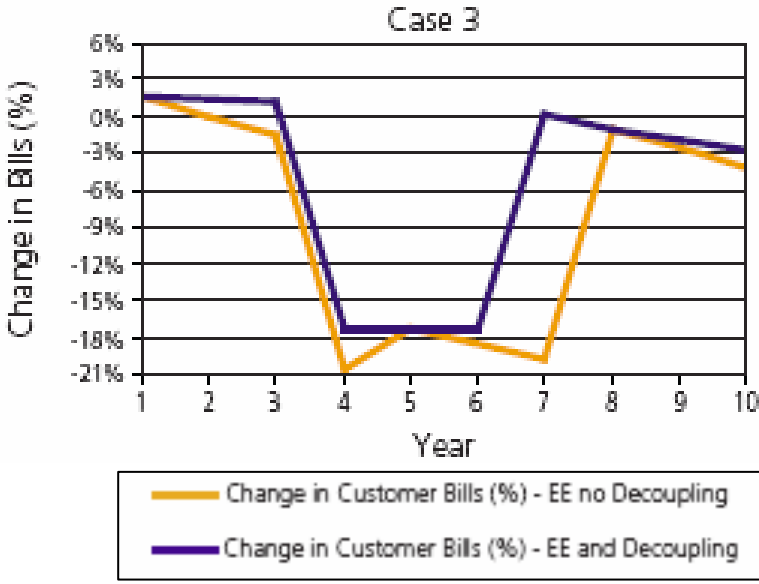


30-year savings impact from EE	Low-Growth Utility
Decrease in Revenue Requirement (net present value [NPV], million dollars [$MM])	$476
Net Customer Savings - decoupling (NPV, $MM)	$319
Net Societal Benefit (NPV, $MM)	$332

Case 3: Power Plant Deferral with Low-Growth

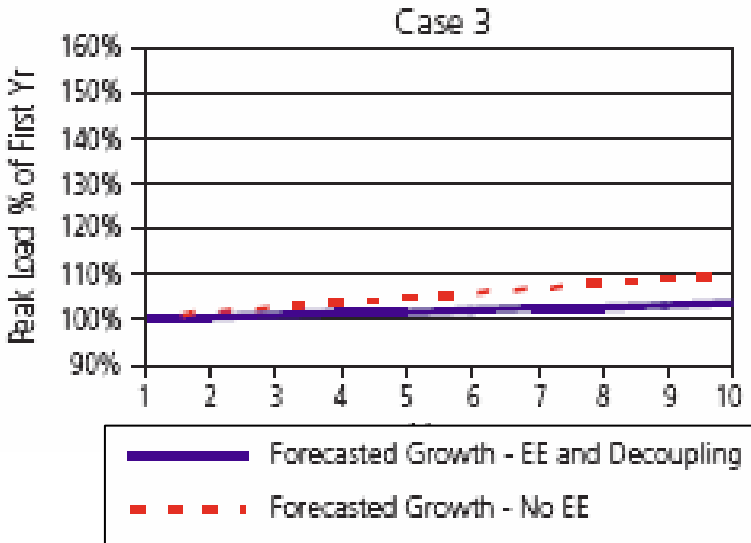
Percent Change in Customer Bills

- Rates rise with large capital expenditures
- Customer bills continue to fall over time as EE drives customer volume down to offset the higher rates.



Comparison of Peak Load Growth

- EE significantly reduces load growth
- EE reduces and defers the need for new capital investment.



Case 4: High-Growth with Electric Power Plant Deferral -- Key Assumptions

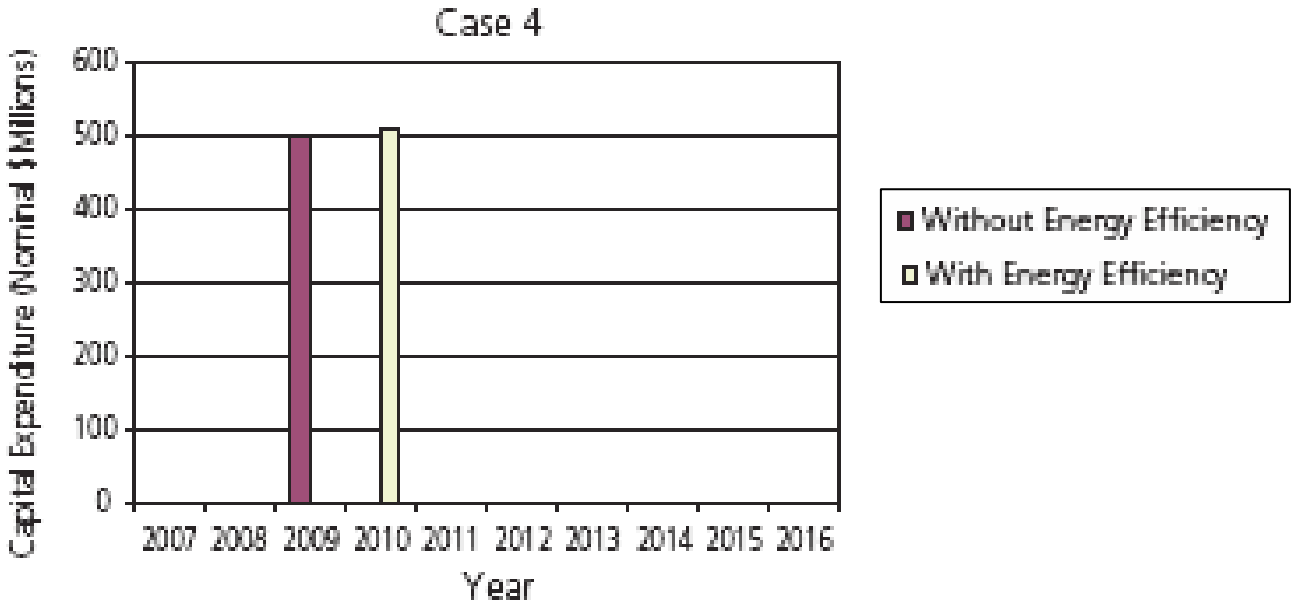
- 5% sales growth rate
- Utility program spending – 2% of utility revenue
- Total EE program costs – $35/MWh
- 75% of energy savings on peak
- 50% growth related generation capacity saved
- 50% growth related capital expenditures saved

