

**Synapse**  
Energy Economics, Inc.

# Energy Efficiency Program Screening: Let's Get Beyond the TRC Test

**7<sup>th</sup> Annual ENERGY STAR Certified Homes Utility Sponsor Meeting**  
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# Recent Synapse Research on EE Screening

- Synapse Energy Economics, *Best Practices in Energy Efficiency Program Screening: How to Ensure that the Value of Energy Efficiency is Properly Accounted for*, prepared for the National Home Performance Council, July 2012.
- Synapse Energy Economics, *Energy Efficiency Cost-Effectiveness Screening: How to Properly Account for Other Program Impacts and Environmental Compliance Costs*, prepared for the Regulatory Assistance Project, November 2012.
- Both are available at [www.synapse-energy.com](http://www.synapse-energy.com).

# Topics Covered in Recent Screening Reports

- Tests used for screening energy efficiency.
- Use of “other program impacts,” especially in the TRC test:
  - Non-energy benefits.
  - Other fuel savings.
- Cost of compliance with environmental regulations.
- Choice of discount rate.
- Calculation of avoided costs.
- Cost-effectiveness screening level.
- Cost-effectiveness study period.
- Risk benefits of energy efficiency.
- Free-ridership, spillover, market transformation.

# Energy Efficiency Screening Tests

- There is considerable debate over whether using the Total Resource Cost (TRC) test is better than using the Program Administrator Cost (PAC) test.
- Most states do not apply the TRC test properly, leading to a significant undervaluation of energy efficiency benefits.
- Applying the TRC test properly requires fully accounting for “other program impacts” (i.e., non-energy benefits and other fuel savings).
- Consumer concerns should be addressed:
  - By addressing customer equity issues.
  - By applying the PAC test strategically.
- These considerations have significant implications for residential retrofit programs.

# Five Cost-Effectiveness Screening Tests

- Participant test: includes costs and benefits from the perspective of the program participant.
- Ratepayer Impact Measure (RIM) test: includes costs and benefits that will affect utility rates.
- Program Administrator Cost (PAC) test: includes the costs and benefits that are considered by the entity administering the energy efficiency program.
- Total Resource Cost (TRC) test: includes the costs and benefits experienced by all utility customers, including participants and non-participants.
- Societal Cost test: includes costs and benefits experienced by all members of society.

# Three Primary Cost-Effectiveness Tests

	<b>PAC Test</b>	<b>TRC Test</b>	<b>Societal Cost Test</b>
<b>Energy Efficiency Costs:</b>			
Program Administrator Costs	Yes	Yes	Yes
EE Measure Cost: Program Financial Incentive	Yes	Yes	Yes
EE Measure Cost: Participant Contribution	---	Yes	Yes
<b>Energy Efficiency Benefits:</b>			
Avoided Energy Costs	Yes	Yes	Yes
Avoided Capacity Costs	Yes	Yes	Yes
Avoided Transmission and Distribution Costs	Yes	Yes	Yes
Wholesale Market Price Suppression Effects	Yes	Yes	Yes
Avoided Cost of Environmental Compliance	Yes	Yes	Yes
Other Fuel Savings (e.g., oil, gas)	---	Yes	Yes
Non-Energy Benefits (utility perspective)	Yes	Yes	Yes
Non-Energy Benefits (participant perspective)	---	Yes	Yes
Non-Energy Benefits (societal perspective)	---	---	Yes

# Other Program Impacts

- We use the term “other program impacts” (OPIs) to include non-energy impacts or non-energy benefits.
- OPIs are those costs and benefits that are not part of the costs, or the avoided cost, of the energy from the utility.
- Examples: increased safety, improved health, reduced O&M costs, increased worker and student productivity, increased comfort, improved aesthetics.
- OPIs also include “other fuel savings,” which are the other fuels that are not provided by the utility, e.g., oil savings.
- OPIs fall into three-categories:
  - Utility-perspective OPIs
  - Participant-perspective OPIs
  - Societal-perspective OPIs.

# Examples of Non-Energy Benefits

- **Utility Perspective:**
  - Reduced arrearages.
  - Reduced carrying costs on arrearages.
  - Reduced bad debt.
- **Participant Perspective:**
  - Improved safety.
  - improved health.
  - reduced O&M costs.
  - increased worker and student productivity.
  - increased comfort.
  - reduced water use.
  - improved aesthetics.
- **Societal Perspective:**
  - Environmental externalities.
  - Health care cost savings.
  - Reduced reliance on fossil fuels.

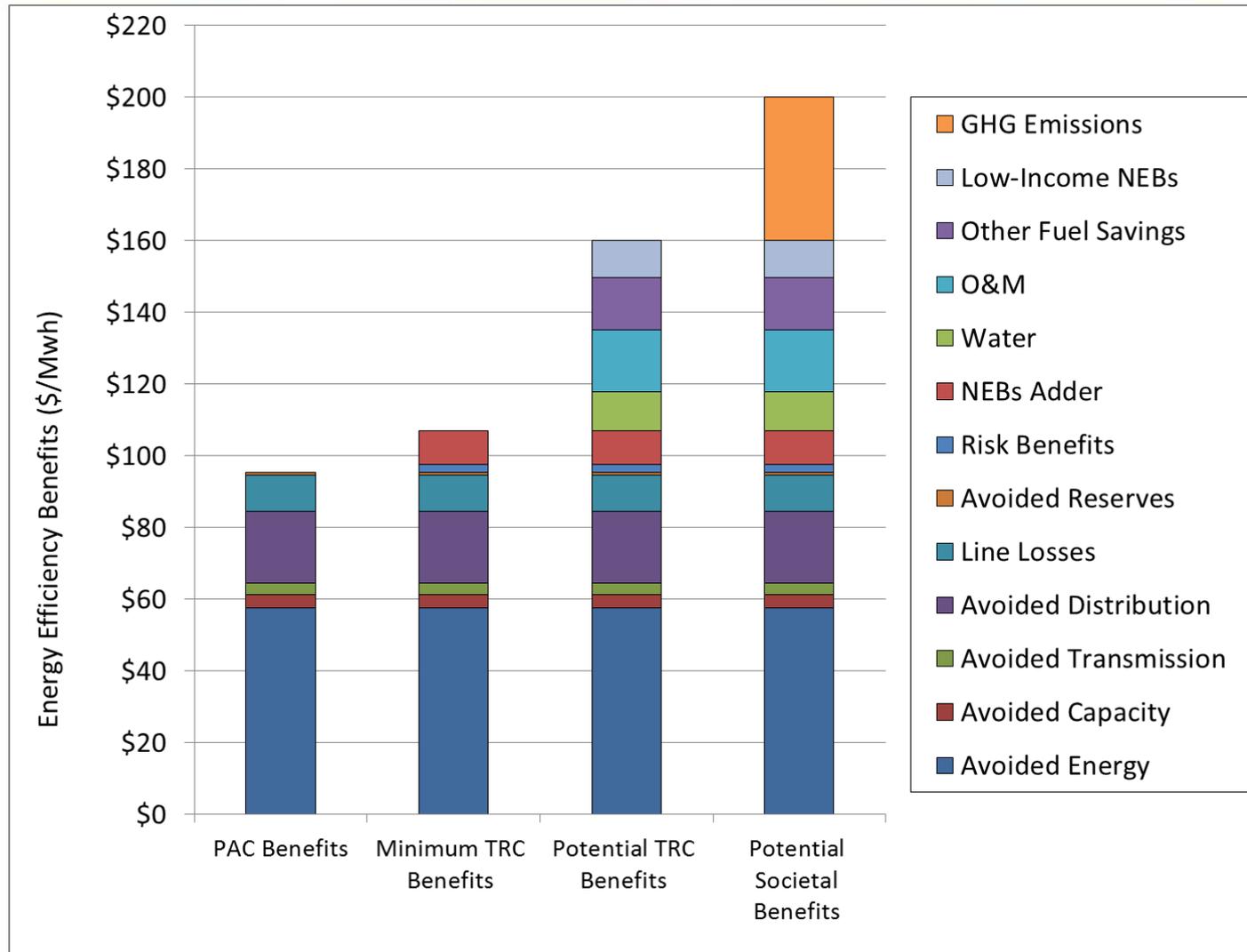
# Current Treatment of Other Program Impacts

- Most states use the TRC test, however...
- Most states completely ignore or significantly undervalue OPIs.
- The outcome:
  - The results of the TRC tests are skewed.
  - The value of efficiency is significantly understated.
  - Significantly less efficiency is identified as cost-effective.
  - Some key programs become uneconomic.
  - Less efficiency is implemented.
  - Customers pay higher costs than necessary.

# Rationale for Including Other Program Impacts

- OPIs should be included in cost-effectiveness tests in order to ensure that the tests are internally consistent.
  - If the participating customer's costs are included, then that customer's benefits should be included as well.
- Participant's costs can be quite large.
- Participant's non-energy benefits can also be quite large.
- Experience indicates that these non-energy benefits are very important to many customers, sometimes more important than the energy benefits.

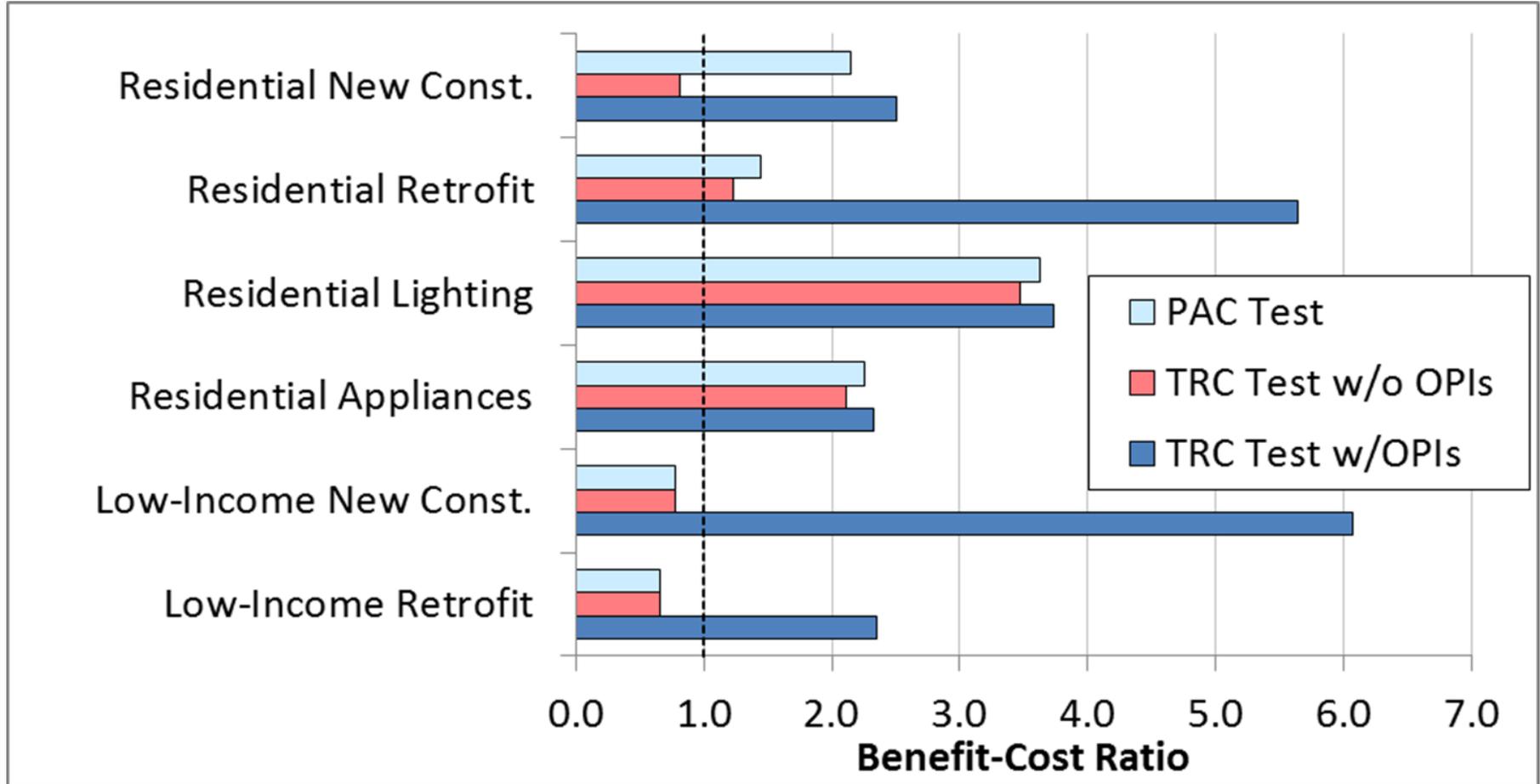
# One Example of Other Program Impacts (VT)



