Synapse
Energy Economics, Inc.

Energy Efficiency Screening:
Accounting for 'Other Program Impacts' & Environmental Compliance Costs

Regulatory Assistance Project Webinar

March 11, 2013

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Overview

- This webinar is a summary of a recent RAP report:
  - 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.
  - Available at:
    - ✓ www.raponline.org
    - ✓ www.synapse-energy.com
- Two important elements of energy efficiency screening:
  - Other Program Impacts (especially non-energy benefits).
  - Cost of Compliance with Environmental Regulations.
- These two elements are frequently not addressed properly:
  - Leading to significant undervaluation of energy efficiency benefits.

Five Standard 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.

Five Standard Cost-Effectiveness Screening Tests

	Participant Test	RIM Test	PAC Test	TRC Test	Societal Cost Test
Energy Efficiency Program Benefits:					
Customer Bill Savings	Yes	---	---	---	---
Avoided Energy Costs	---	Yes	Yes	Yes	Yes
Avoided Capacity Costs	---	Yes	Yes	Yes	Yes
Avoided Transmission and Distribution Costs	---	Yes	Yes	Yes	Yes
Wholesale Market Price Suppression Effects	---	Yes	Yes	Yes	Yes
Avoided Cost of Environmental Compliance	---	Yes	Yes	Yes	Yes
Reduced Risk	---	Yes	Yes	Yes	Yes
Other Program Impacts (utility perspective)	---	Yes	Yes	Yes	Yes
Other Program Impacts (participant perspective)	Yes	---	---	Yes	Yes
Other Program Impacts (societal perspective)	---	---	---	---	Yes
Energy Efficiency Program Costs:					
Program Administrator Costs	---	Yes	Yes	Yes	Yes
EE Measure Cost: Program Financial Incentive	---	Yes	Yes	Yes	Yes
EE Measure Cost: Participant Contribution	Yes	---	---	Yes	Yes
Other Program Impacts (participant costs)	Yes	---	---	Yes	Yes
Lost Revenues to the Utility	---	Yes	---	---	---

Other Program Impacts Defined

- "Other program impacts" (OPIs) include non-energy impacts , especially non-energy benefits:
  - Non-energy impacts are those costs and benefits that are not part of the costs, or the avoided cost, of the energy from the utility.
- OPIs also include other fuel savings; the other fuels that are not provided by the utility delivering the energy efficiency:
  - e.g., oil savings,
  - e.g., gas savings (when the program is delivered by an electric utility).
- 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.

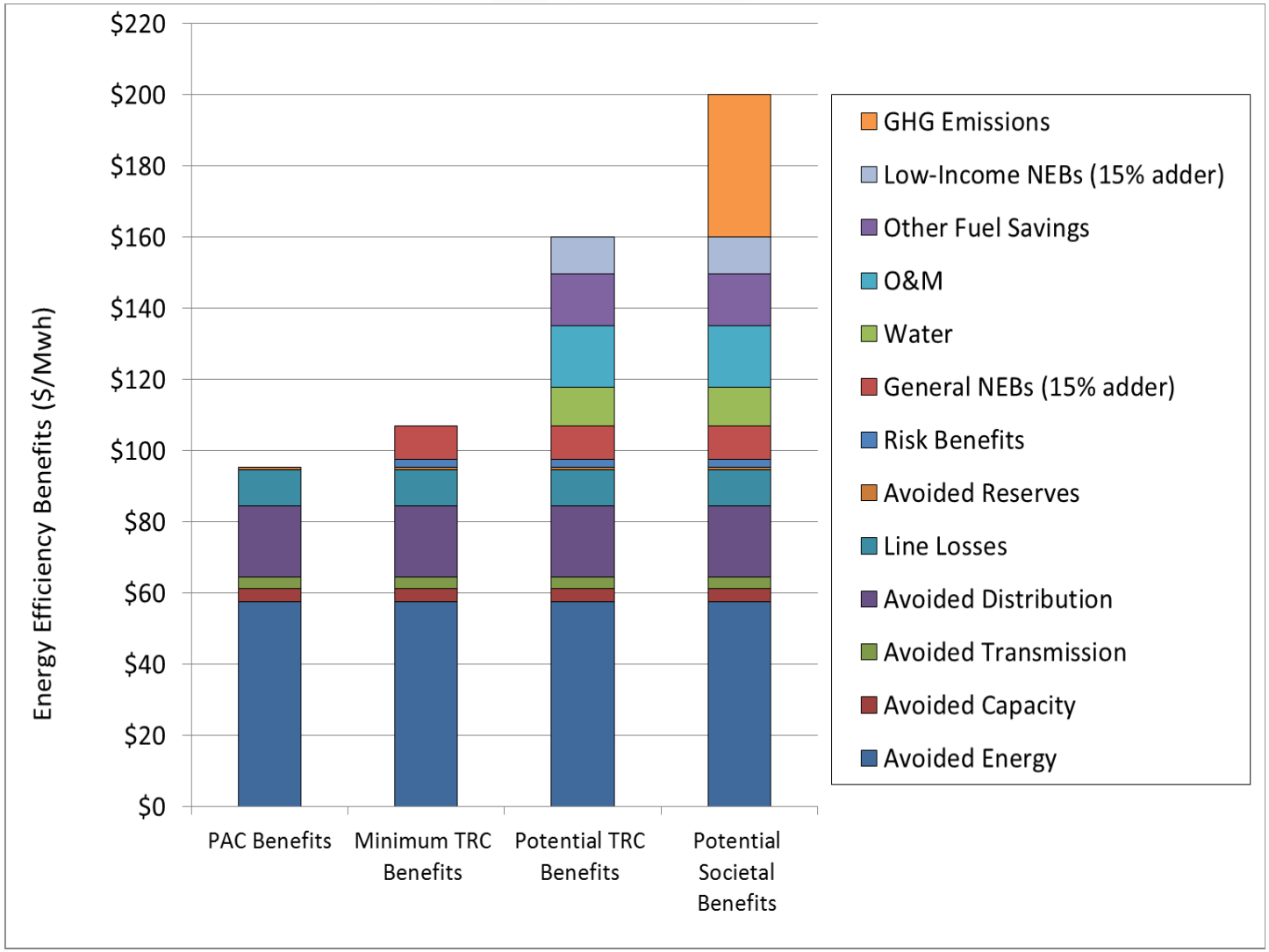
Current Treatment of Other Program Impacts

- Most states use the TRC test or the Societal test as the primary test for screening energy efficiency programs.
  - TRC test (roughly 71% of states).
  - Societal Cost test (roughly 15% of states).
  - PAC test (roughly 12% of states).
- However, many states ignore or significantly undervalue OPIs.
  - This is especially true for non-energy benefits.
- The outcome:
  - The results of the TRC and Societal tests are skewed against efficiency.
  - The value of efficiency is significantly understated.
  - Less efficiency is identified as cost-effective.
  - Some key efficiency 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 costs are included, then their benefits should be included as well.
  - Otherwise, the tests are inconsistent, skewed and misleading.
- Participant's costs can be quite large.
- Participant's non-energy benefits can also be quite large.
  - These should not be excluded simply because they are more difficult to quantify and monetize than participant costs. Using an estimate is better than using zero.
- Experience indicates that non-energy benefits are very important to many customers, sometimes more important than the energy benefits.
  - Many efficiency programs are sucessfully promoted to customers because of the non-energy benefits.

One Example of Other Program Impact Treatment - Vermont

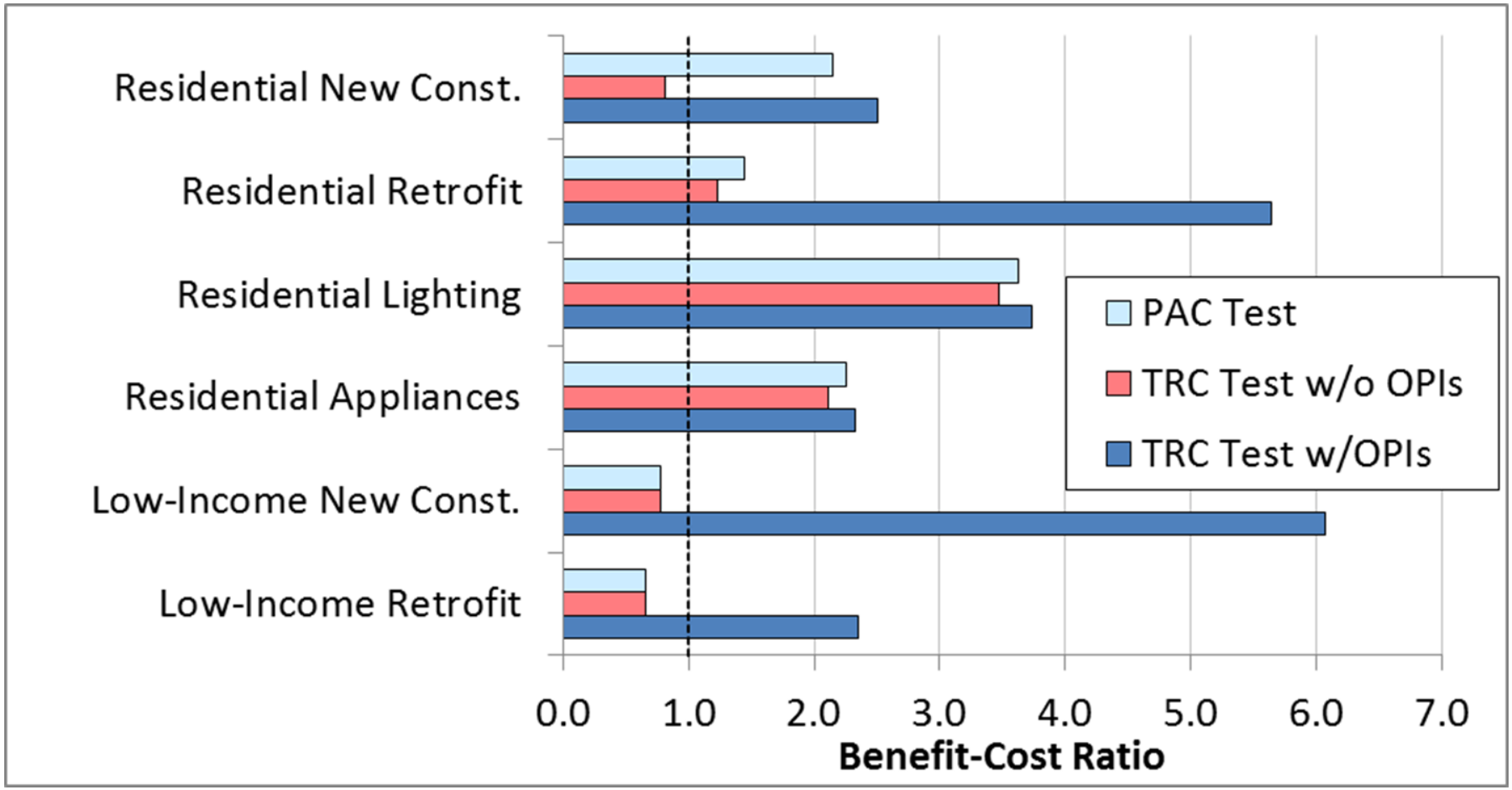


Note: The Commission intentionally set the NEBs adder values at a conservative level, and acknowledged that the full value of NEBs are likely to be greater.