Case 4: Power Plant Deferral with High-Growth

- 2009 power plant deferred to 2011.
- Results in present value savings of $11 million for the 1 year deferral.
- Increase in rates from EE programs is **significantly less** than the rate increase that occurs after the new power plant investment is made, leading to **lower customer bills**.
- Customer bill savings are greatest during the years that the plant is deferred.

Case 4: Power Plant Deferral Length with High-Growth

Comparison of Power Plant Investment Timing - Electric Utility

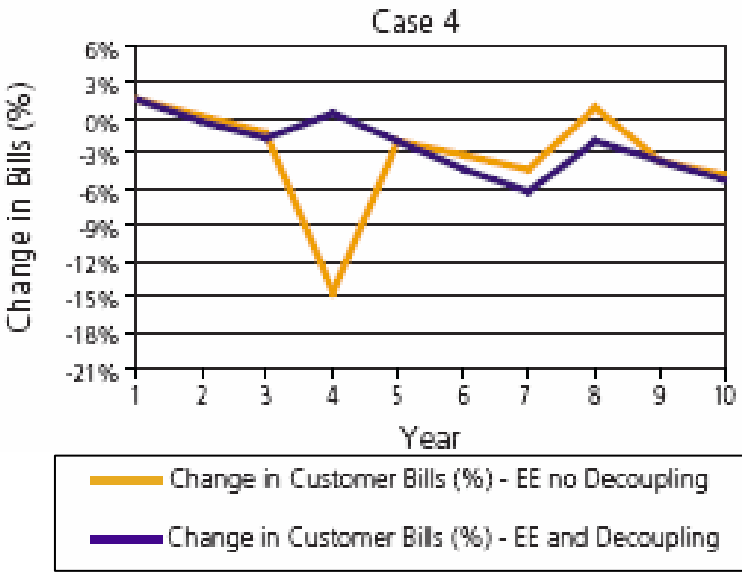


30-year savings impact from EE	High-Growth Utility
Decrease in Revenue Requirement (net present value [NPV], million dollars [$MM])	$338
Net Customer Savings - decoupling (NPV, $MM)	$275
Net Societal Benefit (NPV, $MM)	$269

Case 4: Power Plant Deferral with High-Growth

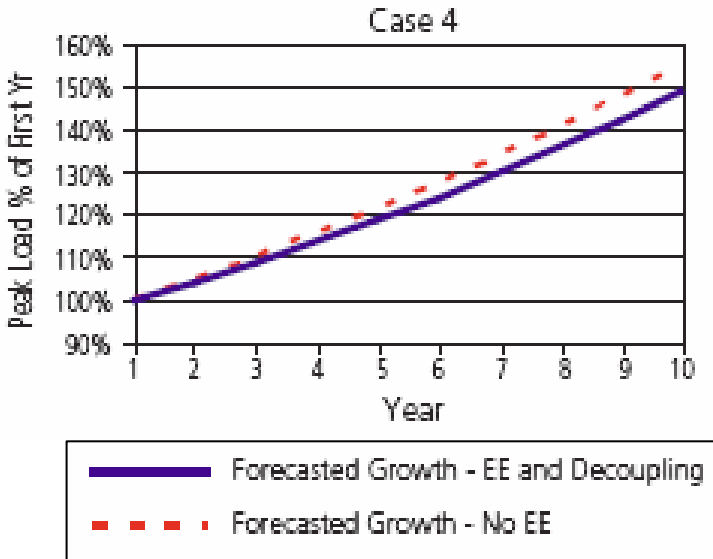
Percent Change in Customer Bills

- Rates rise with large capital expenditures
- Customer bills continue to fall over time as EE drives customer volume down to offset the higher rates



Comparison of Peak Load Growth

- With high growth, EE has a limited impact on peak load and defers a modest amount of new capital investment.