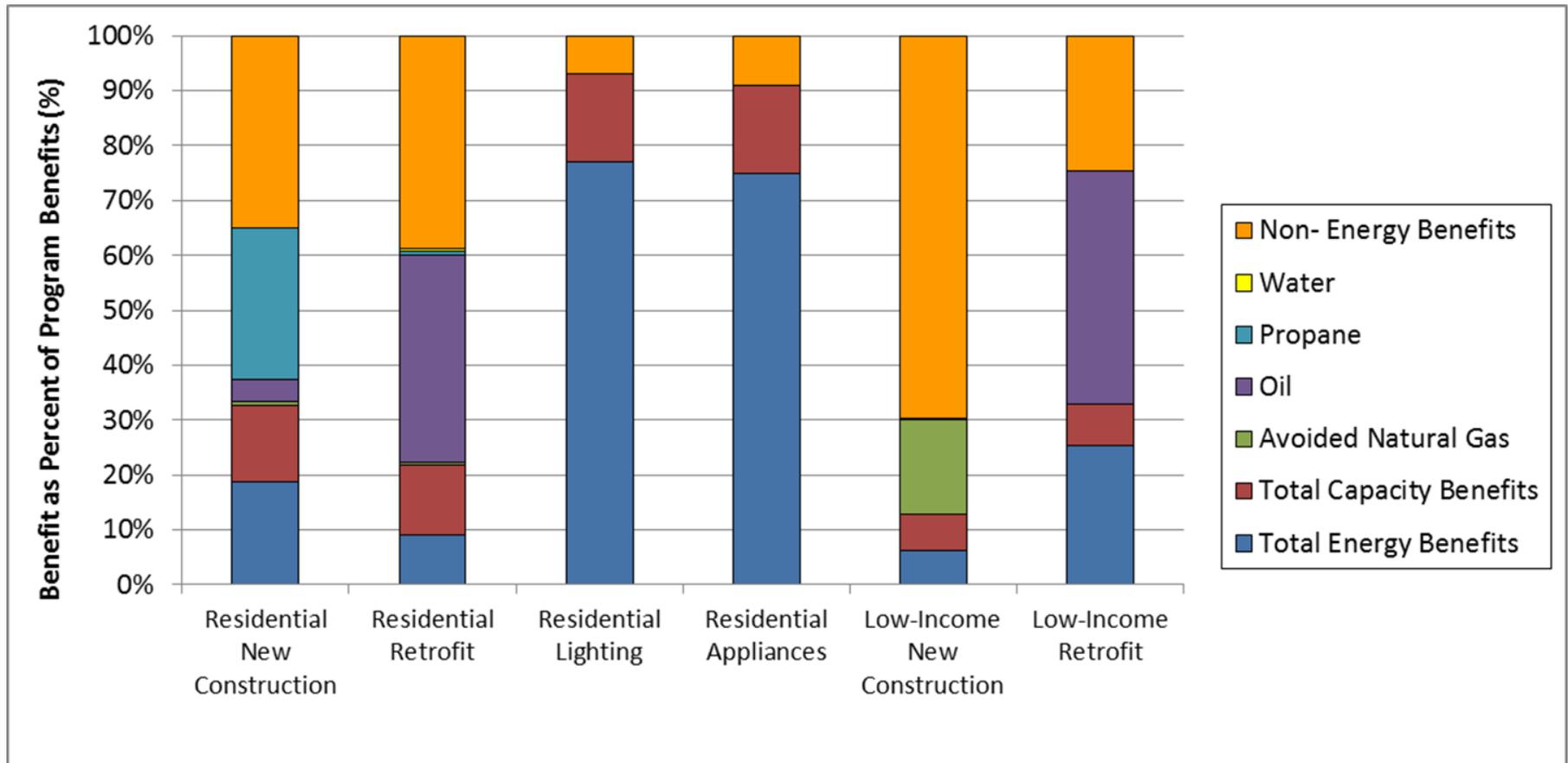
# Implications of Including Other Program Impacts

- Other program impacts can have significant impacts on low-income programs, residential retrofit programs and residential new construction programs.
  - These programs have some of the largest non-energy benefits and other fuel savings.
- Ignoring OPIs has the effect of creating lost opportunities, limiting comprehensive treatment, and hindering customer equity.
- [Note: Much of this presentation focuses on residential programs and OPIs, but commercial and industrial customers also have significant OPIs. The same concepts apply there as well.]

# Actual Cost-Effectiveness Results For 2012 EE Plan for a Massachusetts PA



# Same Cost-Effectiveness Results: Breakout of Benefits by Type



# OPIs Raise Certain Key Customer Concerns

- Including OPIs in the TRC test is likely to expand the universe of cost-effective efficiency.
- This may result in increased energy efficiency budgets, or a more expensive mix of energy efficiency programs within given budgets.
- Including OPIs in the TRC test will also require electric and gas utility customers to pay for efficiency programs that result in non-energy benefits.
  - These benefits could be seen as being outside the sphere of electric and gas utility responsibility.

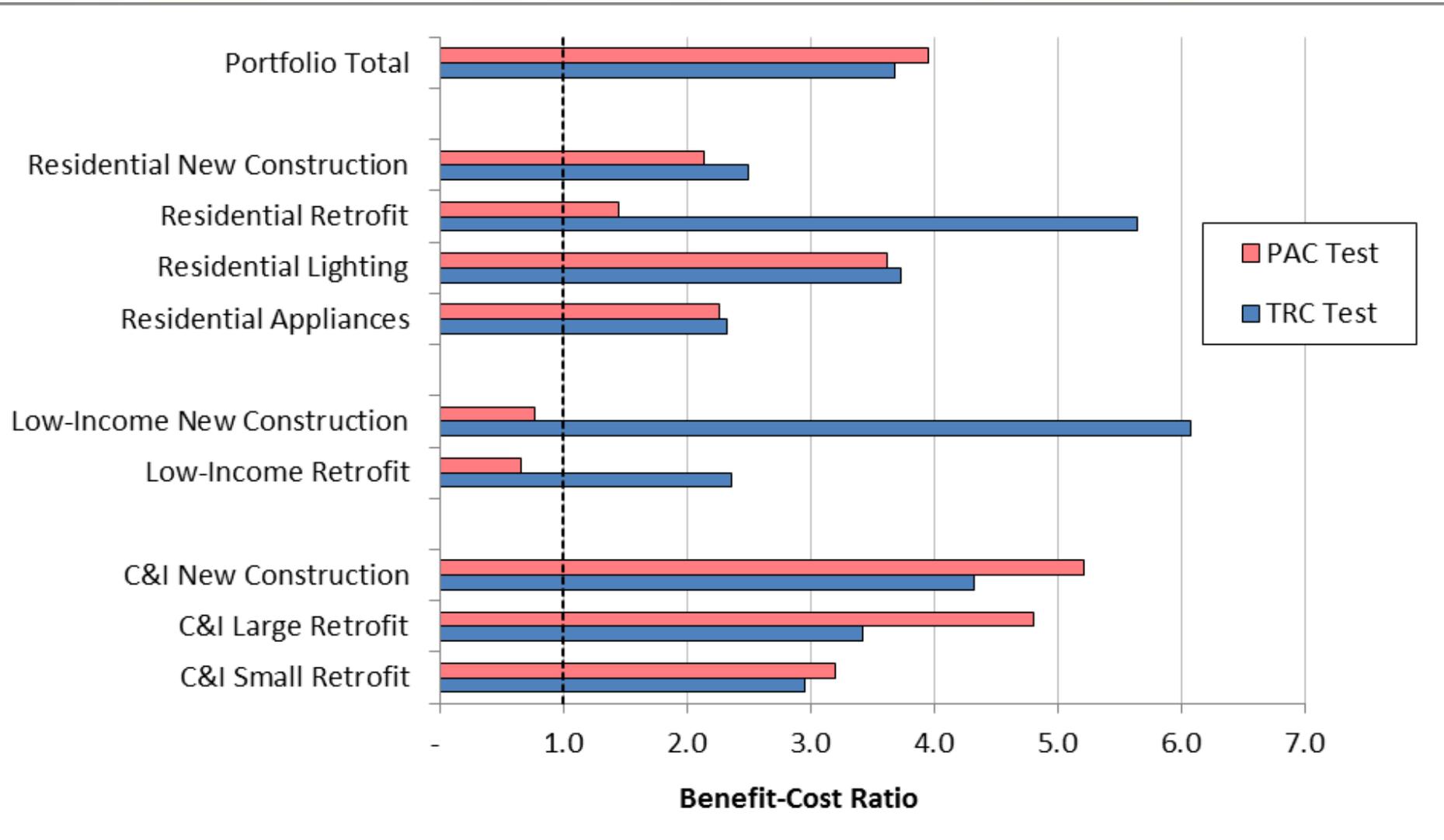
# Addressing Customer Concerns

- Including OPIs is necessary to maintaining internal consistency in the TRC test.
  - If regulators decide they do not want to consider costs and benefits outside the utility's sphere, then they should not use the TRC test, use the PAC test instead.
- Including OPIs helps achieve public policy benefits, especially customer equity.
- Overall customer benefits can be ensured by applying the Program Administrator Cost test to the energy efficiency portfolio, as described below.

# Recommendations for Applying the Tests

- The Societal Cost or the TRC test should be used to screen energy efficiency programs.
  - The TRC test should be used only if it includes reasonable estimates of OPIs.
- However, in order to address customer concerns, the PAC test should be applied to the entire portfolio of efficiency programs.
  - This will ensure that the entire set of programs will result in a net reduction in costs to utility customers.
  - In the example above, under the PAC test:
    - Utility benefits exceed utility costs by a factor of four.
    - Costs = \$195 mil; Benefits = \$773 mil; Net Benefits = \$578 mil

# Cost-Effectiveness Results; TRC and PAC; Portfolio and Program Level



# Which Test is “Better:” TRC, PAC, or Societal?

## My previous opinion:

- In theory, several tests (PAC, TRC, Societal) provide useful information and should be considered in screening EE. But in practice, most states end up using one as the primary test.
- Societal test is best, but is difficult to adopt and apply correctly.
- If a utility applies “reasonable” estimates of other program impacts:
  - the TRC test is preferable to the PAC test.
- If a utility does not apply “reasonable” estimates of other program impacts:
  - then the TRC test is skewed and should not be used,
  - and the PAC test is better than the TRC test.

## My current opinion:

- We should not limit ourselves to two unsatisfactory options.
- We need to address efficiency screening more flexibly and comprehensively.

# Indications of Challenges With Current Practices

- Several states are considering terminating their gas efficiency programs due to cost-effectiveness concerns.
  - Can they implement them anyway?
- States use a range of different tests, with a wide range of different assumptions and methodologies behind them.
  - Why so many differences? Are they all correct?
- Several states are revisiting their efficiency screening practices.
  - The California Public Service Commission has opened a multi-year effort to update their screening tests and assumptions.
  - What does this imply about the CA Standard Practice Manual?
- There is a long-standing debate among efficiency advocates about which is the “best” test for screening.
  - Why is this so difficult to resolve?