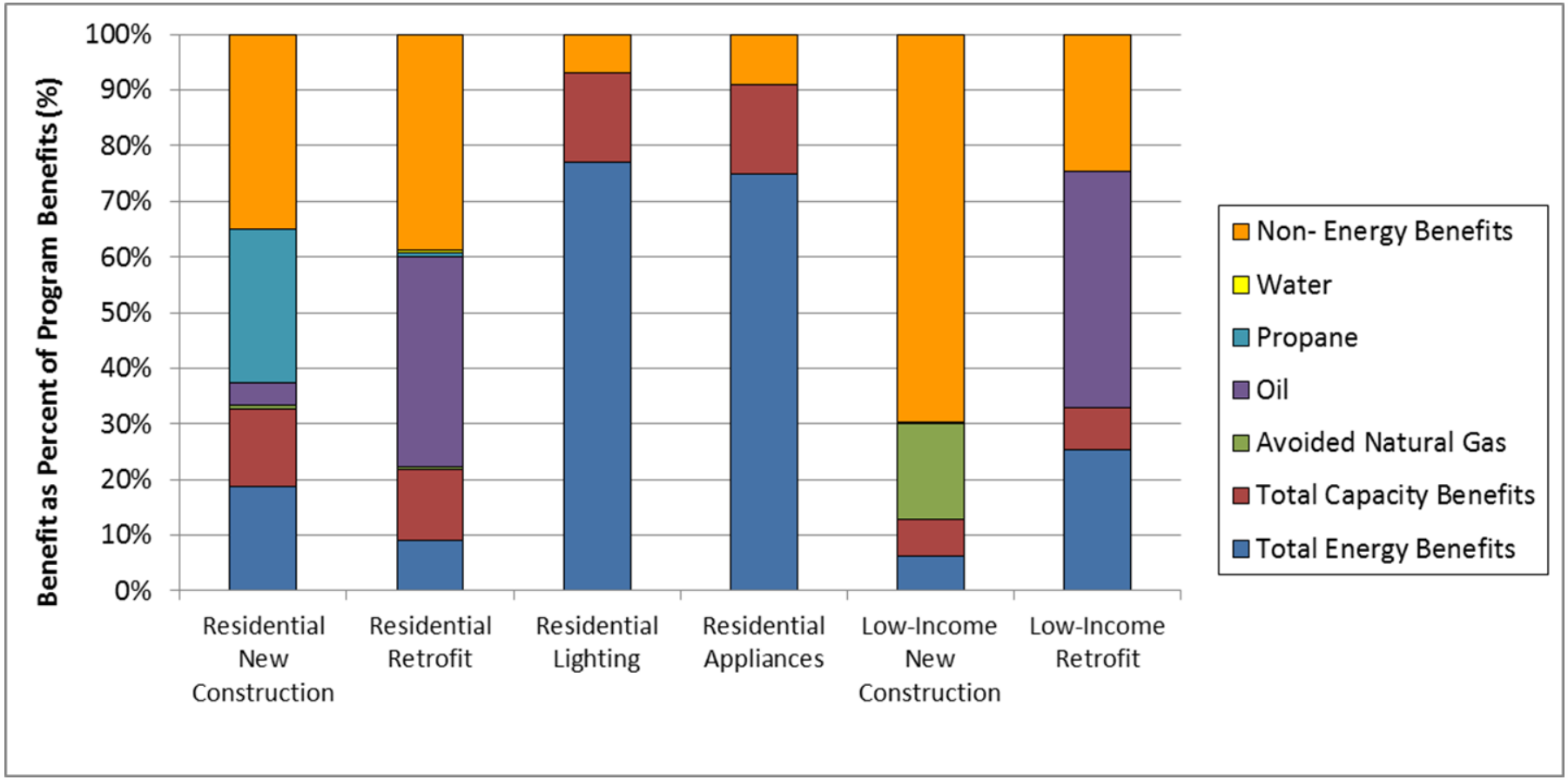
Implications of Including Other Program Impacts

- 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.

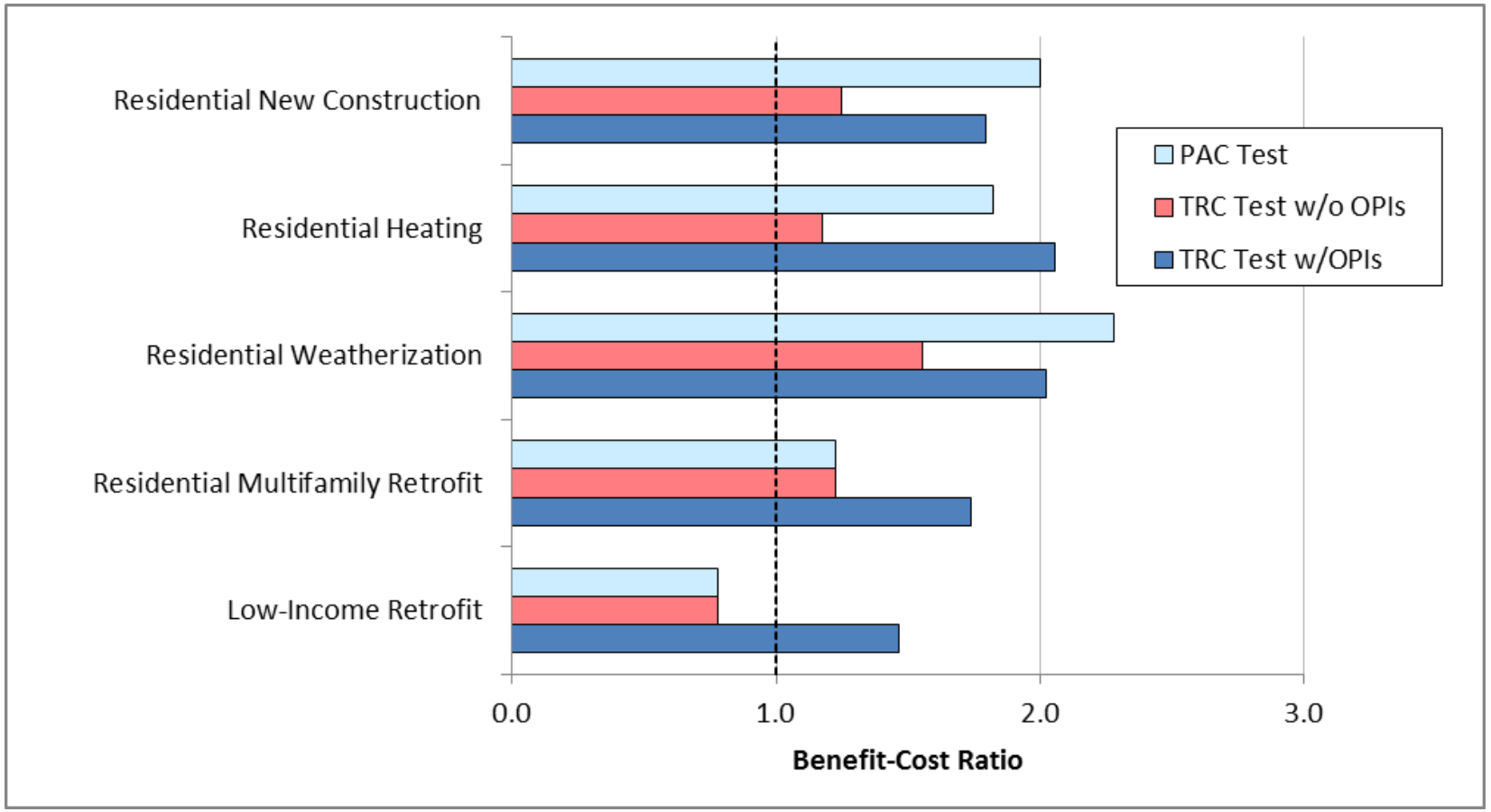
Actual Cost-Effectiveness Results for 2012 Efficiency Plan for a Massachusetts Electric PA