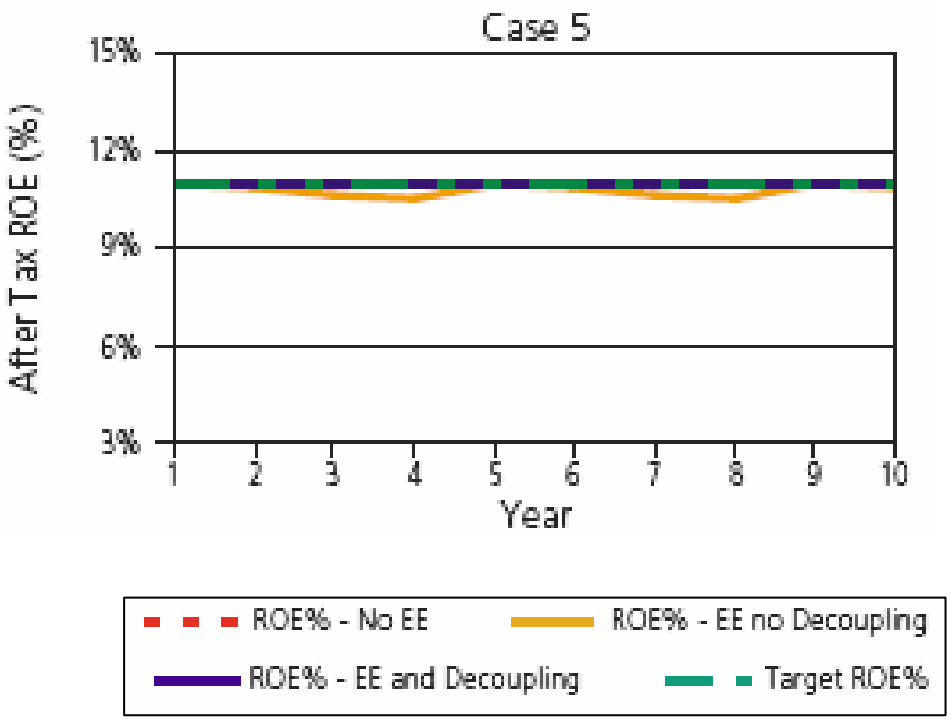
Case 5 : Vertically Integrated Utility - Key Assumptions

- Experiences a 2% percent growth rate
- Invests 2% of revenue in EE
- Assumes the vertically integrated utility has more capital assets and larger annual capital expenditures than a restructured delivery utility.

Case 5: Vertically Integrated Utility
Utility Perspective

Investor-Owned Utility Return on Equity (ROE)

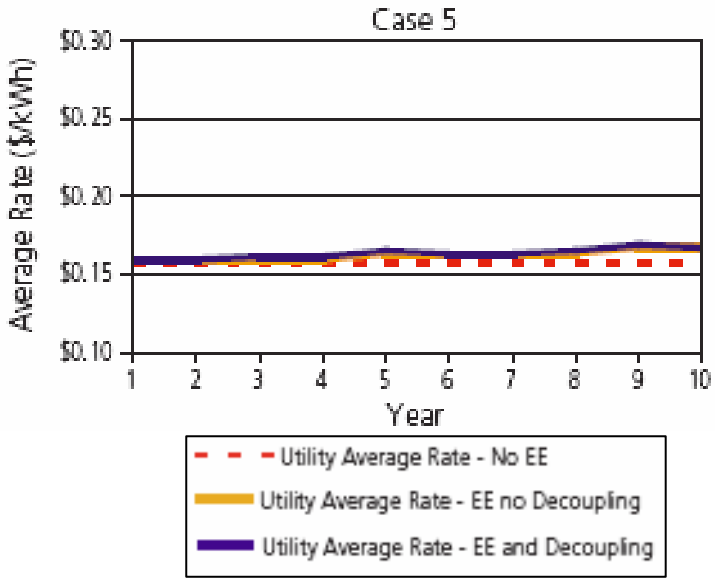
- Since the vertically integrated utility has a large rate base, the impact of EE upon total earnings is limited and it has little impact upon ROE (with or without decoupling).



Case 5: Vertically Integrated Utility
Customer Perspective

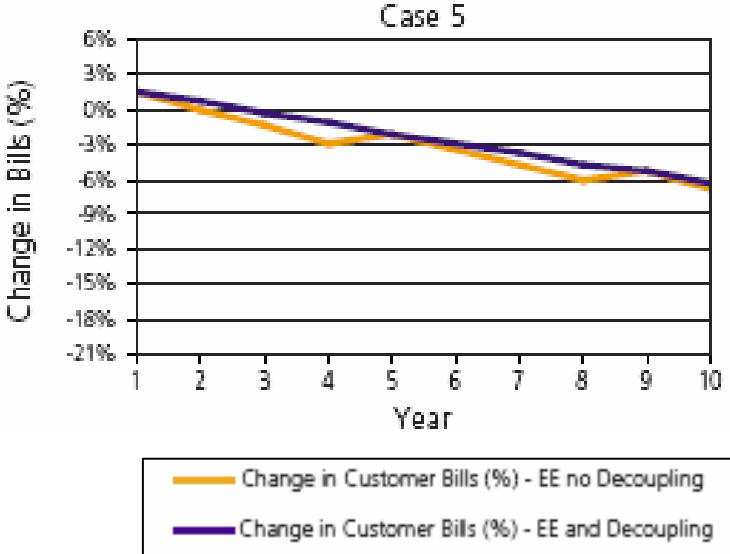
Average Rates (kWh)

- Without EE, the utility sells higher volumes and has lower rates.