# Cause #1: Requirement to Monetize Everything

- Every state essentially requires that all costs and all benefits be quantified and monetized.
- Costs are relatively easy to quantify and monetize.
- Some benefits are very difficult to quantify and monetize.
- Many states are not willing to quantify some of the benefits, due to the uncertainties, contention and costs involved.
- Consequently, key benefits are ignored.

## Cause # 2: Some Energy Policy Goals Are Ignored

- There are many public policy goals underlying the decision of which energy efficiency resources to implement:
  - Reduce electricity and gas costs and bills.
  - Improve the reliability of the energy system.
  - Mitigate risks of the energy system.
  - Assist low-income customers with high energy burdens.
  - Reduce the environmental impact of electricity and gas.
  - Promote economic development (i.e., create jobs).
  - Maintain customer equity.
- However, some of these goals are not addressed when applying the current efficiency screening tests.
  - Some of them should not or cannot be monetized in current tests.
- Result: Key public policy goals are ignored.



## Cause #3: Tests are Frequently Misunderstood

- Purpose and implications of tests are not always well understood by key stakeholders.
  - Limitations of RIM test are not always fully understood.
  - TRC is seen as a consumer protection test, rather than a test to determine the efficient allocation of resources from a “societal” perspective.
  - NEBs / OPIs are seen as optional

# How Did We Get Here?

- In the early days, the advocates argued that utilities *should* implement energy efficiency because it is cost-effective.
- However, this notion seems to have been modified into something very different: utilities *cannot* implement it unless it is cost-effective.
  - This would be a fine principle, as long as you have faith in the ability to measure cost-effectiveness.
  - However, our ability to measure cost-effectiveness is limited by our ability to monetize all of the public policy implications.
- As a result, the current tests create a ceiling that limits which efficiency programs can be implemented.
  - But the ceiling is artificially low.
  - Because it requires everything to be monetized and it does not account for certain public policy goals.

# Responses to Recent Screening Challenges

- Range of responses to current screening challenges:
  - Develop new methods for measuring benefits and costs.
  - Assemble more data.
  - Proposals to reconsider the most appropriate screening test (e.g. move from TRC to PAC; move from TRC to Societal).
- However, efforts to date are not addressing the core causes of the problems:
  - Requirement to monetize every cost and benefit.
  - Some public policy goals are ignored.
  - Misunderstanding of the tests.
- We need to be thinking beyond these options.

# NHPC Campaign to Move This Ball Forward

- Explicit recognition that current proposals to address the problems are not sufficient.
- Goal to convene a group of industry experts to develop more comprehensive solution(s).
  - We met with several efficiency leaders on 9/12/13 to discuss these issues and to brainstorm solutions.
  - The group included some experts who prefer the PAC test, some who prefer the TRC test, and some who prefer the Societal Cost test.
  - We agreed on many of the issues discussed above, and agreed on an outline for a proposed solution.
- We are drafting up a position paper, to be released November 18.
  - We are looking for interested individuals and organizations to support the paper.
- The proposed solution is outlined below.

# Criteria for a New Framework

1. Explicitly identify the objective of EE screening.
2. Explicitly account for states' energy policy goals.
3. Explicitly account for all relevant costs and benefits, even those that are hard to monetize.
4. Compare all energy resources in a comparable manner.
5. Provide transparency for all inputs and outputs.
6. Allow for practical application.

# Objectives for Screening Energy Efficiency

1. To identify those resources that are in the public interest because of their long-term value to the utility system.
2. To identify those resources that are in the public interest because of their long-term to society.

Each state should decide which objective is primary:

- If primary objective is long-term value to the utility system, then state should begin with the Utility Cost test.
- If primary objective is long-term value to society, then state should begin with the Societal Cost test.
- There is no longer a role for the TRC test.
  - If a state is concerned with the “total cost” of EE, then it should use the Societal Cost test.

# Accounting for Energy Policy Goals

- Once a state has identified its primary objective, and therefor its choice for a primary test, a secondary consideration is necessary to ensure that the state's energy policy goals are achieved.
- If the state has chosen the Utility Cost test to be primary, then what energy policy goals are not accounted for with this test?
  - For example, assist low-income customers, promote job growth.
- If the state has chosen the Societal Cost test to be primary, then what energy policy goals are not accounted for with this test?
  - For example, promote job growth.

# Utility Value Resource Test

	Utility Cost Test	Utility Resource Value Test
<b>Energy Efficiency Costs:</b>		
Utility (or Program Administrator) Program Costs	Yes	Yes
Financial Incentive Provided to Participant	Yes	Yes
<b>Energy Efficiency Benefits:</b>		
Avoided Energy Costs	Yes	Yes
Avoided Capacity Costs	Yes	Yes
Avoided Transmission and Distribution Costs	Yes	Yes
Wholesale Market Price Suppression Effects	Yes	Yes
Avoided Cost of Environmental Compliance	Yes	Yes
Utility Non-Energy Benefits (e.g., reduced arrears)	Yes	Yes
<b>Energy Policy Goals:</b>		
Achieve Other Fuel Savings (e.g., oil, gas, propane)	---	Yes
Assist Low-Income Customers With Energy Costs	---	Yes
Reduce Environmental Impacts	---	Yes
Promote Job Growth and Economic Development	---	Yes
Other Policy Objectives Identified by the State	---	Yes

# Societal Value Resource Test

	Societal Cost Test	Societal Resource Value Test
<b>Energy Efficiency Costs:</b>		
Utility (or Program Administrator) Program Costs	Yes	Yes
Financial Incentive Provided to Participant	Yes	Yes
Participant Contribution to Efficiency Resource	Yes	Yes
<b>Energy Efficiency Benefits:</b>		
Avoided Energy Costs	Yes	Yes
Avoided Capacity Costs	Yes	Yes
Avoided Transmission and Distribution Costs	Yes	Yes
Wholesale Market Price Suppression Effects	Yes	Yes
Avoided Cost of Environmental Compliance	Yes	Yes
Other Fuel Savings (e.g., oil, gas, propane)	Yes	Yes
Utility Non-Energy Benefits (e.g., reduced arrears)	Yes	Yes
Participant Non-Energy Benefits (e.g., reduced O&M, productivity)	Yes	Yes
Societal Non-Energy Benefits (e.g., environmental benefits)	Yes	Yes
<b>Energy Policy Objectives:</b>		
Promote Job Growth and Economic Development	---	Yes
Other Policy Objectives Identified by the State	---	Yes

# An Example: Low Income Efficiency Programs

- A state chooses to use the Utility Value Resource Test to screen efficiency programs.
- The Commission has established a goal of using efficiency programs to assist low-income customers in reducing their bills.
- A utility offers well-designed efficiency programs to low-income customers, but they are not cost effective under the Utility Cost test.
- The Commission explicitly recognizes that the UCT test does not account for all of the benefits of the low-income program and allows an adder as a proxy for these benefits.
- The Commission finds the low-income program is in the public interest because of its long-term value to the utility system and it helps achieve the goal of assisting low-income customers. Commission approves program.

# Address Customer Impacts and Interests

In determining whether efficiency resources are in the public interest, Commissioners should always keep customer impacts in mind:

- The PAC test can be applied at the portfolio level to make sure that energy bills for all customers on average will be reduced.
- Distributional equity should not be addressed with the RIM test.

Instead:

- Consider customer participation rates as an indication of customer equity (i.e., the extent to which customers will see lower bills).
- Design programs to help promote customer participation; thereby offsetting rate impacts and promoting customer equity.
- Design regulatory policies to promote customer participation:
  - Get better data on participation.
  - Use participation goals in program planning process.
  - Use participation goals in utility shareholder incentives.

# Appendix

# Appendix

# Recent Survey of Screening Practices in Northeast States

Cost-Effectiveness Metric		Connecticut	Delaware	District of Columbia	Massachusetts	New Hampshire	New York	Rhode Island	Vermont
<b>Primary Policy Driver</b>		Focus on electric system impacts only	Still under development	Energy efficiency programs must meet the Societal Cost test	All available cost-effective energy efficiency	Reduce market barriers to investments in cost-effective energy efficiency	Maximize cost-effectiveness given limited funding	All cost-effective energy efficiency	Least cost planning including environmental costs
<b>Cost-Effectiveness Test(s) &amp; Application</b>	<b>Primary Test</b>	PAC	TRC	Societal	TRC	TRC	TRC	TRC	Societal
	<b>Secondary Test</b>	TRC	Societal; RIM						TRB; PAC
	<b>Primary Screening Level</b>	Program	Portfolio	Portfolio	Program	Program	Measure	Portfolio	Portfolio
	<b>Additional Screening Level(s)</b>		Program	Program, Project, Measure			Project, Program		Program, Project, Measure
	<b>Discount rate used in Test</b>	Utility WACC (currently 7.43%)	Societal Treasury Rate (rate TBD)	Societal 10Yr Treasury (currently 1.87%)	Low-Risk 10Yr Treasury (currently 0.55%)	Prime Rate (currently 2.46%)	Utility WACC (currently 5.5%)	Low-Risk 10Yr Treasury (currently 1.15%)	Societal (currently 3%)
	<b>Study period over which Test is applied</b>	Measure Life	Measure Life	Measure Life	Measure Life	Measure Life	Measure Life	Measure Life	Measure Life
<b>Avoided Costs Included in Primary Cost-Effectiveness Test</b>	<b>Capacity Costs</b>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	<b>Energy Costs</b>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	<b>T&amp;D Costs</b>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	<b>Environmental Compliance</b>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	<b>Price Suppression</b>	Yes	Yes	Yes	Yes	No	No	Yes	No
	<b>Line Loss Costs</b>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	<b>Reduced Risk</b>	No	Yes	Yes	No	No	No	No	Yes
<b>OPIs/NEBs Included in Primary Cost-Effectiveness Test</b>	<b>Utility OPIs</b>	No	No	No	Quantified	No	No	Quantified	Part of 15% Adder
	<b>Participant OPIs</b>								
	<b>Resource</b>	No	Yes - Calculation TBD	Quantified	Quantified	Quantified	Quantified	Quantified	Quantified
	<b>Low-Income</b>	Qualitative	No	Part of 10% Adder	Quantified	Qualitative	Qualitative	Quantified	Additional 15% Adder
	<b>Equipment</b>	No	No	O&M Quantified	Quantified	No	Qualitative	Quantified	O&M Quantified
	<b>Comfort</b>	No	No	Part of 10% Adder	Quantified	No	No	Quantified	Part of 15% Adder
	<b>Health &amp; Safety</b>	No	No	Part of 10% Adder	Quantified	No	No	Quantified	Part of 15% Adder
	<b>Property Value</b>	No	No	Part of 10% Adder	Quantified	No	No	Quantified	Part of 15% Adder
	<b>Utility Related</b>	No	No	Part of 10% Adder	Quantified	No	No	Quantified	Part of 15% Adder
<b>Societal OPIs</b>	No	No	Part of 10% Adder	No	No	No	Quantified	Part of 15% Adder	

# Energy Policy Goals in Legislation in Select States

Public Policy	CA	CO	DE	IL	ME	MA	MI	NV	NM	NY	NC	RI	VT	VA	WA
<b>All Available Energy Efficiency</b>	✓				✓	✓			✓			✓	✓		✓
<b>Utility System Policies:</b>															
System Reliability*	✓		✓	✓				✓	✓	✓	✓	✓	✓	✓	
Affordability / Least Cost*	✓		✓	✓			✓		✓		✓	✓	✓	✓	
Resource Adequacy	✓		✓	✓			✓		✓	✓	✓	✓	✓	✓	
Resource Diversity*	✓	✓	✓	✓			✓	✓			✓	✓		✓	
Energy Security / Reduce Imported Fuels*	✓						✓		✓				✓		✓
Fair Utility Regulation				✓							✓				
Efficient Use of Resources / System Efficiency*			✓	✓				✓			✓	✓	✓	✓	
Economic Use of Resources*				✓				✓		✓	✓				
<b>Consumer/Societal Policies:</b>															
Public Interest (1)	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓		✓	
Reasonable Rates	✓	✓	✓	✓			✓		✓		✓				✓
Reduce the Burden on Low-Income Customers*									✓			✓		✓	
Equity				✓							✓	✓			
Economic Development*	✓	✓	✓					✓		✓		✓	✓	✓	✓
Meet Long-Term Needs		✓	✓	✓						✓	✓				
Encourage Private Investment							✓								
<b>Environmental Policies:</b>															
Environmental Quality (2)*	✓	✓	✓	✓			✓	✓	✓	✓		✓	✓	✓	✓

\* An asterisk indicates a policy goal that efficiency helps to achieve.