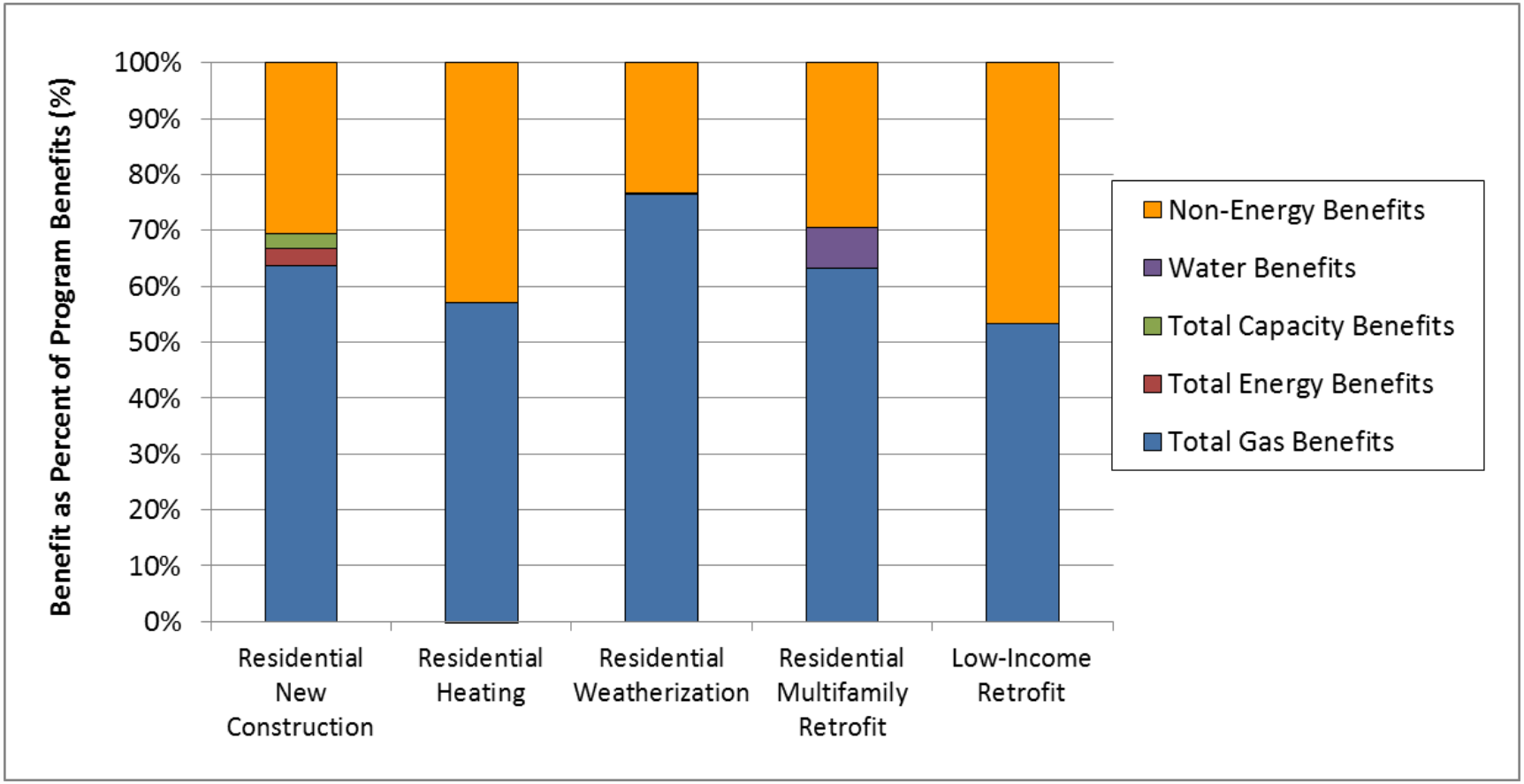
Same Cost-Effectiveness Results for a Massachusetts Electric PA: Breakout of Benefits



Actual Cost-Effectiveness Results for 2012 Efficiency Plan for a Massachusetts Gas PA



Same Cost-Effectiveness Results for a Massachusetts Gas PA: Breakout of Benefits



Options for Estimating Non-Energy Benefits

Recognize that uncertainty can be addressed.

- Many of the EE planning assumptions contain uncertainty (e.g., fuel prices).
- Using an approximation is better than assuming a value of zero.

1. Conduct a study to provide better estimates.
   - Can often be done for a small portion of EM&V budgets.
2. Begin with readily measurable non-energy benefits.
   - Move to more challenging ones later.
3. Conduct sensitivity analyses.
   - e.g., for programs where there is likely to be a material impact.
4. Consider proxies or adders.
5. Consider hybrid approaches.
   - e.g., quantify readily measurable, and use a proxy for the others.

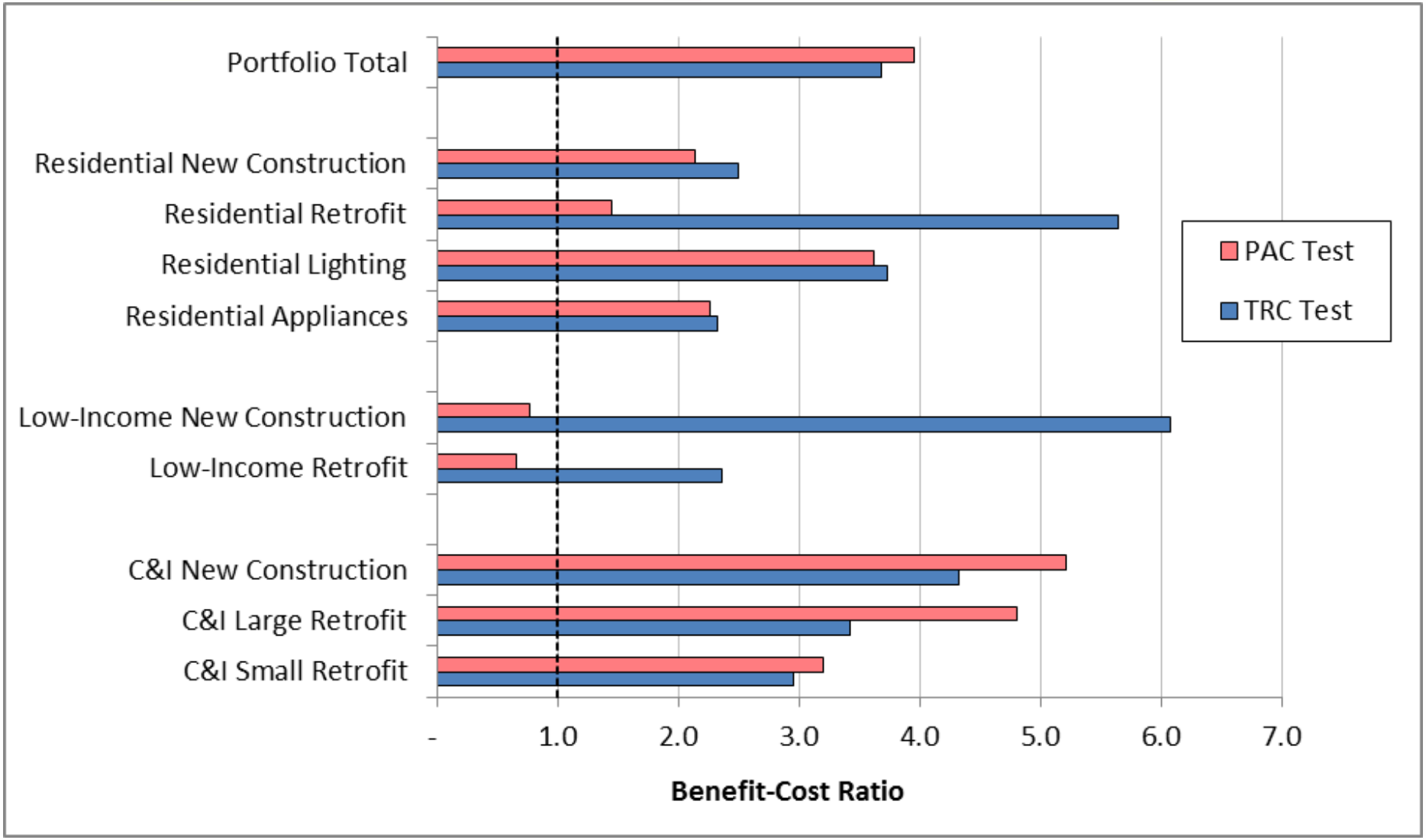
Customer Concerns Raised With Regard to Applying OPIs

1. 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.
2. Including OPIs in the TRC test will require electric and gas utility customers to pay for efficiency programs that result in benefits that are not related to the utility service.
   - These benefits could be seen as being outside the sphere of electric and gas utility responsibility.
   - e.g., Why should electric customers pay for participant oil savings, or for participant health and safety benefits?

Addressing Customer Concerns

- Overall customer benefits can be ensured by applying the Program Administrator Cost test to the energy efficiency portfolio.
  - This will ensure that energy efficiency programs will reduce utility costs (i.e., reduce revenue requirements).
  - In the Massachusetts 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
- Including OPIs helps achieve key public policy benefits.
  - Especially customer equity. In the absence of OPIs (especially non-energy benefits) some key programs may appear to be uneconomic:
    - ✓ Low-income programs.
    - ✓ New construction programs.
    - ✓ Whole-house retrofit programs.
  - If these programs are screened out, then there will be less opportunity for some customers to benefit, reducing customer equity.

Same Cost-Effectiveness Results for Massachusetts Electric PA: TRC and PAC; Portfolio and Program Level