Percent Change in Customer Bills

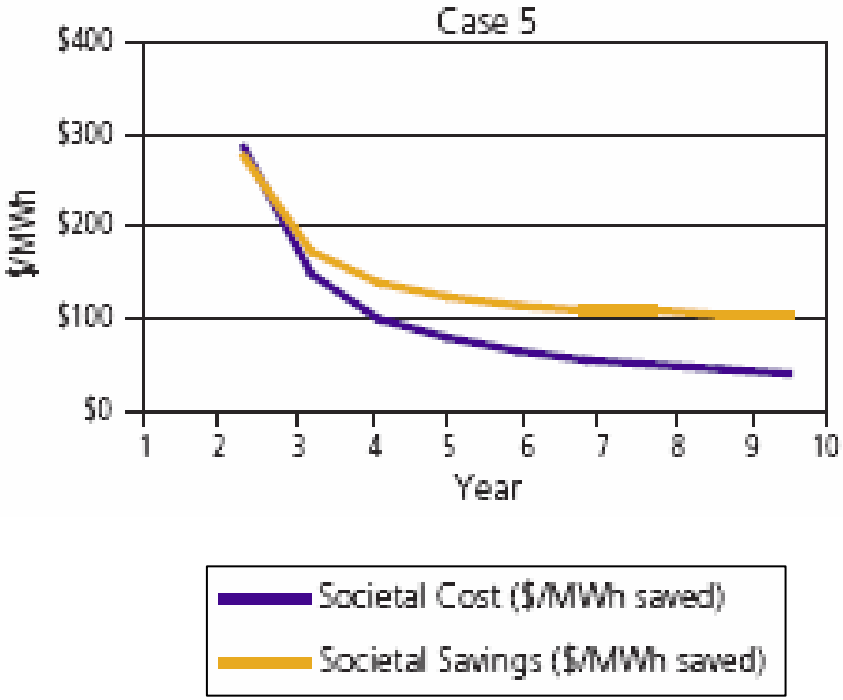
- Total customer bills with EE programs decline over time, indicating average customer savings resulting from lower energy consumption.
- Customer utility bills decrease more smoothly with decoupling as a result of the more frequent rate adjustments.



Case 5: Vertically Integrated Utility Society/Community Perspective

Delivered Costs and Benefits of EE

- Over time, the savings from EE exceed the annual costs.
- The societal cost and societal savings are the same, with and without decoupling.



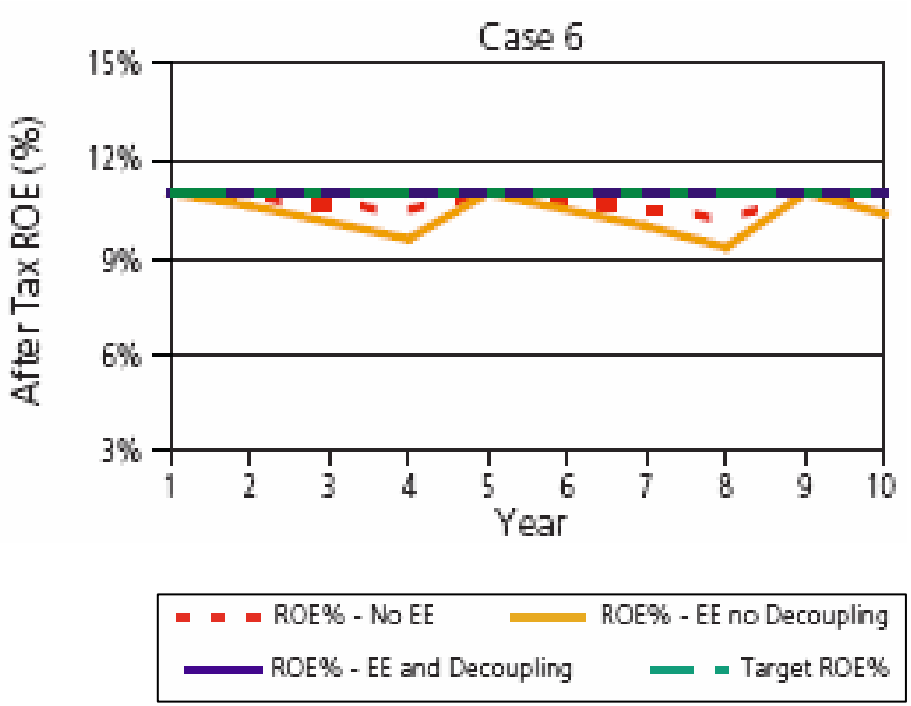
Case 6: Restructured Delivery Company - Key Assumptions

- Restructured Delivery Company is a utility without generation or retail sales functions.
- Experiences a 2% percent growth rate
- Invests 2% of revenue in EE
- Assumes a vertically integrated utility has more capital assets and larger annual capital expenditures than the restructured delivery utility.