# Adders Can be Used to Address Energy Policy Goals

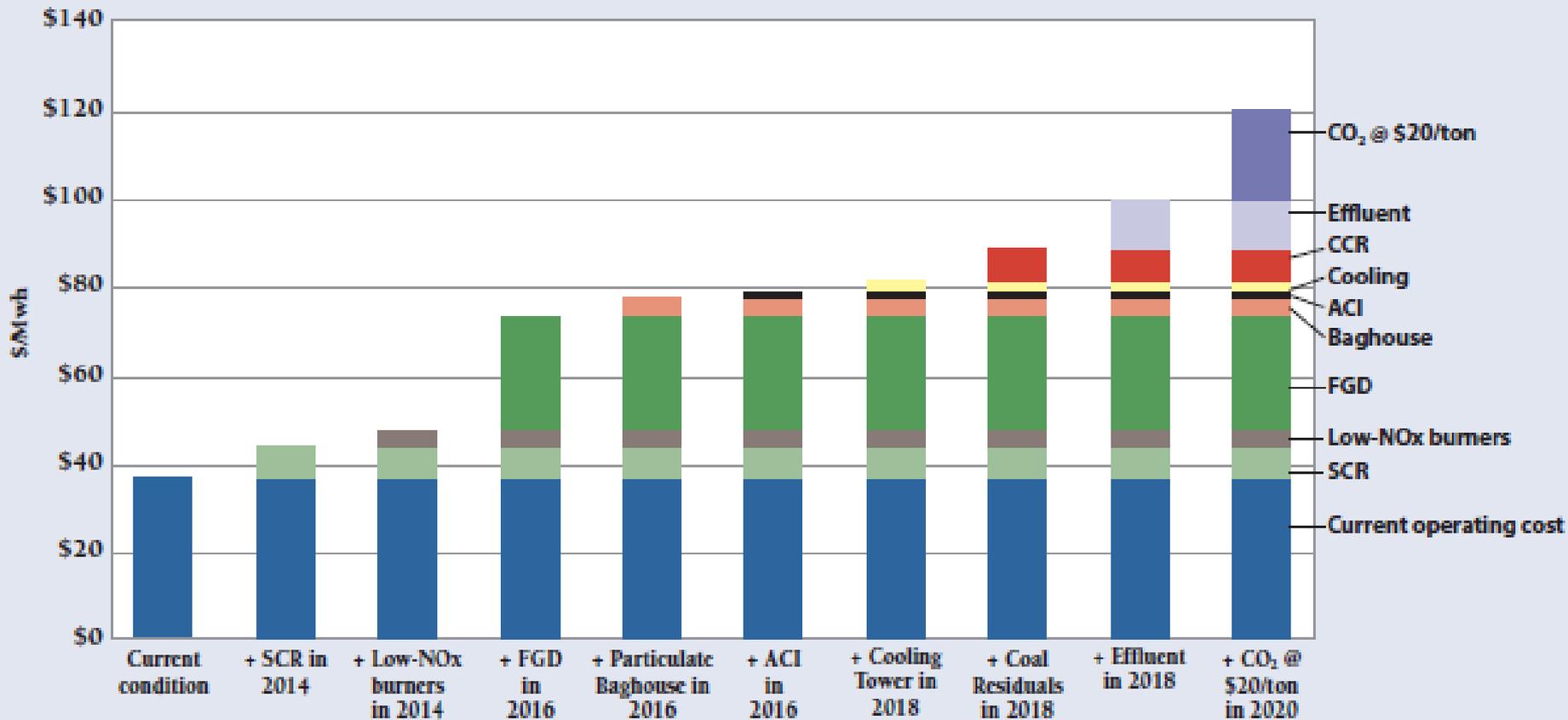
	PAC Test	Public Interest Test	
		(benefit)	(\$mil)
<b>Energy Efficiency Costs: (\$mil)</b>			
Program Administrator Costs	10	---	---
EE Measure Cost: Program Financial Incentive	100	---	---
Total Monetized Costs:	110	---	---
<b>Energy Efficiency Benefits: (\$mil)</b>			
Avoided Energy Costs	38	---	---
Avoided Capacity Costs	19	---	---
Avoided Transmission and Distribution Costs	14	---	---
Wholesale Market Price Suppression Effects	12	---	---
Avoided Cost of Environmental Compliance	15	---	---
Non-Energy Benefits (utility perspective)	2	---	---
Total Monetized Benefits:	100	---	---
PAC Test Benefit Cost Ratio	0.91	---	---
PAC Test Net Benefits (\$mil)	-10	---	---
<b>Energy Policy Objectives:</b>			
Achieve Other Resource Savings (\$mil)	---	5	5
Assist Low-Income Customers With Energy Costs	---	20%	20
Reduce Environmental Impacts	---	15%	15
Reduce Risks on the Electricity and Gas Systems	---	5%	5
Promote Job Growth and Economic Development	---	10%	10
Total Policy Benefits (\$mil)	---	---	55
Total Benefits (\$mil)	---	---	155
PI Test Benefit Cost Ratio	---	---	1.4
PI Test Net Benefits (\$mil)	---	---	45

# Compliance with Environmental Regulations

- Energy efficiency can help reduce the costs of complying with environmental regulations.
- The costs of complying with environmental regulations are not environmental externalities.
  - Environmental compliance costs will be incurred by utilities and passed on to customers.
  - Therefore, environmental compliance costs should be included in the PAC test, the TRC test and the Societal test.
  - Externalities are those impacts that remain after regulations are met.
  - Externalities should be included only in the Societal test.
- EE screening should account for current and future regulations.
- Two important types environmental regulations:
  - EPA regulations on fossil plants.
  - Greenhouse gas regulations.

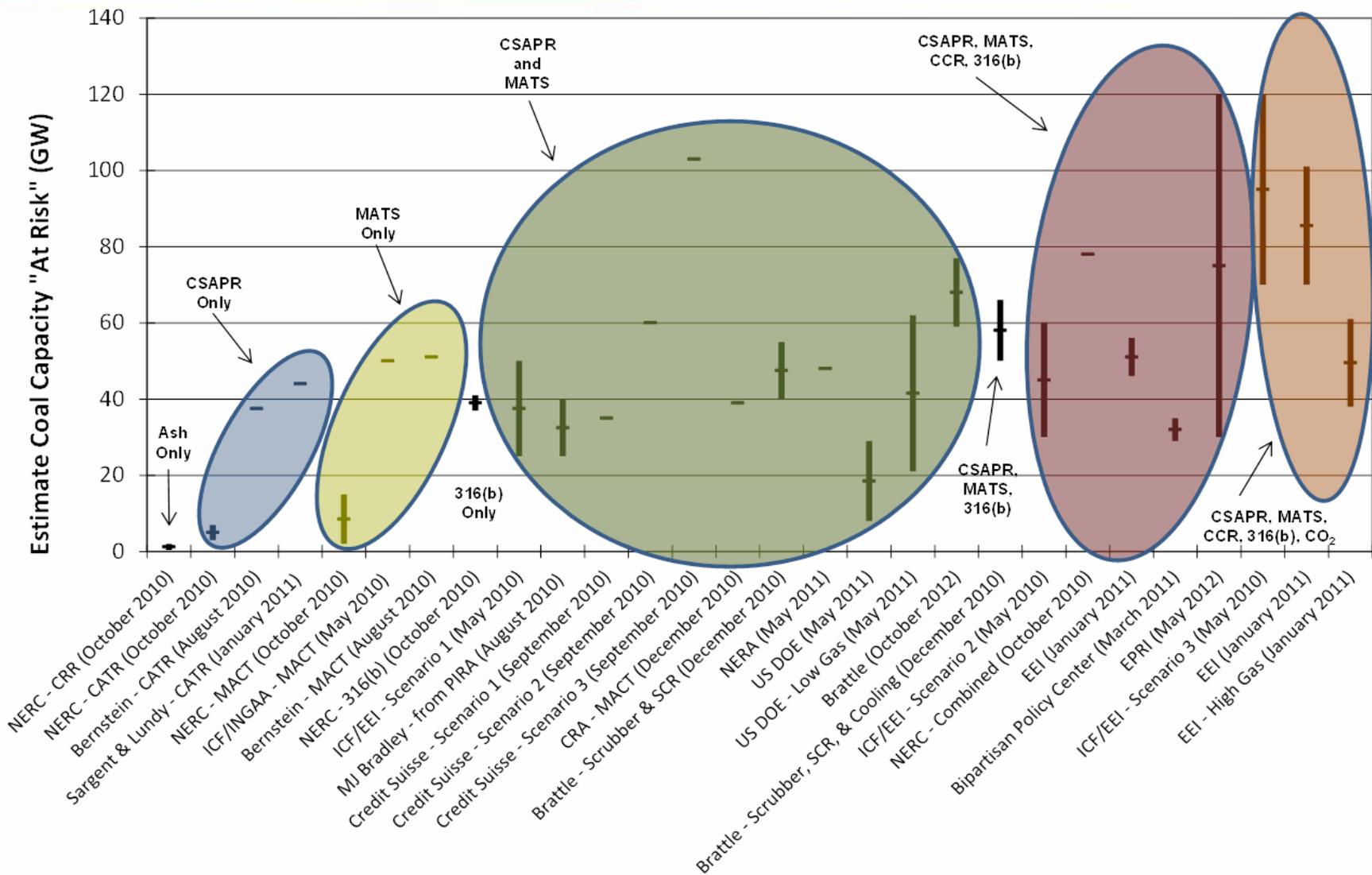
# Potential Costs of Complying with EPA Regulations