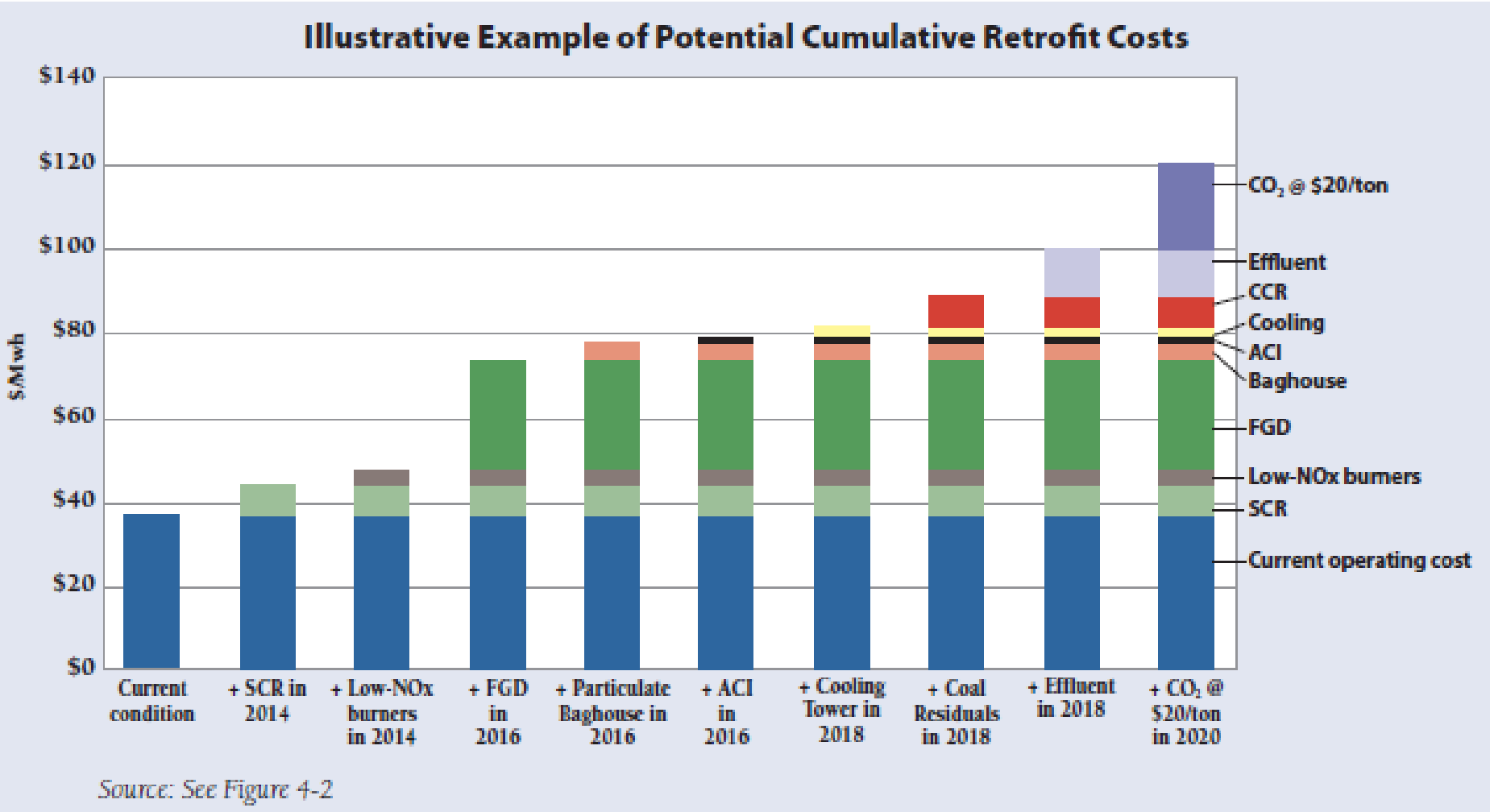
Recommendations for Applying the Tests With OPIs

- The Societal Cost test or the TRC test should be used to screen energy efficiency programs.
  - The Societal Cost test and the TRC test must include reasonable estimates of OPIs.
  - Otherwise, the results will be skewed and misleading.
- The PAC test should be applied to the entire portfolio of efficiency programs.
  - To ensure utility costs are reduced.
- The combination of the two tests in this way achieves the appropriate balance between maximizing the value of EE and protecting customers.

Compliance with Environmental Regulations

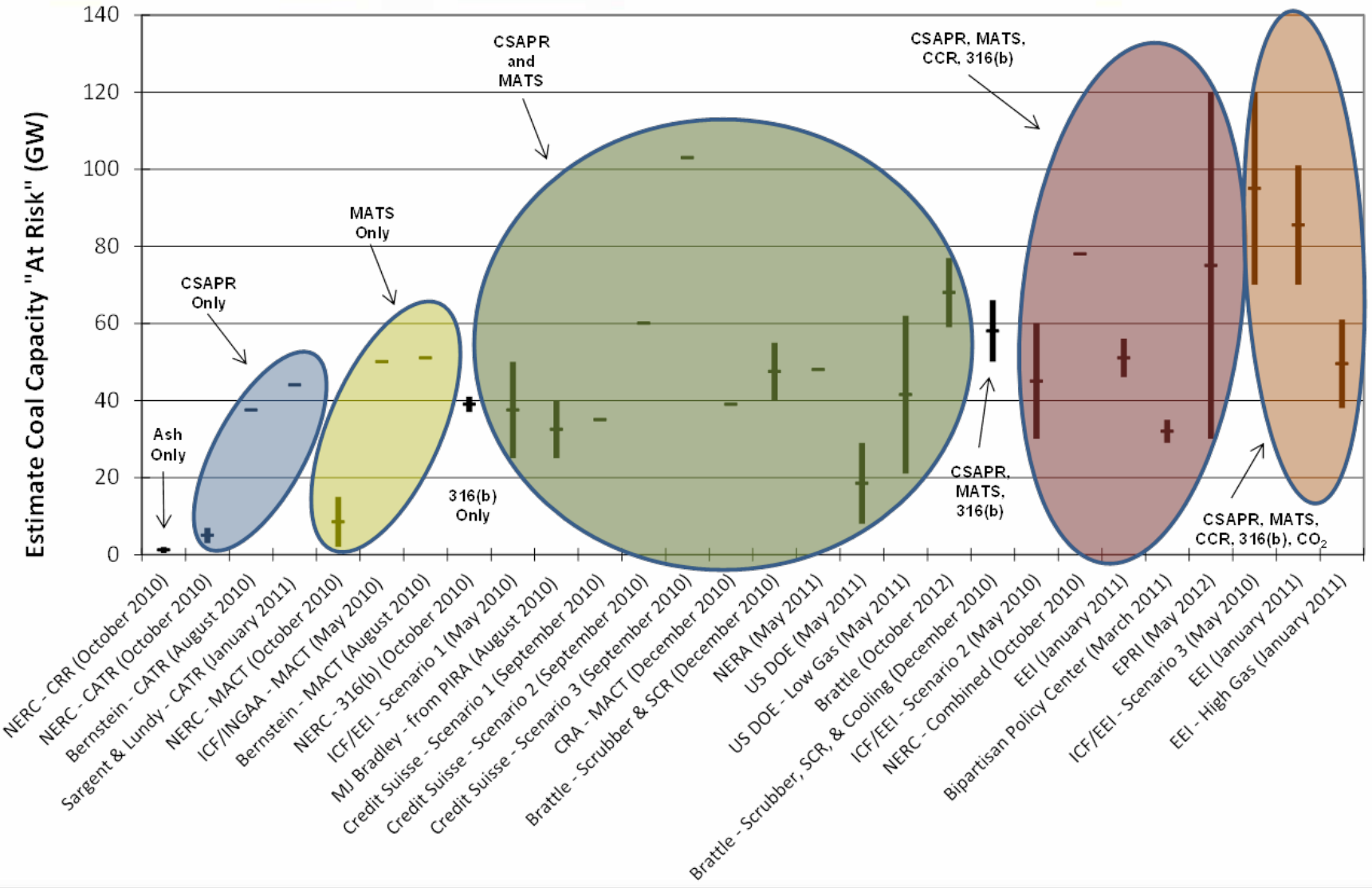
- Energy efficiency can help reduce the costs of complying with environmental regulations.
- The costs of complying with environmental regulations are not environmental externalities.
  - Environmental compliance costs will be incurred by utilities and passed on to customers.
  - Therefore, environmental 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