Case 6: Restructured Delivery Company
Utility Perspective

Investor-Owned Utility of Return on Equity (ROE)

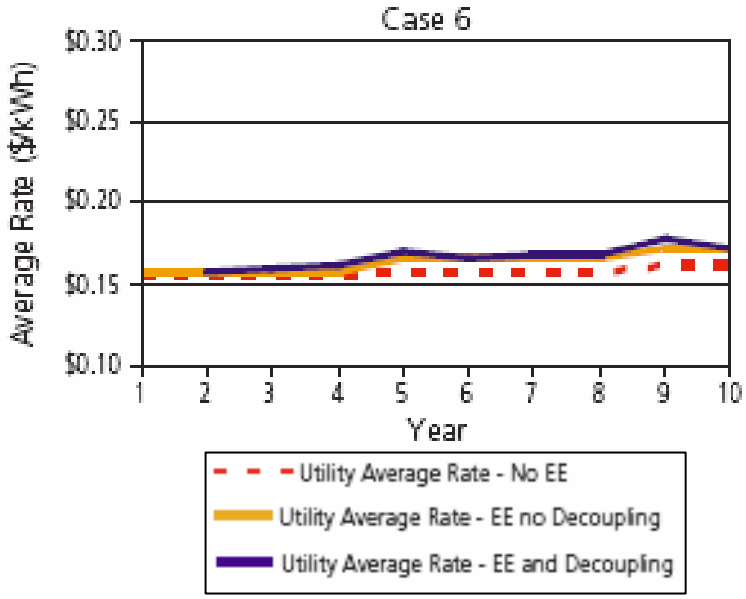
- With a smaller rate base and revenues only from kWh deliveries, EE has a large impact on a ROE without decoupling than a vertically integrated utility.



Case 6: Restructured Delivery Company Customer Perspective

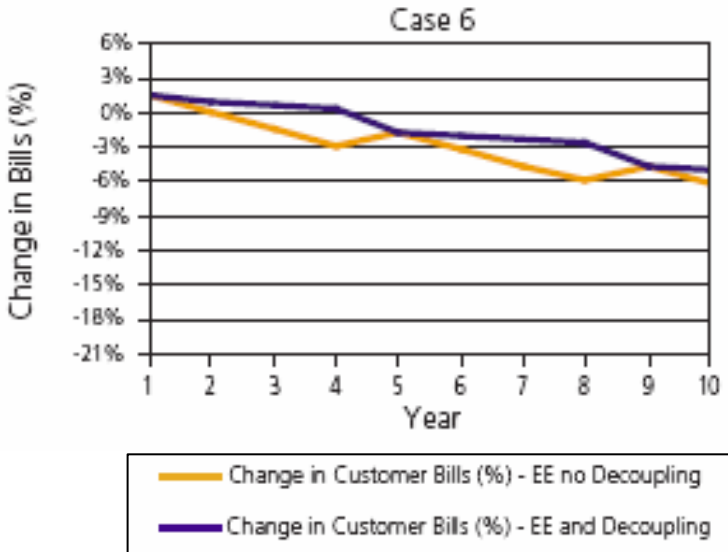
Average Rates (kWh)

- Without EE, the utility transports higher volumes and has lower rates.



Percent Change in Customer Bills

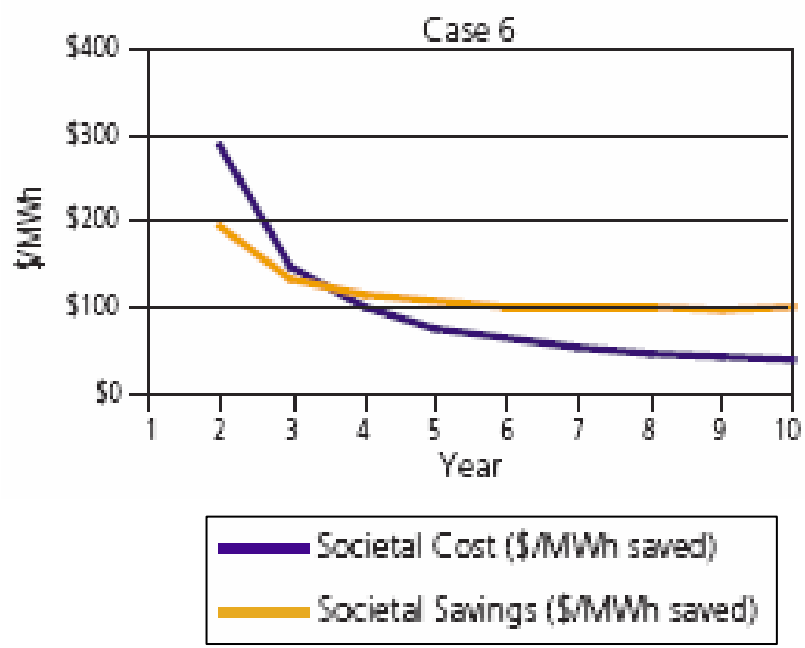
- Total customer bills with EE programs decline over time, indicating average customer savings resulting from lower energy consumption.
- Customer utility bills decrease more slowly in the decoupling case, because rates are increased earlier to offset reduced sales.