**Illustrative Example of Potential Cumulative Retrofit Costs**



Source: See Figure 4-2

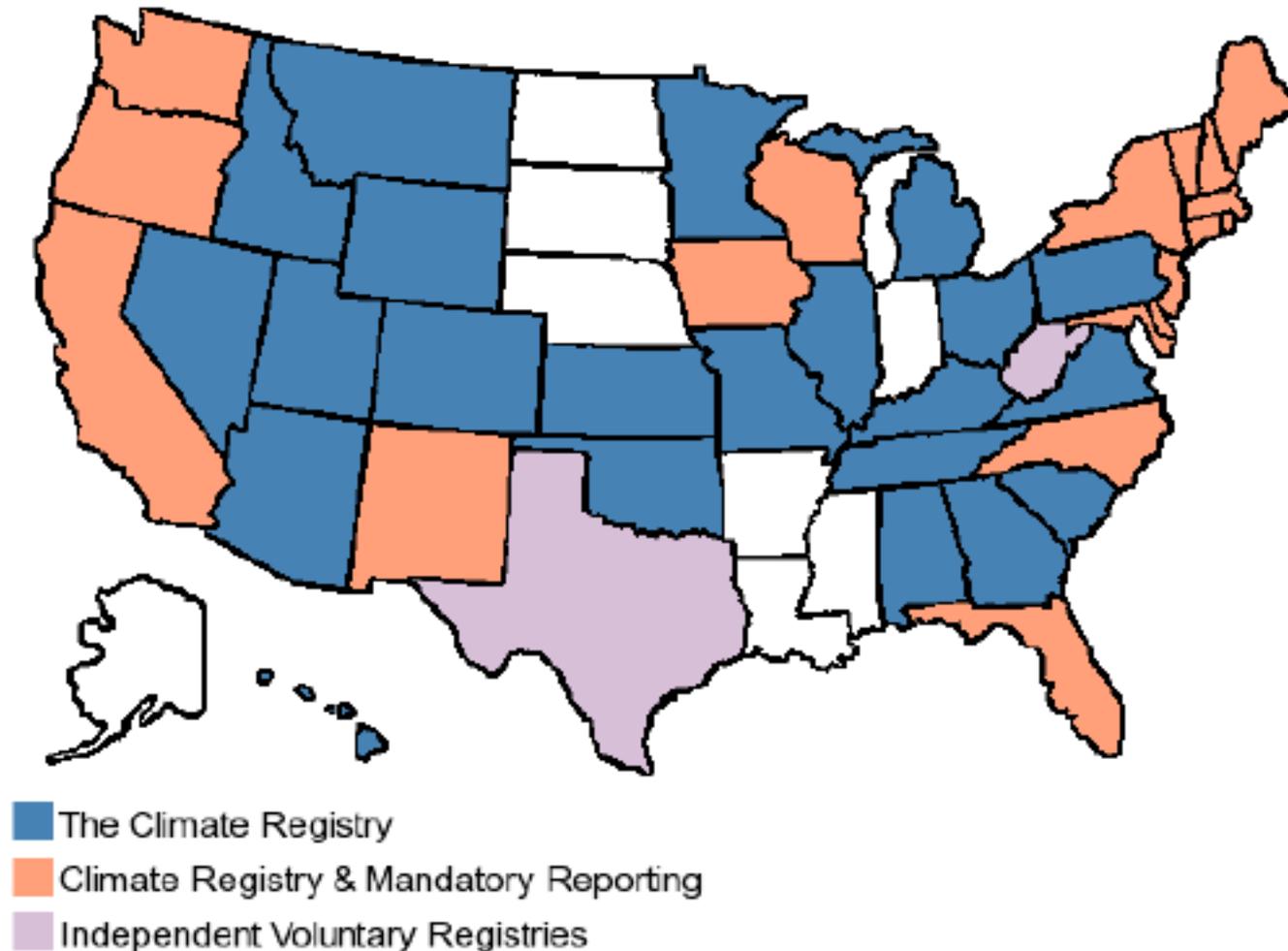
# One-Third of US Coal Plants at Risk



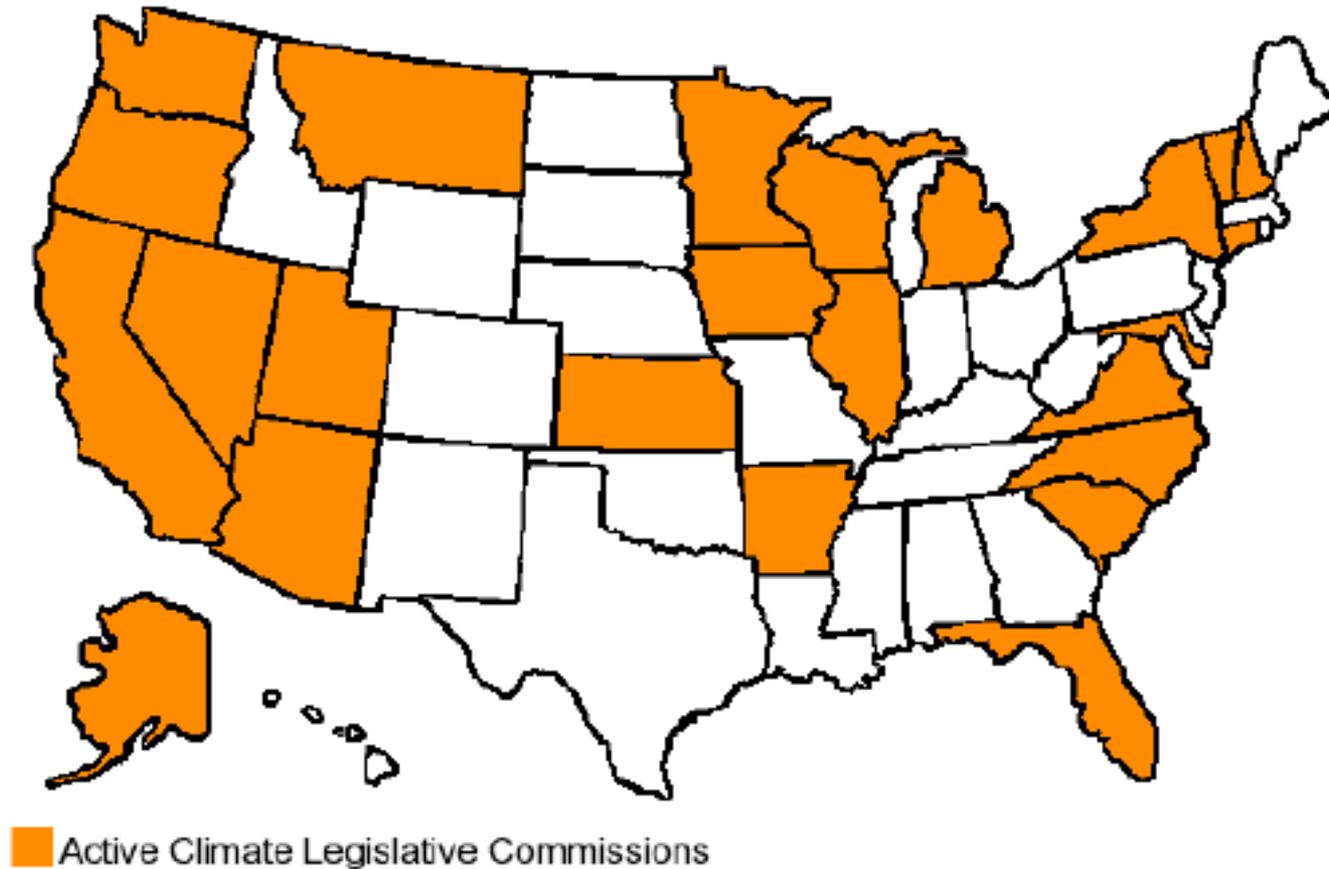
# Climate Change Requirements: Current and Future

- While there remains some uncertainty about how the federal government will address climate change;
  - There are already regulations in place at the state and regional levels, and
  - There will be some form of federal climate change regulations within the electricity resource planning horizon (i.e., 20 – 30 years).
- Federal
  - EPA Actions. Regulate GHG under the Clean Air Act.
  - Congressional Actions?
- Regional
  - RGGI, Western Climate Initiative, North America 2050, Midwest GHG Reduction Accord.
- State
  - Many states already have climate change requirements.
  - See slides below. From the Center for Climate and Energy Solutions.

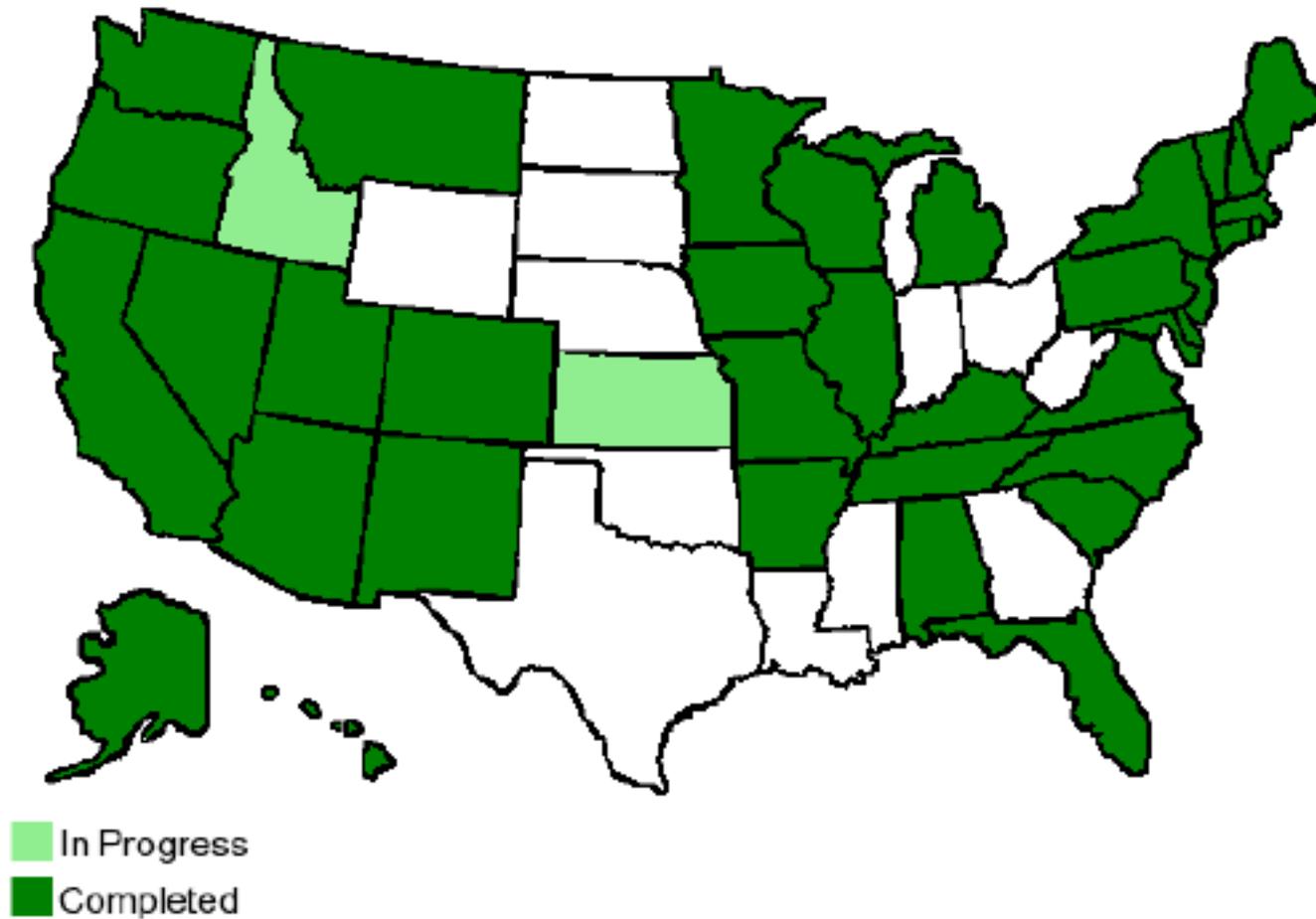
# States with GHG Reporting and Registries