Source: See Figure 4-2

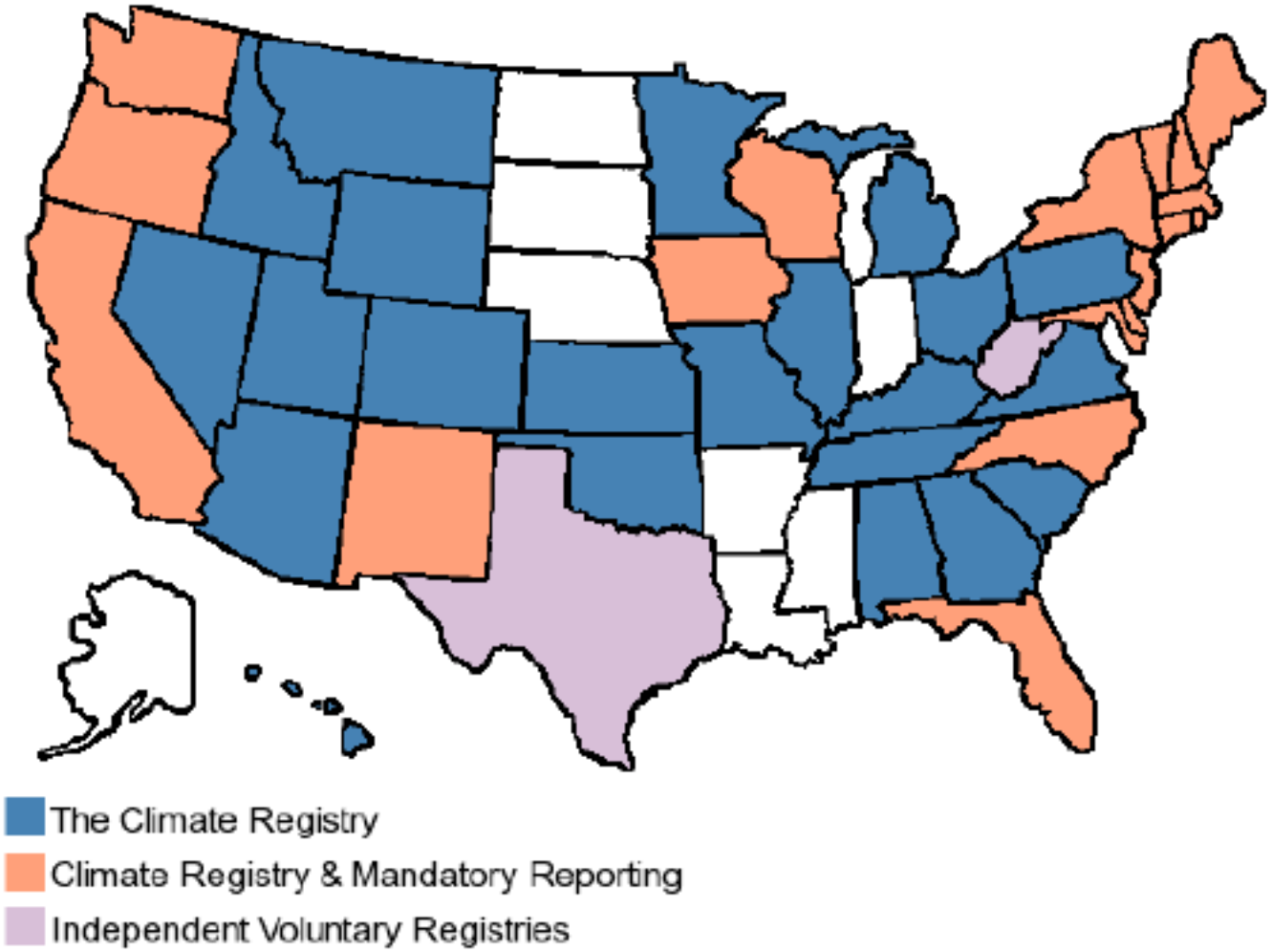
One-Third of US Coal Plants at Risk



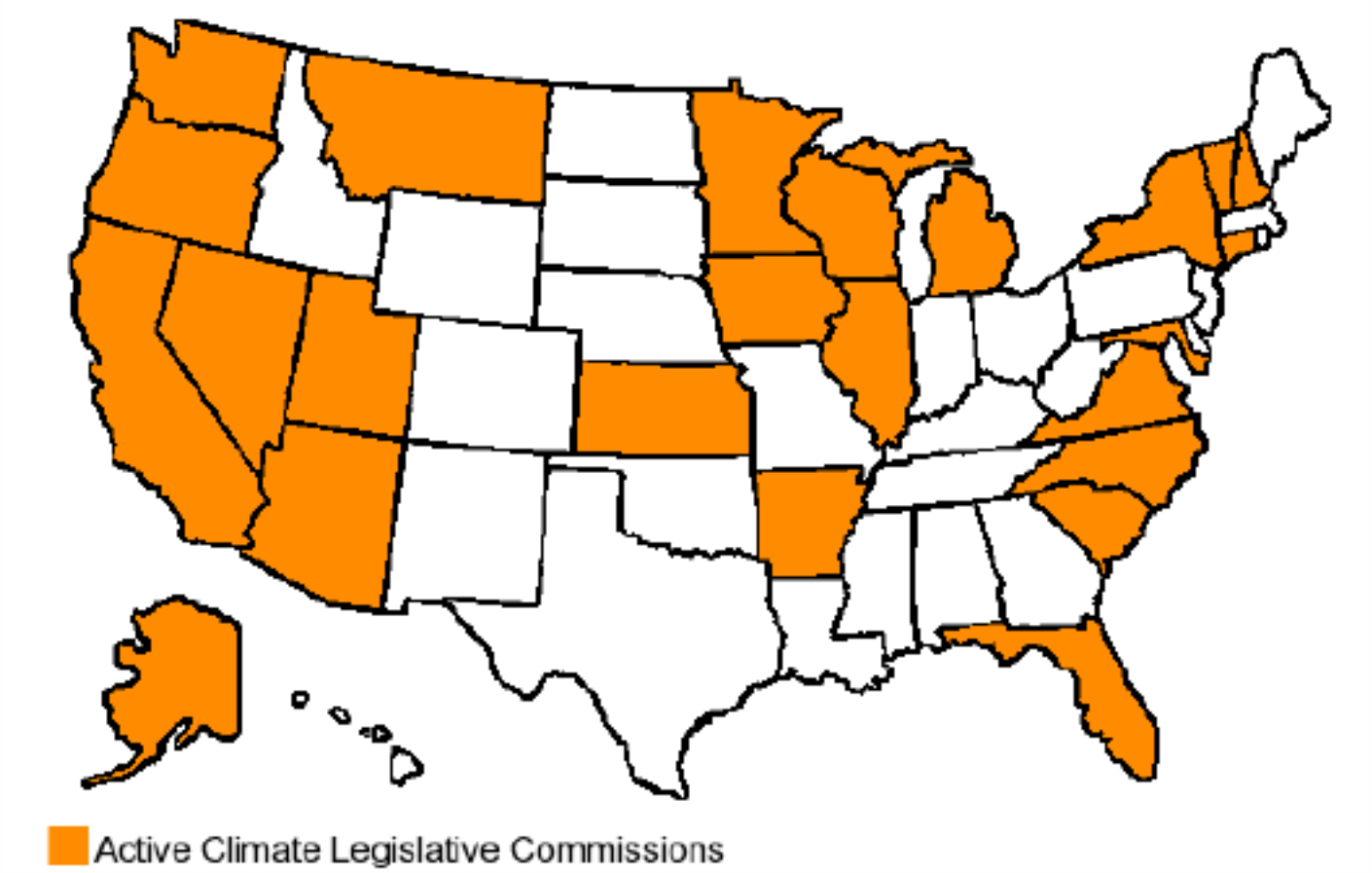
Climate Change Requirements: Current and Future

- 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.

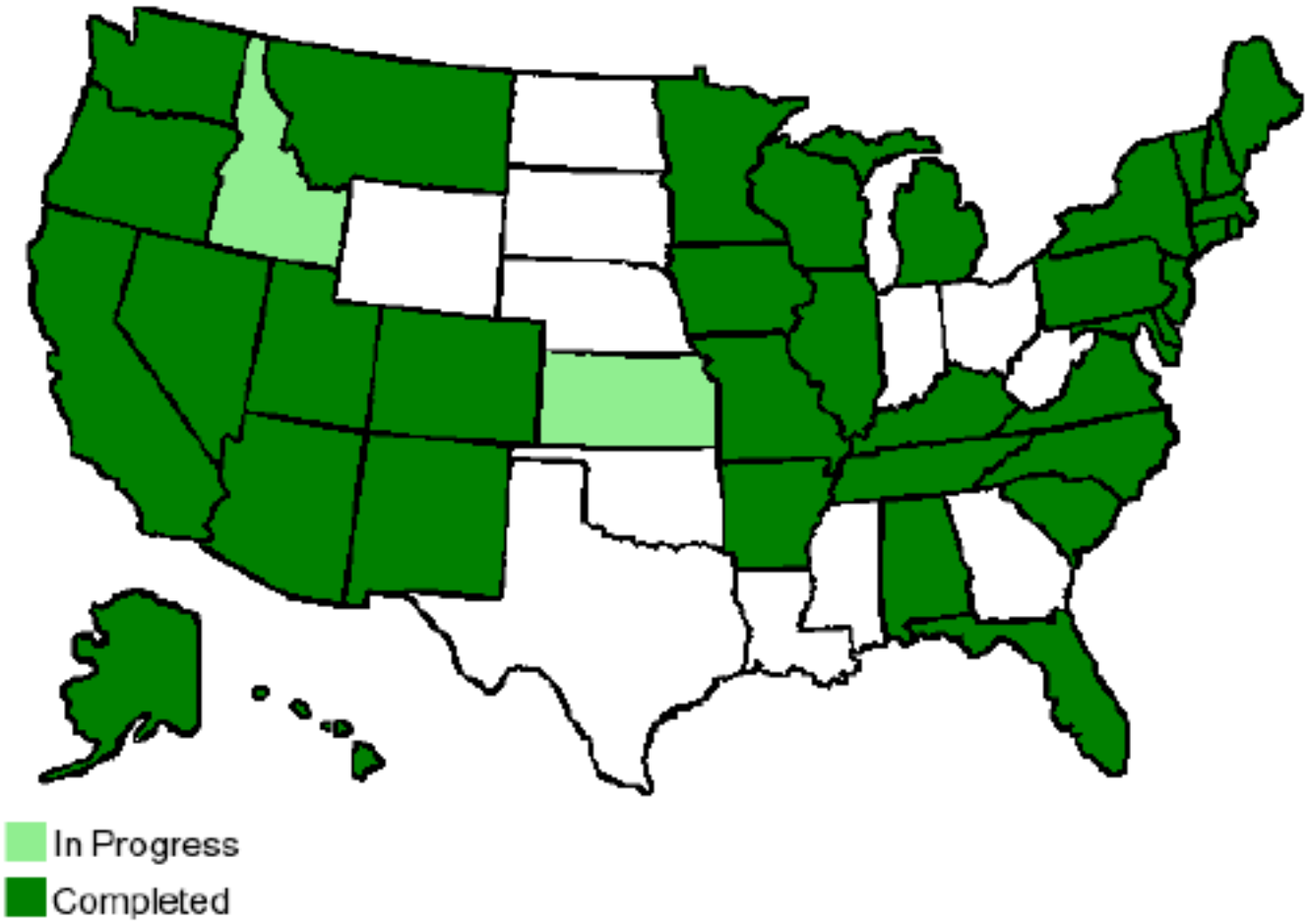
States with GHG Reporting and Registries