Case 6: Restructured Delivery Company
Society/Community Perspective

Delivered Costs and Benefits of EE

- Savings from EE exceed the costs over time.
- The distribution utility has a low initial societal savings because the distribution company reduces fewer capital expenditures at the outset of the EE investments.



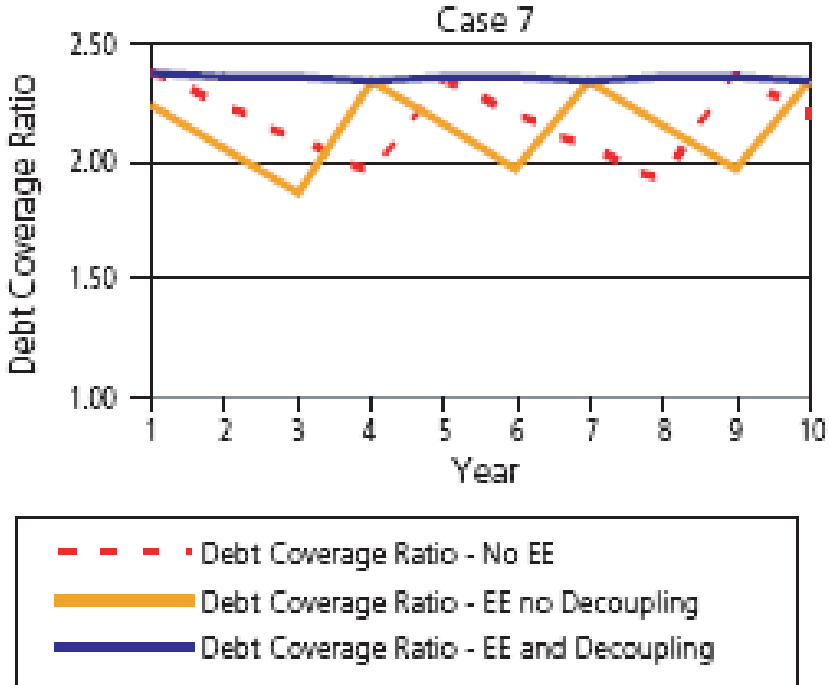
Case 7: Publicly and Cooperatively Owned Electric Utilities - Minimum debt coverage ratio

- Many issues related to impact of growth rates and capital deferral discussed in IOU examples apply to publicly and cooperatively owned utilities
- Net societal benefit perspective = identical results for publicly, cooperatively, and privately owned utilities
- Ratemaking and utility financing perspectives are different
- **Case 7 assumes**:
  - EE program of 2% of revenue
  - 2% load growth

Case 7: Publicly and Cooperatively Owned Electric Utilities - Minimum debt coverage ratio

Utility Financial Health

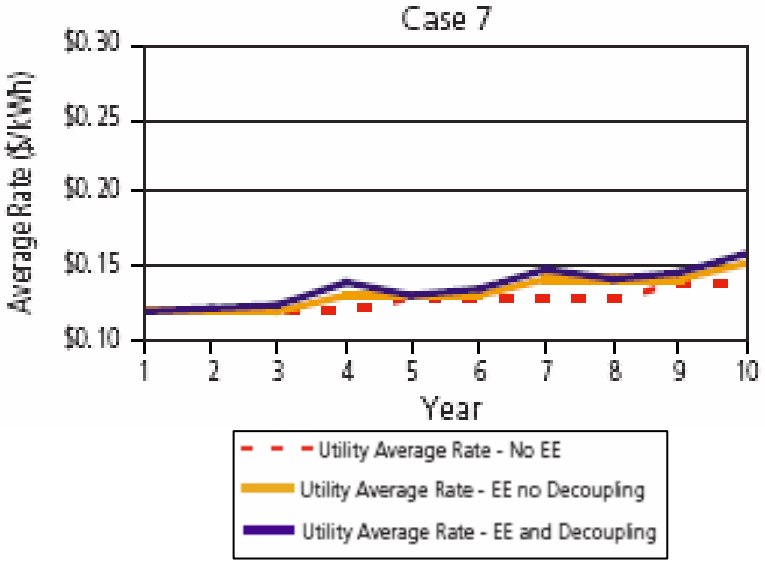
- A decoupling mechanism stabilizes the utility's ability to cover debt by adjusting rates for variations in throughput.
- Without decoupling, rates are adjusted whenever the debt coverage rate falls below a threshold (ratio 2 in the example).
- The rate adjustment is required earlier in the EE scenario.