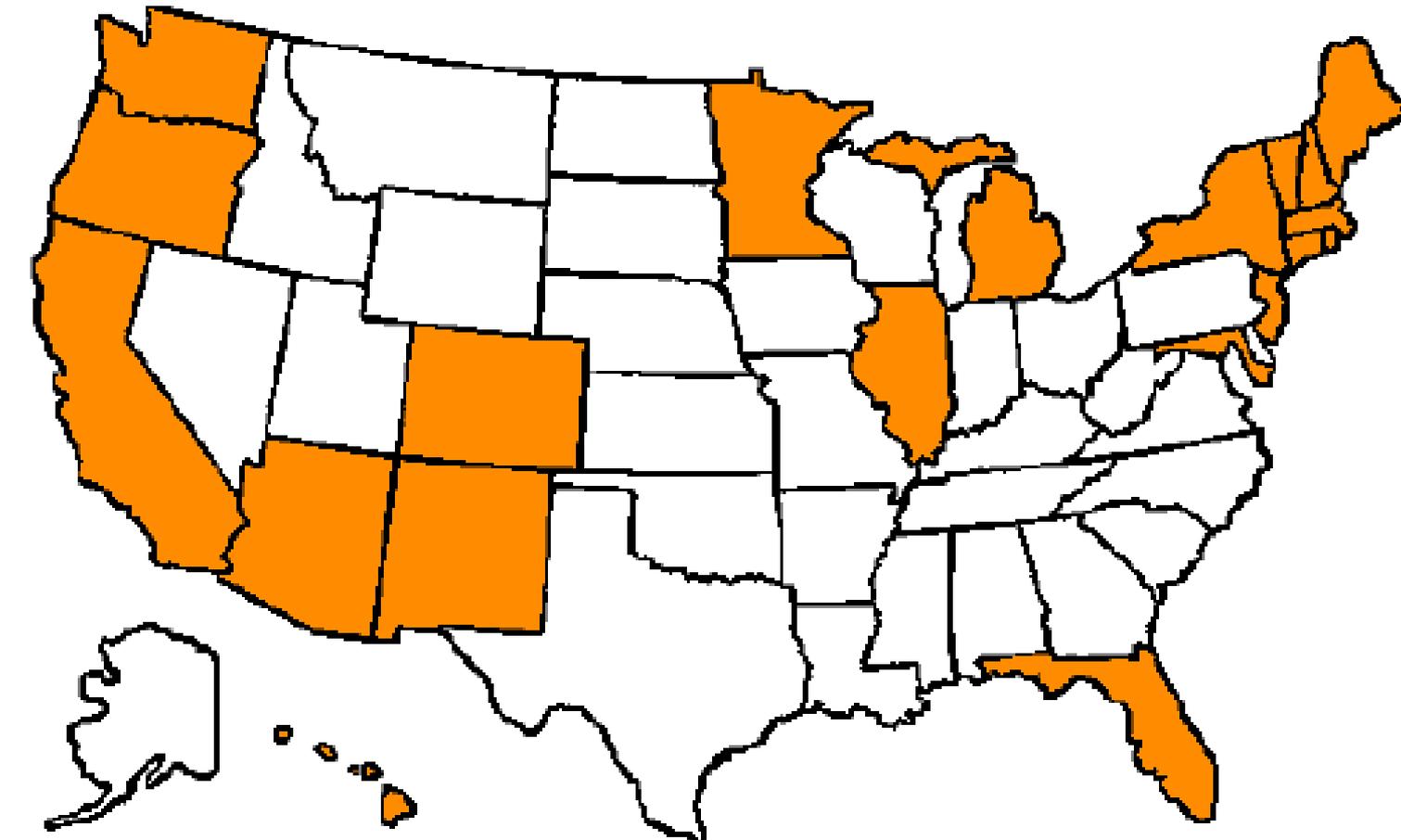
# States with Active Legislative Commissions and Executive Branch Advisory Groups



# States With Climate Action Plans

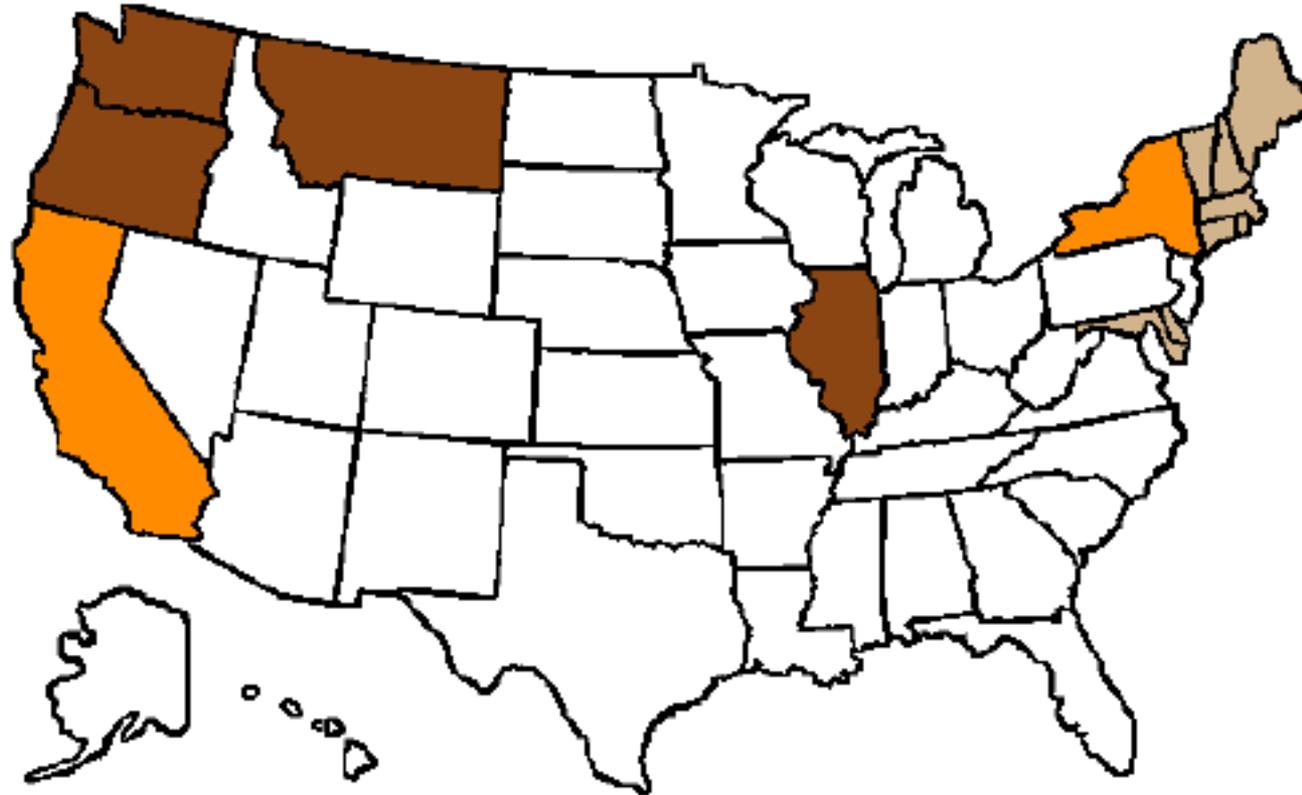


# States with GHG Targets



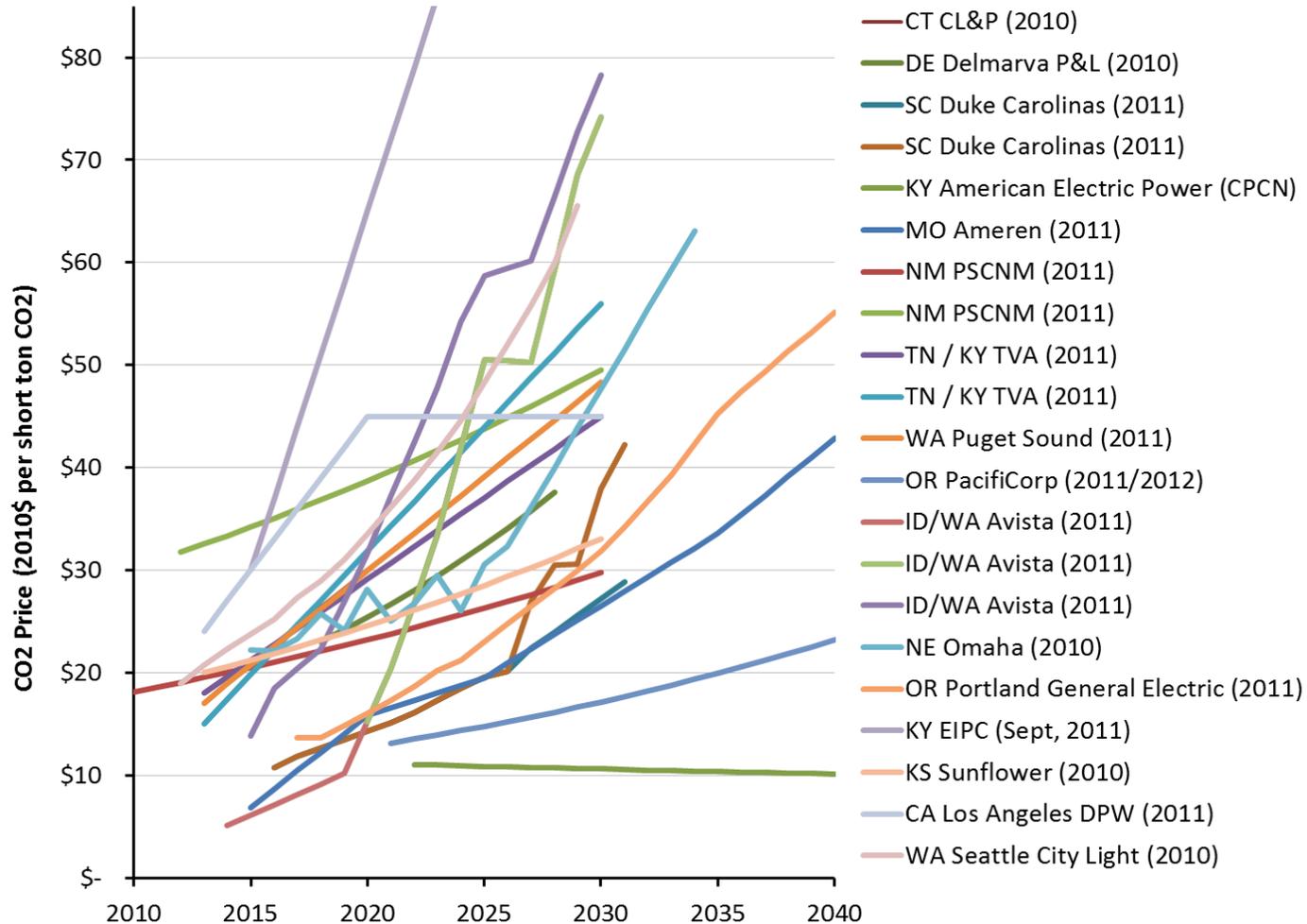
States with GHG Emissions Targets

# States with Emission Caps on Electricity

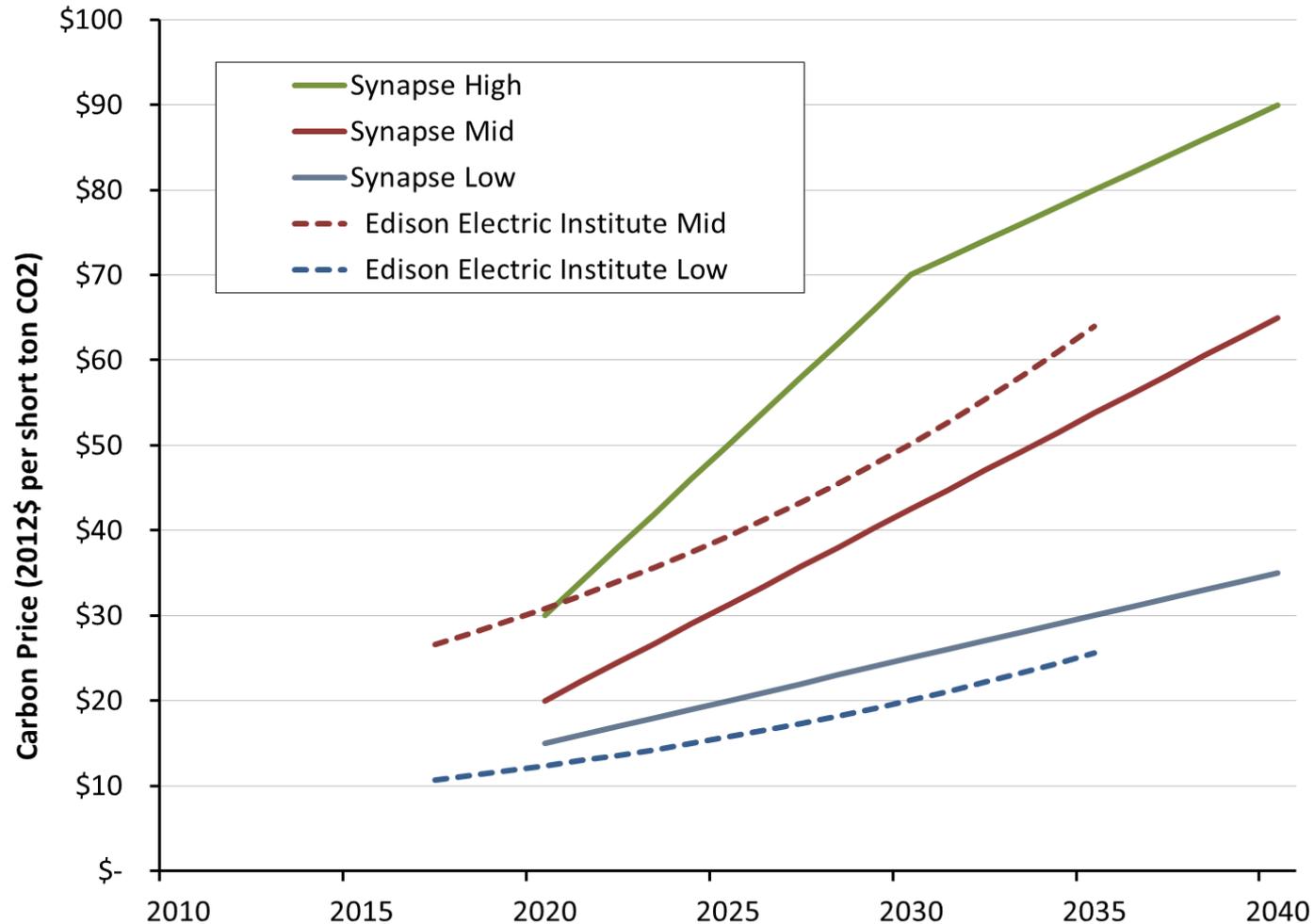


-  Emission Performance Standards
-  Utility Sector Cap and Trade
-  Emissions Standards and Cap and Trade