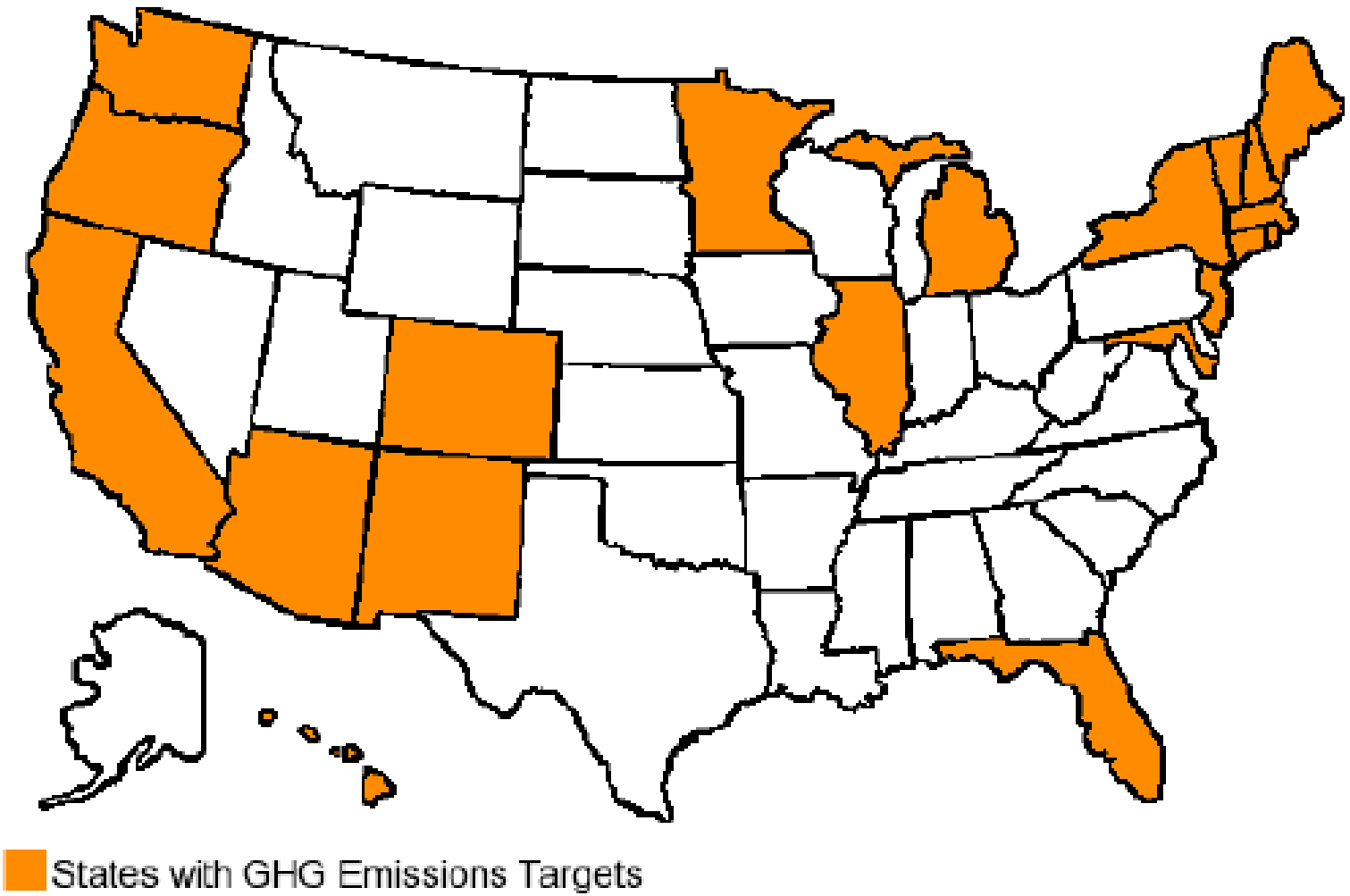
States with Active Legislative Commissions and Executive Branch Advisory Groups