Case 7: Publicly and Cooperatively Owned Electric Utilities - Minimum debt coverage ratio

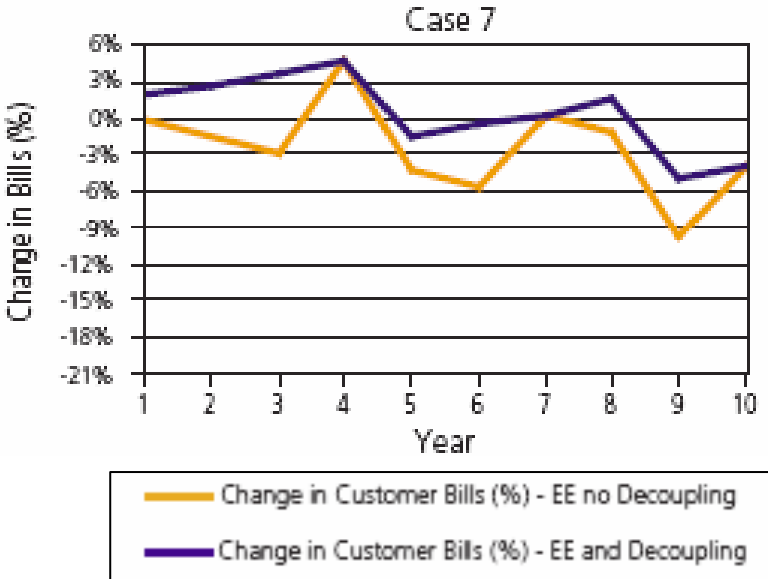
Average Rates (kWh)

- With or without decoupling, rates are adjusted to maintain financial health.
- Rates are lowest without EE and highest with EE and decoupling.



Percent Change in Customer Bills

- Average customer bills decline with EE investments, with and without decoupling.
- The ‘randomness’ in the bill change is due to different timing of rate adjustments in the EE and no EE cases.
- Downward trend overall.



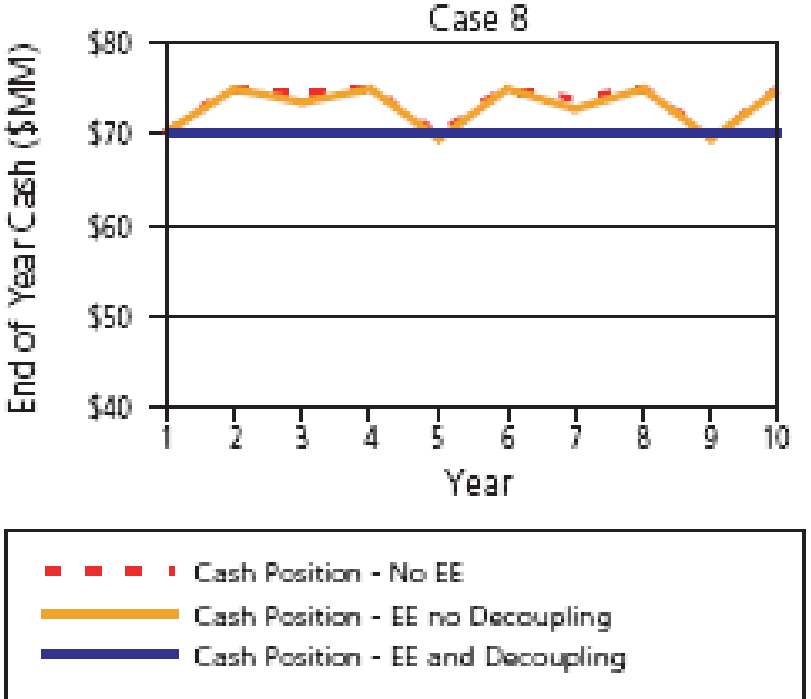
Case 8: Publicly and Cooperatively Owned Electric Utilities - Minimum cash position

- Many issues related to impact of growth rates and capital deferral discussed in IOU examples apply to publicly and cooperatively owned utilities
- Net societal benefit perspective = identical results for publicly, cooperatively, and privately owned utilities
- Ratemaking and utility financing perspectives are different
- Financial position of publicly owned utilities is evaluated primarily based on either:
  - The debt coverage ratio (which is critical to maintaining a high bond rating and low cost capital), or
  - The minimum cash position (for utilities with no debt)
- **Case 8 assumes**:
  - EE program of 2% of revenue
  - 2% load growth

Case 8: Publicly and Cooperatively Owned Electric Utilities - Minimum cash position

Cash Position at End of Year

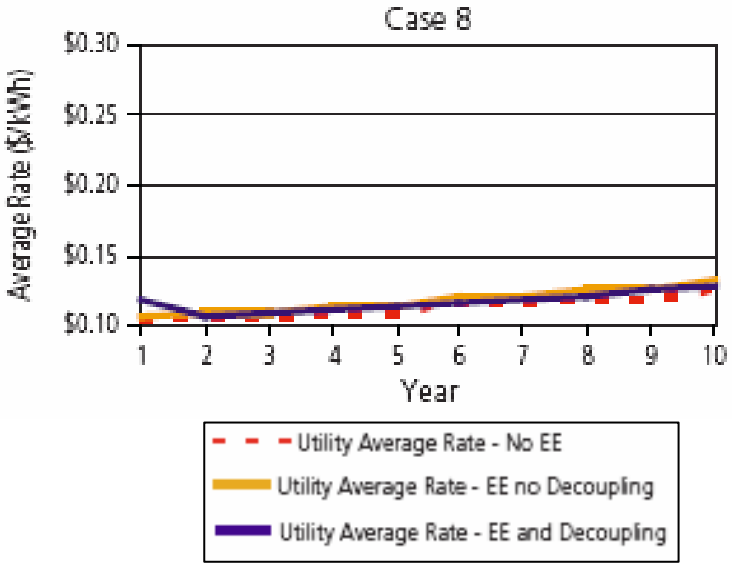
- In the no decoupling cases (with and without EE), rates are reset if the cash position falls below a minimum threshold ($70 million in this example).
- With decoupling, the utility adjusts rates to hit the target cash level in each year.
- Results are similar as long as there is an ability to reset rates when needed to maintain a minimum cash position.