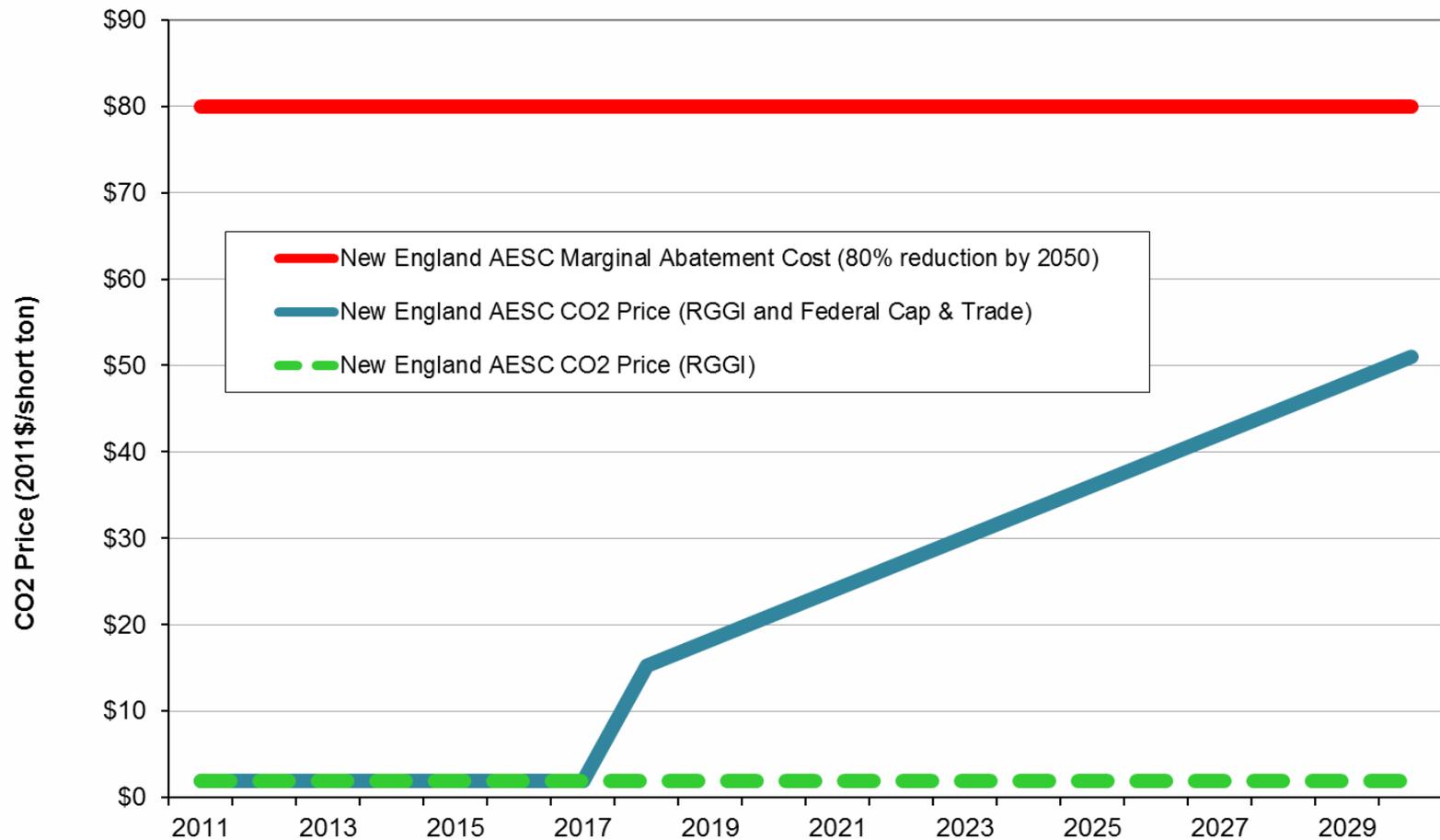
# CO2 Price Assumptions Used in Utility IRPs



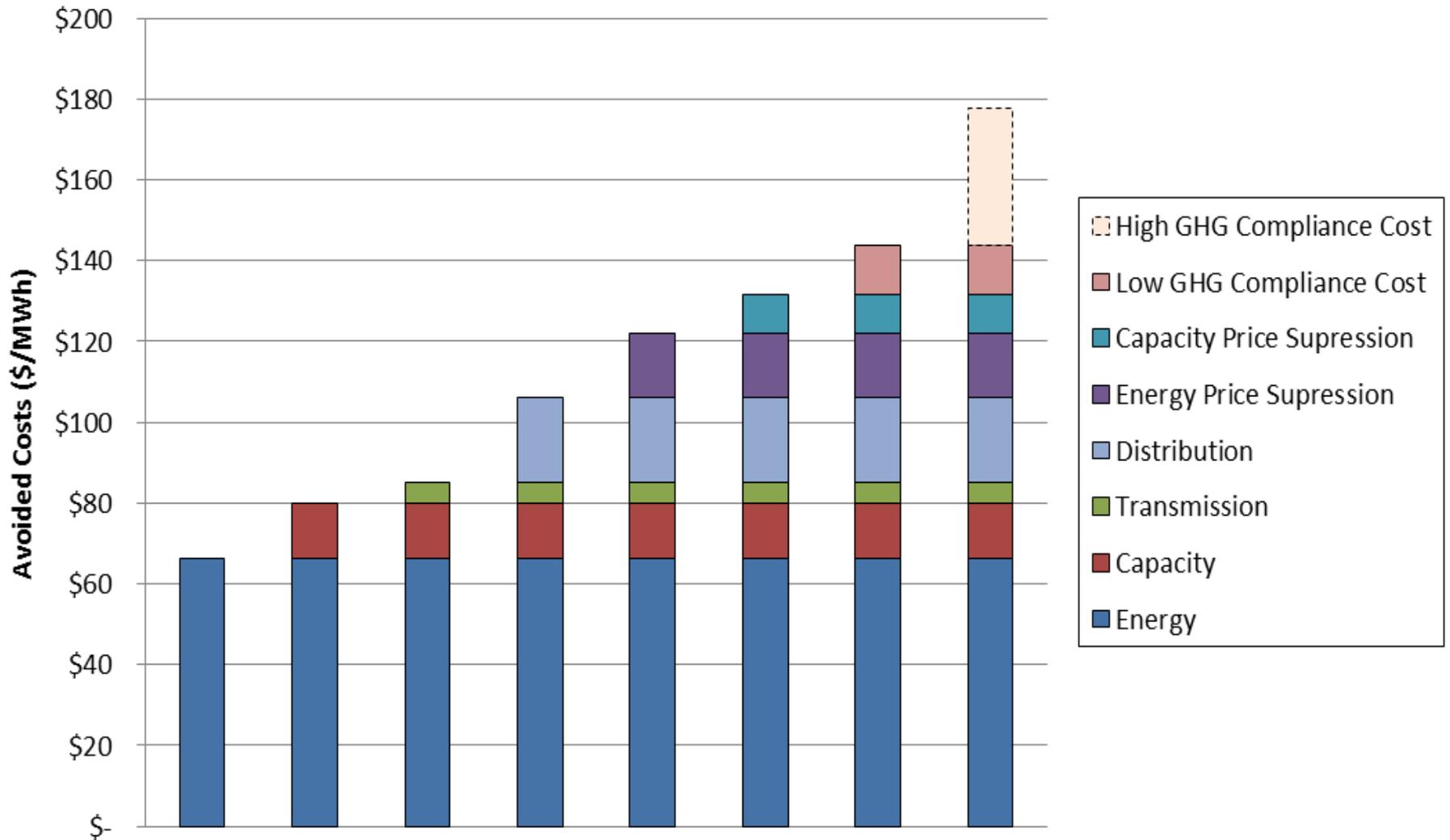
# Generic Estimates of CO2 Prices



# GHG Compliance Costs – Three Versions



# Implications of GHG Compliance Costs



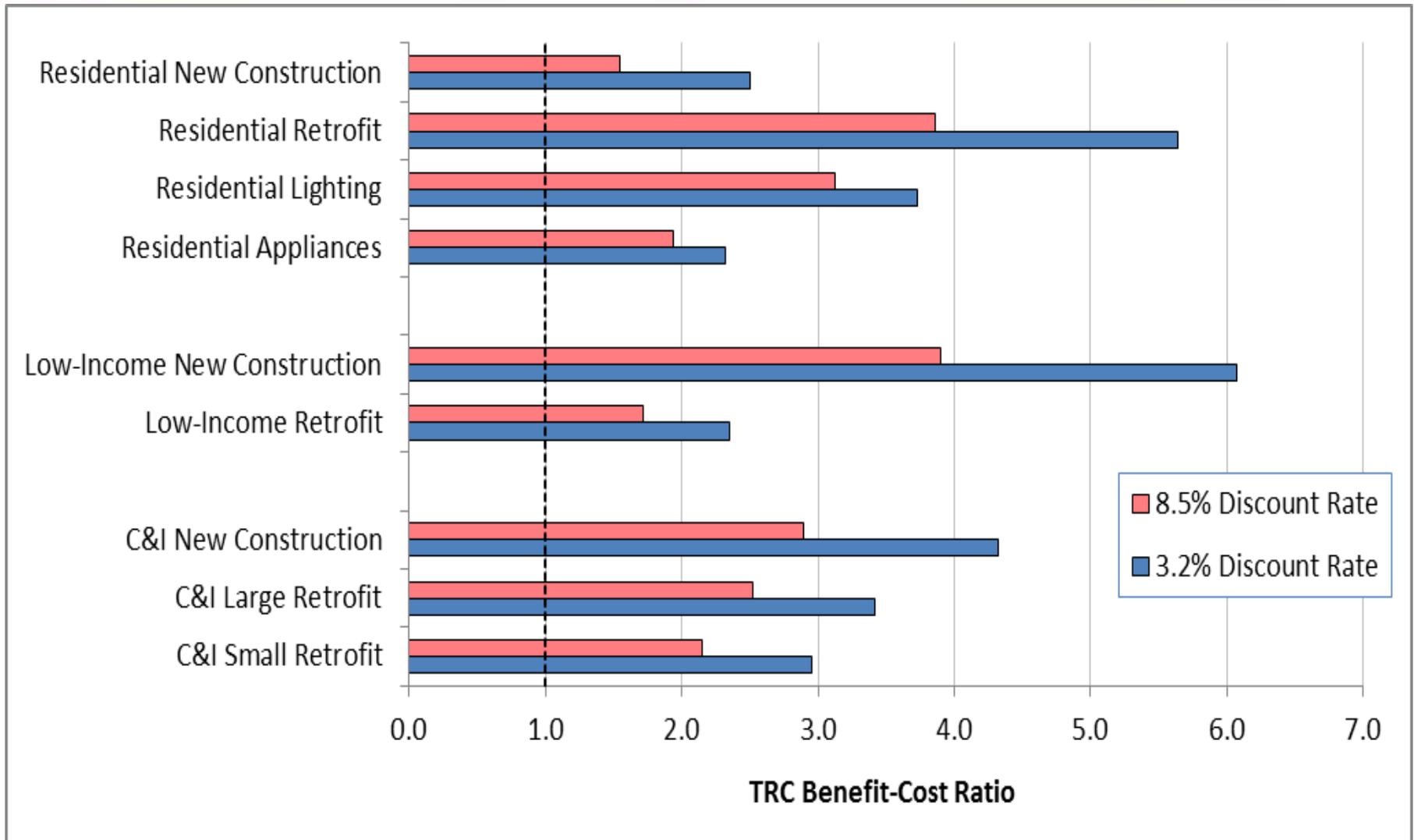
# Recommendations on Treatment of Environmental Compliance Costs

- Include environmental compliance costs in the Societal Cost, the TRC and the PAC tests – these are not externalities.
- Evaluate and implement EE on a timely basis.
  - Cannot wait until a plant retrofit / retirement decision is imminent. Planning and implementation must be frequent and on-going.
- Consider all likely environmental compliance costs.
  - Avoid the problem of piecemeal compliance.
- Apply comprehensive planning practices.
  - Better integration of environmental regulations and electricity goals.
- Account for GHG compliance costs now.
  - Federal, regional and state level requirements.
- Treat efficiency comparably with other GHG abatement options.