States With Climate Action Plans

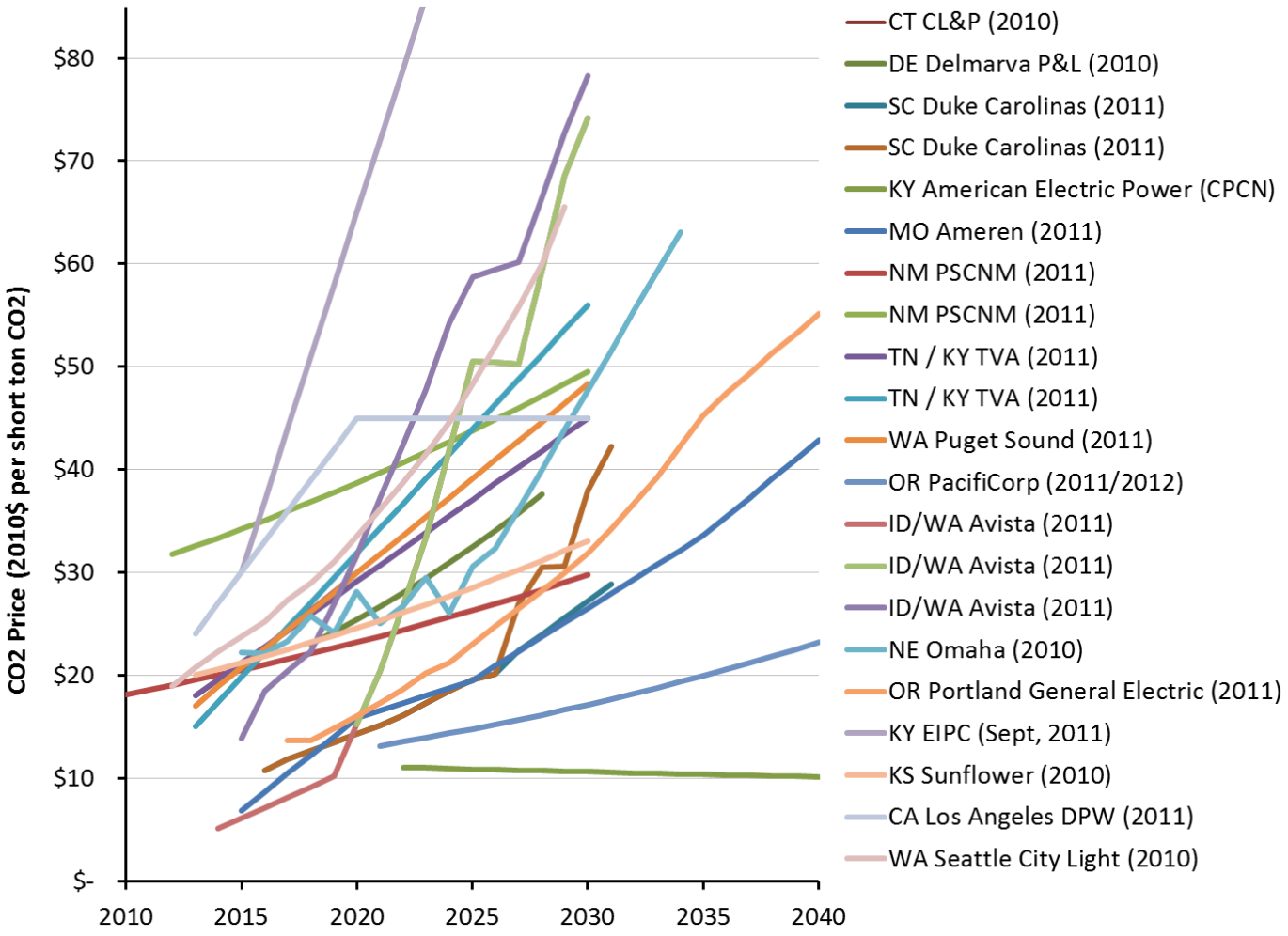


States with GHG Targets

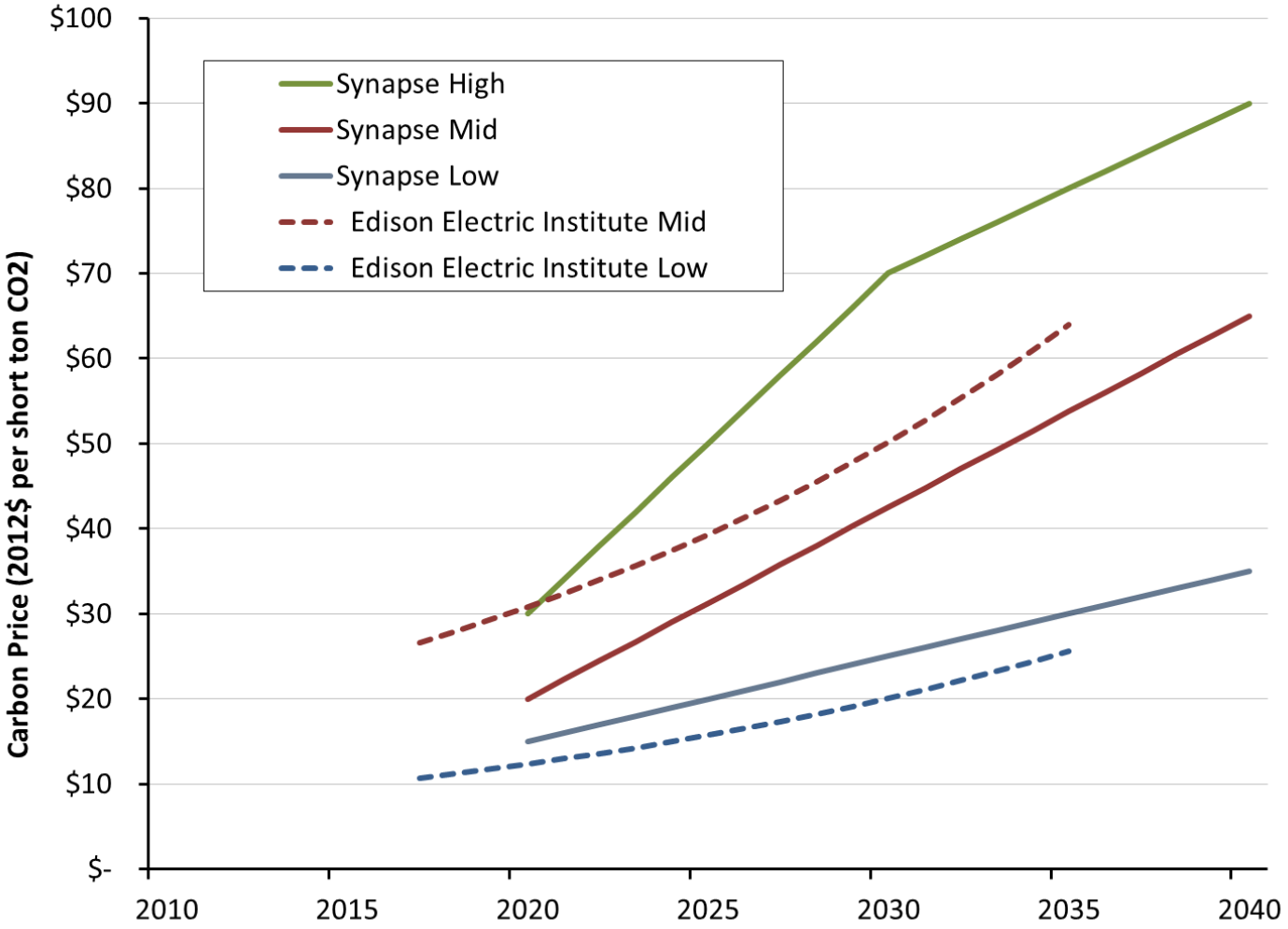


States with Emission Caps on Electricity

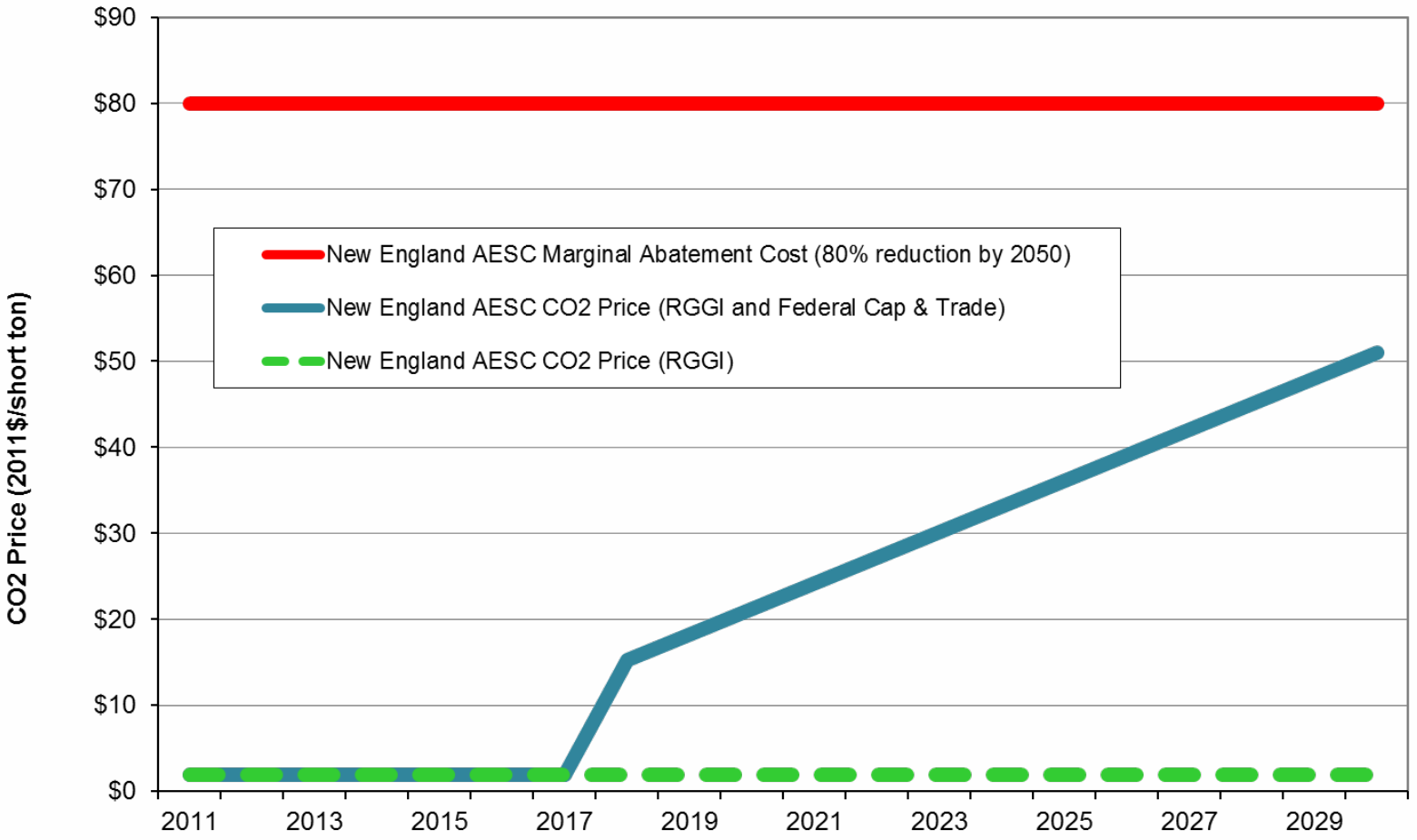
CO2 Price Assumptions Used in Utility IRPs



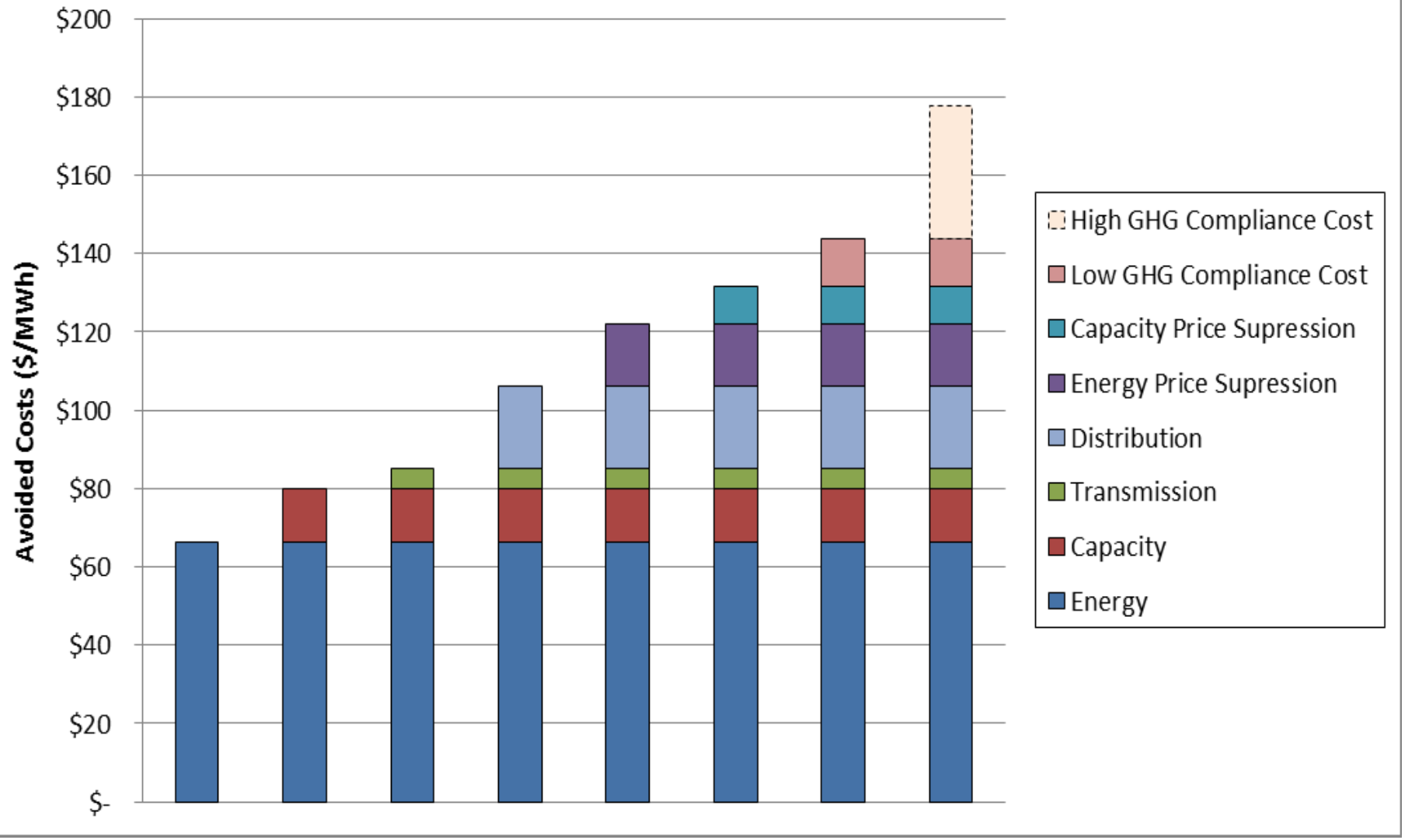
Generic Estimates of CO2 Prices



GHG Compliance Costs – Three Versions



Implications of GHG Compliance Costs



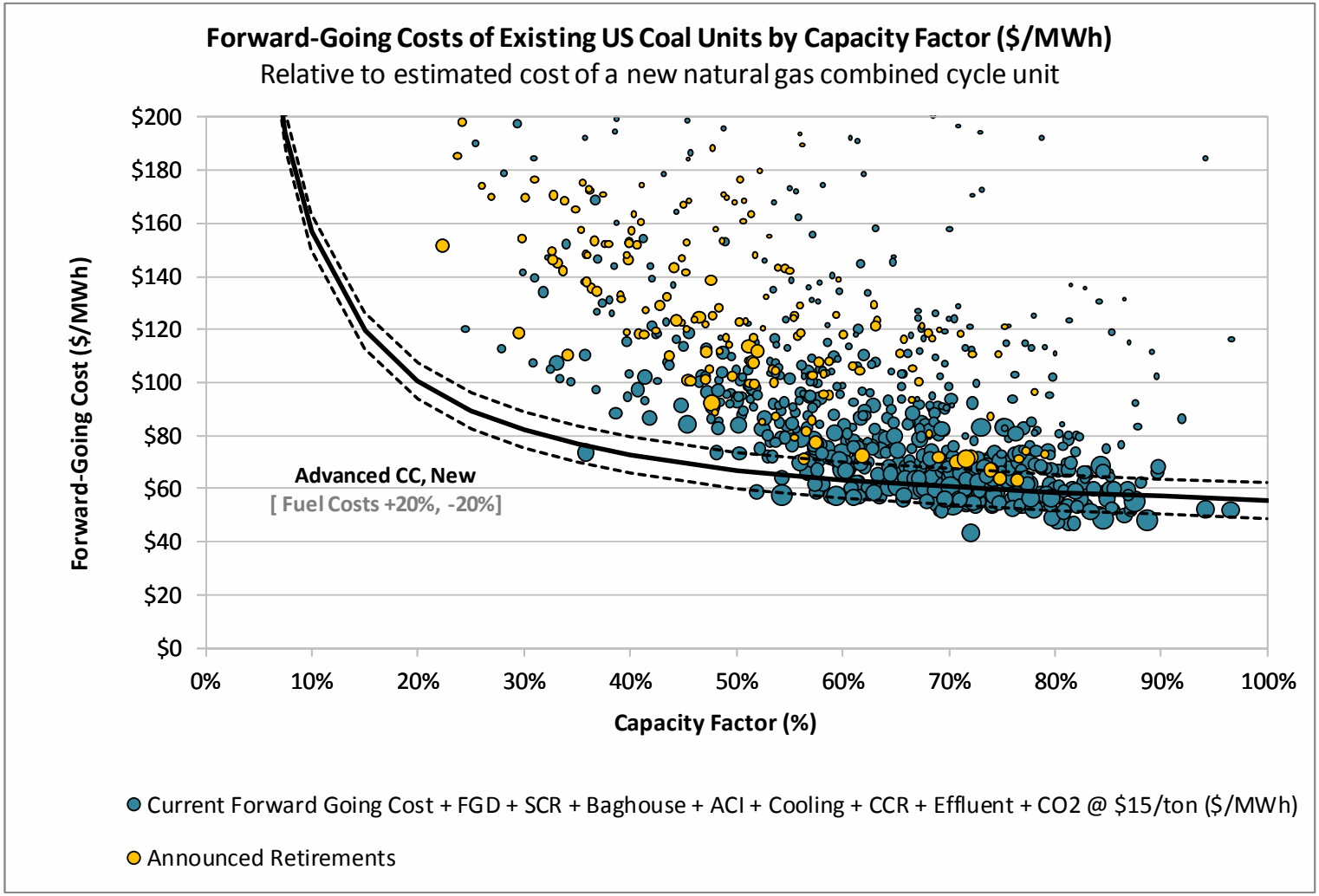
Recommendations on Treatment of Environmental Compliance Costs

- 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.