Case 8: Publicly and Cooperatively Owned Electric Utilities - Minimum cash position

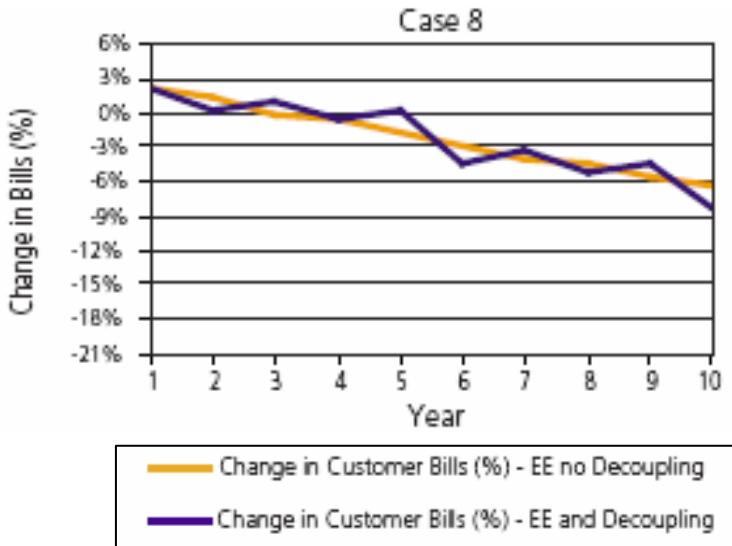
Average Rates (kWh)

- Once EE is implemented, retail rate levels are similar, with or without decoupling in place.
- The decoupling case is slightly smoother with smaller, more frequent rate adjustments.



Percent Change in Customer Bills

- Average customer bills decline with EE investments in both the decoupling and no decoupling cases.



Key Points

- EE business cases show all types of utilities can benefit from increased investment in EE
- Enhanced ratemaking policies can help maintain utility financial health while also allowing recovery just for costs approved by the commission or other oversight body
- Average customer bills decreased 2-9% with efficiency over 10-year periods in the 8 cases
- Positive net benefits to society
- Benefits can increase by quantifying environmental and new infrastructure project risks

National Action Plan for Energy Efficiency Recommendations

- Variety of options exist to overcome the barriers to increased investment in energy efficiency
- EE business cases highlight opportunities for implementing recommendations
  - Ratemaking policies can maintain a utility's financial health while implementing cost-effective EE programs.
  - Increased use of EE can be achieved through evaluating EE as a resource in utility planning processes.
  - Appropriate evaluation of the benefits of EE are key

National Action Plan for Energy Efficiency
Recommendations

- Recognize energy efficiency as a high-priority energy resource.
- Make a strong, long-term commitment to implement cost-effective energy efficiency as a resource.
- Broadly communicate the benefits of and opportunities for energy efficiency.
- Provide sufficient, timely and stable program funding to deliver energy efficiency where cost-effective.
- Modify policies to align utility incentives with the delivery of cost-effective energy efficiency and modify ratemaking practices to promote energy efficiency investments

National Action Plan Resources to Help Demonstrate the Business Case for EE

- **National Action Plan for Energy Efficiency: The Report**
  Covers key barriers and policy options for energy efficiency in resource planning, utility revenue requirements, rate design and program implementation.
  - Chapter 4: Business Case for Energy Efficiency
- **Energy Efficiency Benefits Calculator**
  Designed to educate stakeholders on the economic and environmental benefits of energy efficiency. Used to develop all business cases for National Action Plan.
- **Consumer Energy Efficiency Fact Sheet**
  Designed to help communicate the benefits of efficiency to consumers and how utility and state investment in energy efficiency helps them.

National Action Plan Upcoming Resources to Help Demonstrate the Business Case for EE

- Examination of Utility Rate Revenue Stability Mechanisms and Incentives *(Summer 07)*
- Guidebook on Energy Resource Planning and Procurement Processes (integrating energy efficiency) *(Spring 07)*
- Guidebook for Conducting Potential Studies for Cost-Effective Energy Efficiency *(March 07)*

For More Information

www.epa.gov/eeactionplan

Speaker's contact information

Stacy Angel
Angel.Stacy@epa.gov
(202) 343-9606

Larry Mansueti
Lawrence.Mansueti@hq.doe.gov
(202) 586-2588