# Choice of Discount Rate

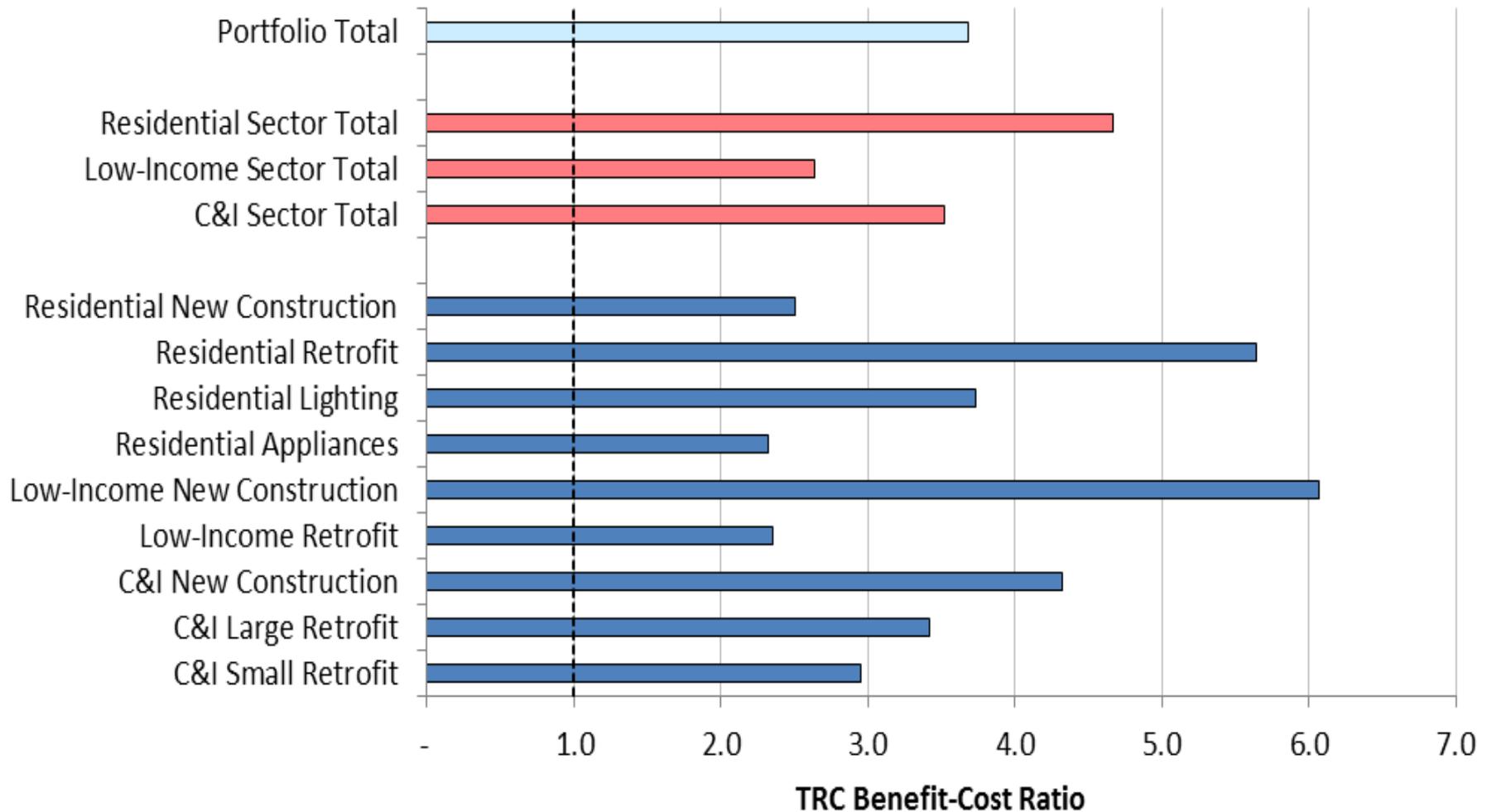
- In theory, the different cost-effectiveness tests require the use of different discount rates because they represent the perspectives of different decision-makers.
- Many states use the utility's weighted average cost of capital (WACC) for a discount rate, based on the notion that energy efficiency investments are comparable with supply-side investments,
  - However, the cost recovery for energy efficiency investments is typically not comparable to that for supply-side investments.
  - Utilities are typically allowed to recover efficiency investments immediately through system benefit charges, while they typically have to raise capital to invest in supply-side resources.
  - Thus, the utility's WACC may not be applicable to energy efficiency programs.
- We recommend that states use a generic market indicator of a low-risk investment, such as the interest rate on long-term U.S. Treasury bills, for those programs where the costs are recovered in a pass-through charge.

# Cost-Effectiveness with Different Discount Rates



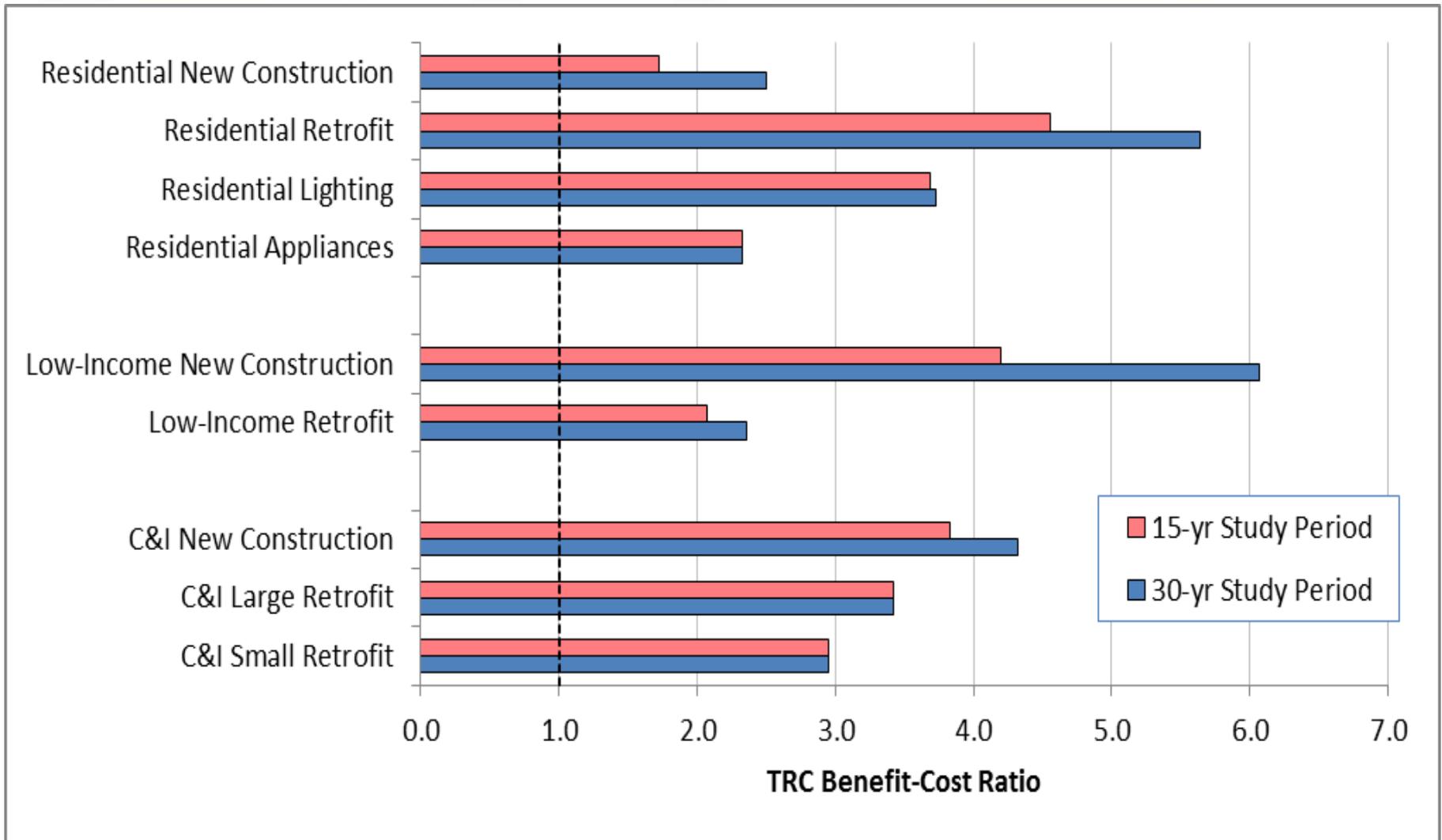
- Some states require that each energy efficiency measure be screened for cost-effectiveness, while others require screening at the program or portfolio level.
- We recommend that states do not require energy efficiency to be screened at the measure level, because:
  - This ignores the important interactions between measures.
  - This creates lost opportunities, and limits comprehensive whole-building approaches.
  - This makes it more difficult to achieve customer equity.
- When energy efficiency measures are screened in the field (i.e., at the customer's premises), they should be screened using the Participant's Cost test.

# Cost-Effectiveness at Different Screening Levels



- Energy efficiency measures produce savings over the course of their useful lives.
  - Depending on the measure, the useful life can be as long as 20 years or more.
- Energy efficiency screening practices should use study periods that include the full life of the measures.
- Artificial caps on study periods or useful measure lives will skew the cost-effectiveness analysis, and result in an under-investment in energy efficiency.

# Cost-Effectiveness with Different Study Periods



# The Risk Benefits of Energy Efficiency

- It is important to recognize that energy efficiency can mitigate various risks associated with energy planning and the construction and operation of large, conventional power plants.
- These risks include fuel price risk, construction cost risk, planning risk, reliability risk, and risks associated with new regulations.
- These risk benefits should be accounted for when screening energy efficiency programs, either through system modeling or through risk adjustments to the energy efficiency benefits.

# Projected Utility Generation Resources in 2015 – Relative Cost and Risk



# Free-riders, Spillover, Market Transformation

- In order to fully capture the actual effect of energy efficiency programs, it is important to properly account for free-riders, spillover effects, and market transformation.
- These effects should be estimated and accounted for in a manner that is timely, consistent, and comprehensive.
- Programs that are expected to have significant market transformation impacts should be provided with greater flexibility in the screening process.

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