Appendix

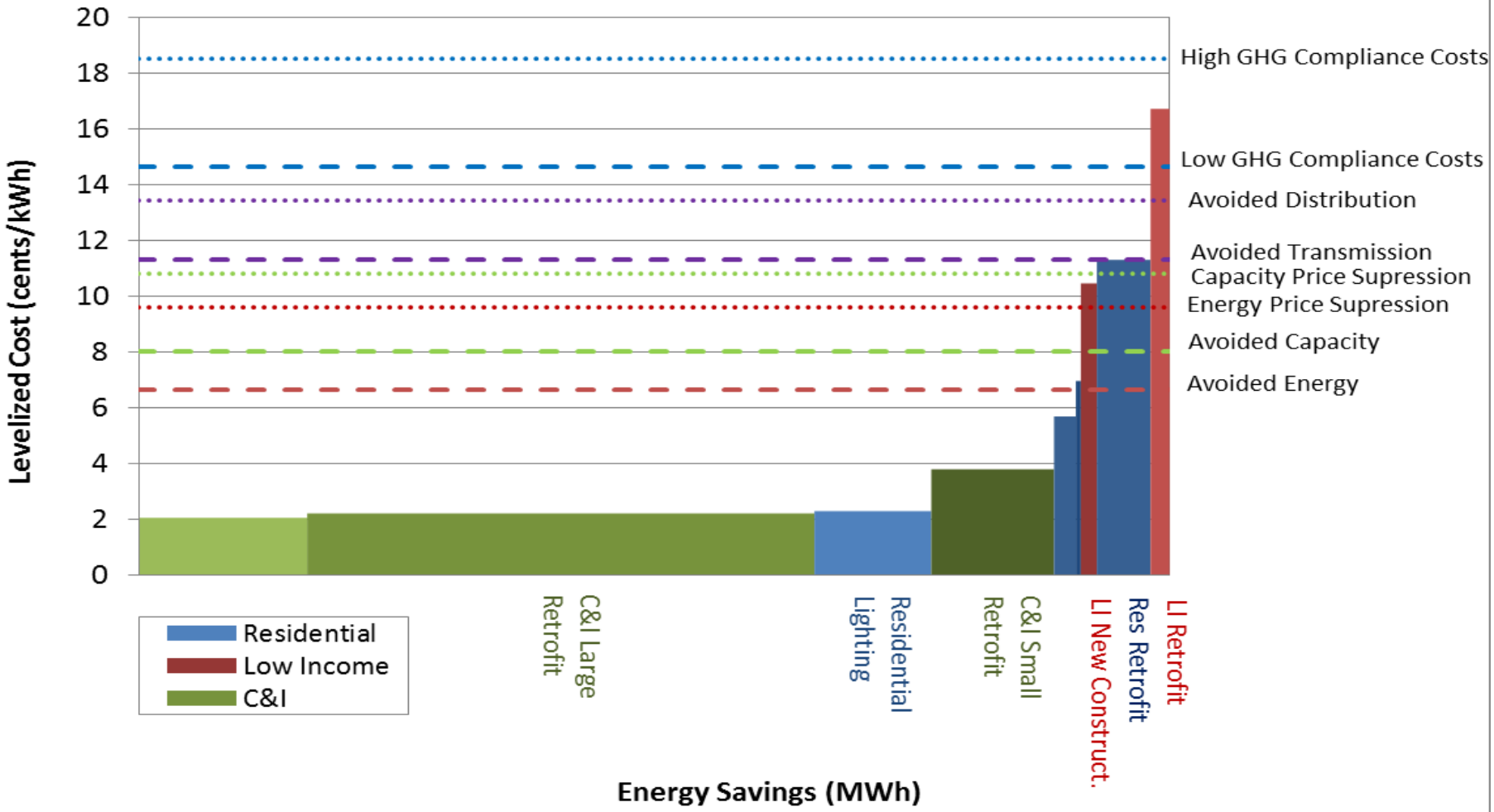
	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
AIR											
Cross-States Air Pollution Rule (SO_2/NO_X)	Phase 1 Caps		Phase 2 Caps			Possible Phase 3, Pending Revised NAAQS					
Mercury and Air Toxics Standards				National Emissions Standards in Place							
CO_2 New Performance Standards	Standards for New Units in Place			Standards for Existing Units: Pending State/EPA Rulemaking							
WATER											
316(b) Water Intake						Final Rule is Pending; Will Require a Five Year Phase-In					
Water Effluent						Proposed and Final Rules are Pending					
WASTE											
Coal Combustion Residuals					Final Rule is Pending						

Announced Retirements of US Coal Fleet



Note: Area of circles indicate MW capacity of units

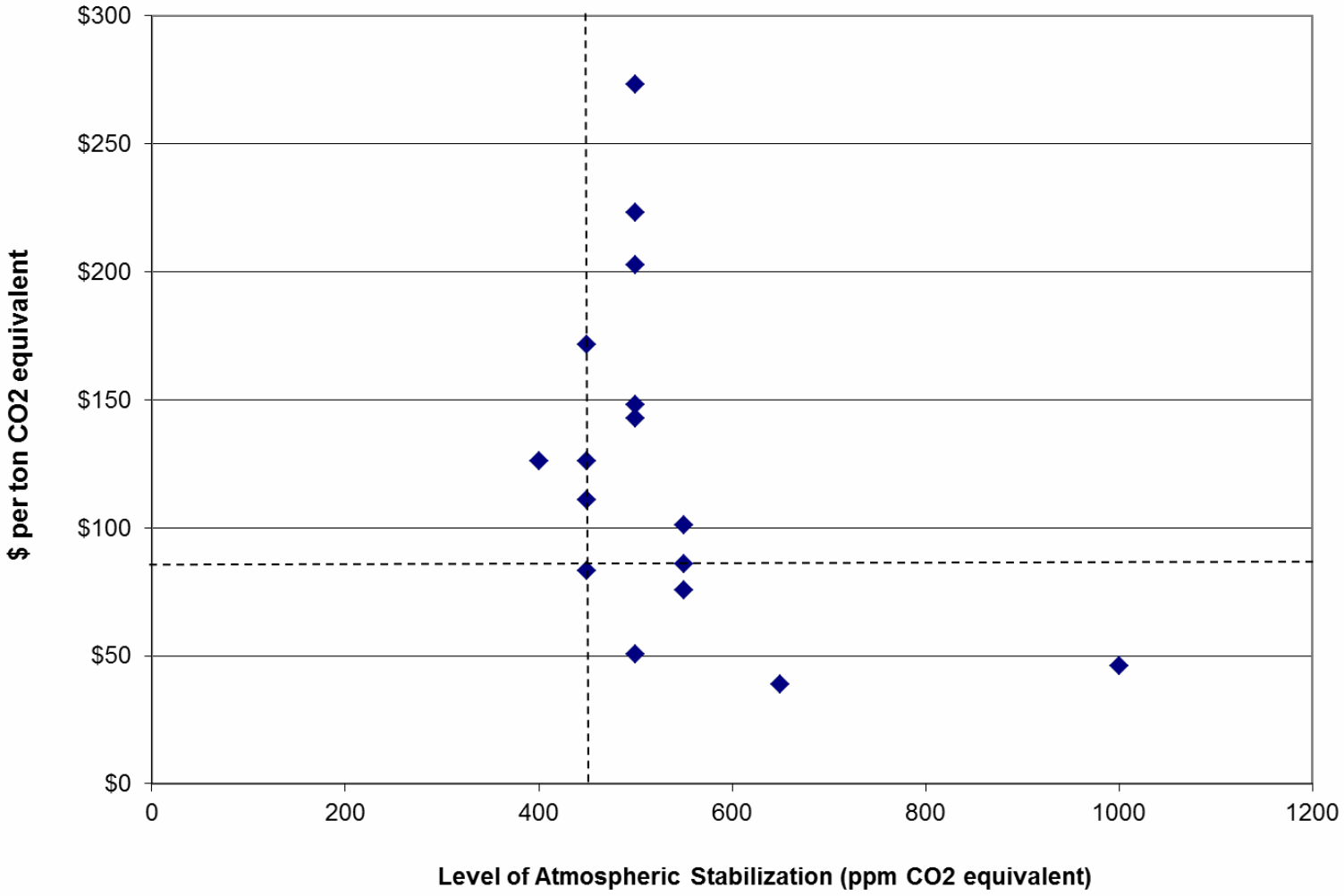
Avoided Costs Relative to the Levelized Cost of Saved Energy (cents/kWh)



AESC Estimate of Marginal Abatement Costs

- The $80/ton represents the long-term marginal cost of abating global CO2 emissions across all sectors to maintain atmospheric concentrations of CO2 at 450 ppm or lower.
- The scientific community has established that achieving this level of atmospheric concentration will require 80% reduction of 1990 emissions by 2050.
- The GWSA requires 80% reduction of MA emissions by 2050. However, it will cost more to achieve this reduction in MA relative to global reductions.
- This value can be described as a cost of compliance with GWSA.
- The $80/ton is based on a review of national and international studies. It is in the low end of the range of estimates (see next slide).

Studies Used to Support $80/ton Marginal Abatement Cost



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