Synapse
Energy Economics, Inc.

Best Practices in Energy Efficiency Program Screening

NARUC Summer Meetings
Energy Efficiency Cost-Effectiveness Breakfast
July 23, 2012

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Overview

- Application of the cost-effectiveness tests.
- Other program impacts.
- Balancing customer costs with public policy benefits.
- Choice of discount rate.
- Avoided costs.
- Avoided environmental compliance costs.
- Free-ridership, spillover, market transformation.
- Risk benefits of energy efficiency.
- Cost-effectiveness study period.
- Cost-effectiveness screening level.
- Best test(s) to use for screening energy efficiency.

Five Standard Cost-Effectiveness Tests

	Participant Test	RIM Test	PAC Test	TRC Test	Societal Cost Test
Energy Efficiency Program Benefits:					
Customer Bill Savings	Yes	---	---	---	---
Avoided Generation Costs	---	Yes	Yes	Yes	Yes
Avoided Transmission and Distribution Costs	---	Yes	Yes	Yes	Yes
Avoided Cost of Environmental Compliance	---	Yes	Yes	Yes	Yes
Other Program Benefits (utility perspective)	---	---	Yes	Yes	Yes
Other Program Benefits (participant perspective)	Yes	---	---	Yes	Yes
Other Program Benefits (societal perspective)	---	---	---	---	Yes
Energy Efficiency Program Costs:					
Program Administrator Costs	---	Yes	Yes	Yes	Yes
EE Measure Cost: Rebate to Participant	---	Yes	Yes	Yes	Yes
EE Measure Cost: Participant Contribution	Yes	---	---	Yes	Yes
Other Program Costs	Yes	---	Yes	Yes	Yes
Lost Revenues to the Utility	---	Yes	---	---	---

Application of the Cost-Effectiveness Tests

- There has been much debate about which is the best test for screening energy efficiency, since the beginning of EE.
- While the choice of cost-effectiveness test is important, it is also important to ensure that the tests are properly applied.
- Many states are not properly applying the cost-effectiveness tests today.
  - For several reasons.
- Consequently, energy efficiency is being undervalued, and customers are paying more than necessary for electricity and gas services.

Definition of Other Program Impacts

- We use the term “other program impacts” (OPIs) to include the impacts that are not part of the costs, or the avoided costs, of the energy provided by the utility.
- Other program impacts include:
  - Non-energy benefits and non-energy costs.
  - Other fuel savings; e.g., when an electric utility efficiency program saves gas, oil or propane.
- We created this new term to be clear that other fuel savings should be treated consistently with non-energy benefits.

Examples of Other Program Impacts

- Utility-Perspective OPIs: reduced customer arrearages, reduced bad debt write-offs, improved customer service.
  - Should be included in the PAC, TRC and Societal tests.
- Participant-Perspective OPIs: other fuel savings, reduced maintenance, increased productivity, improved health, increased safety. Many of these are especially important for low-income customers.
  - Should be included in the TRC and Societal tests.
- Societal-Perspective OPIs: reduced environmental externalities, reduced cost of providing health care.
  - Should be included in the Societal test.

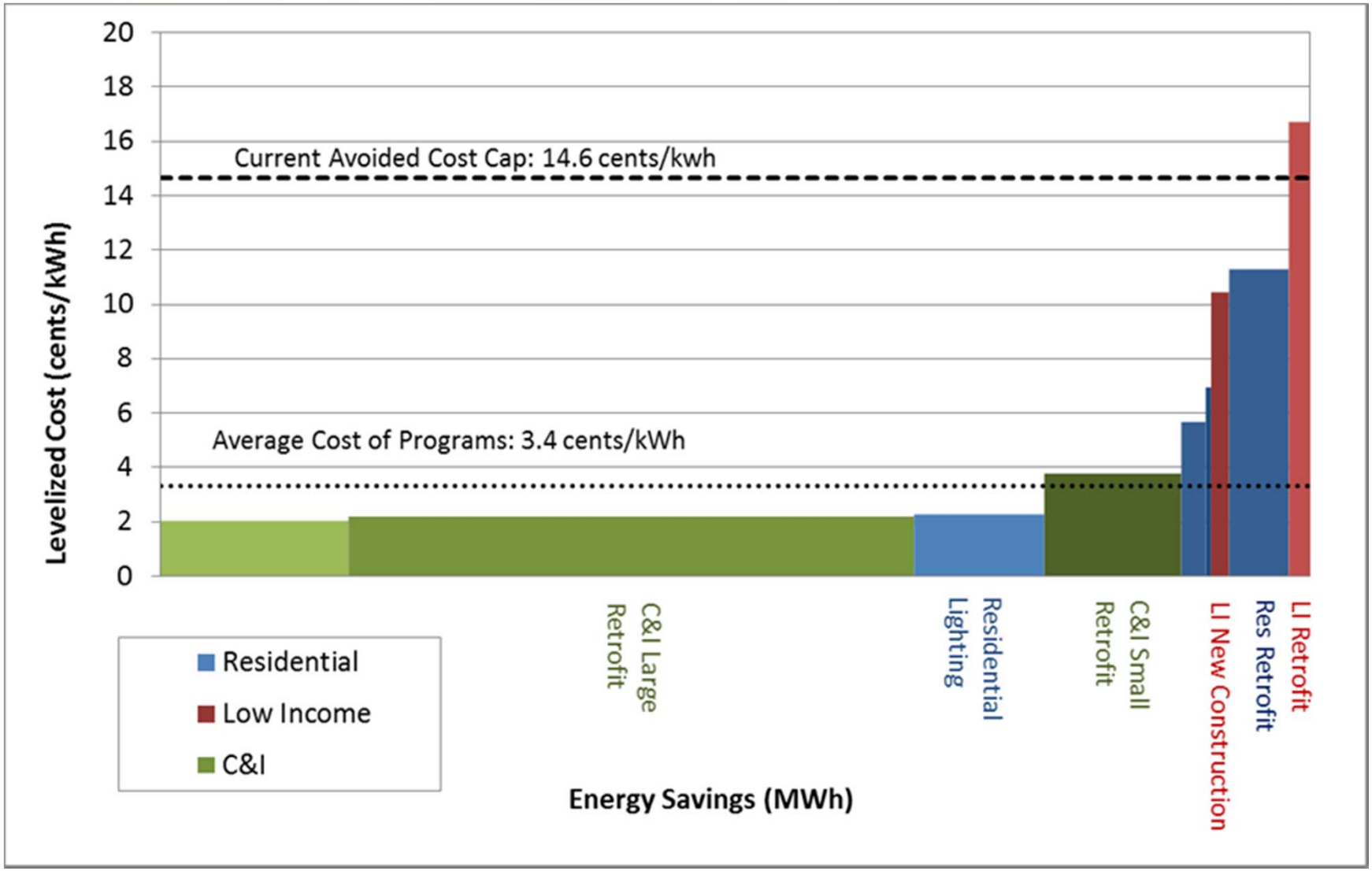
Rationale for Including Other Program Impacts

- To ensure that the tests are internally consistent.
  - TRC test includes the participant's costs, therefore this test should include the participant's benefits.
  - Societal Cost test includes all costs and benefits to society, therefore this test should include utility, participant, & societal OPIs.
  - If the tests are not internally consistent, they become misleading, even meaningless.
- To account for important public policy implications.
  - The PAC test ensures that revenue requirements will be reduced.
  - The additional costs and benefits in the TRC test have important public policy implications:
    - This is especially, but not exclusively, true for the low-income benefits and the other fuel savings.

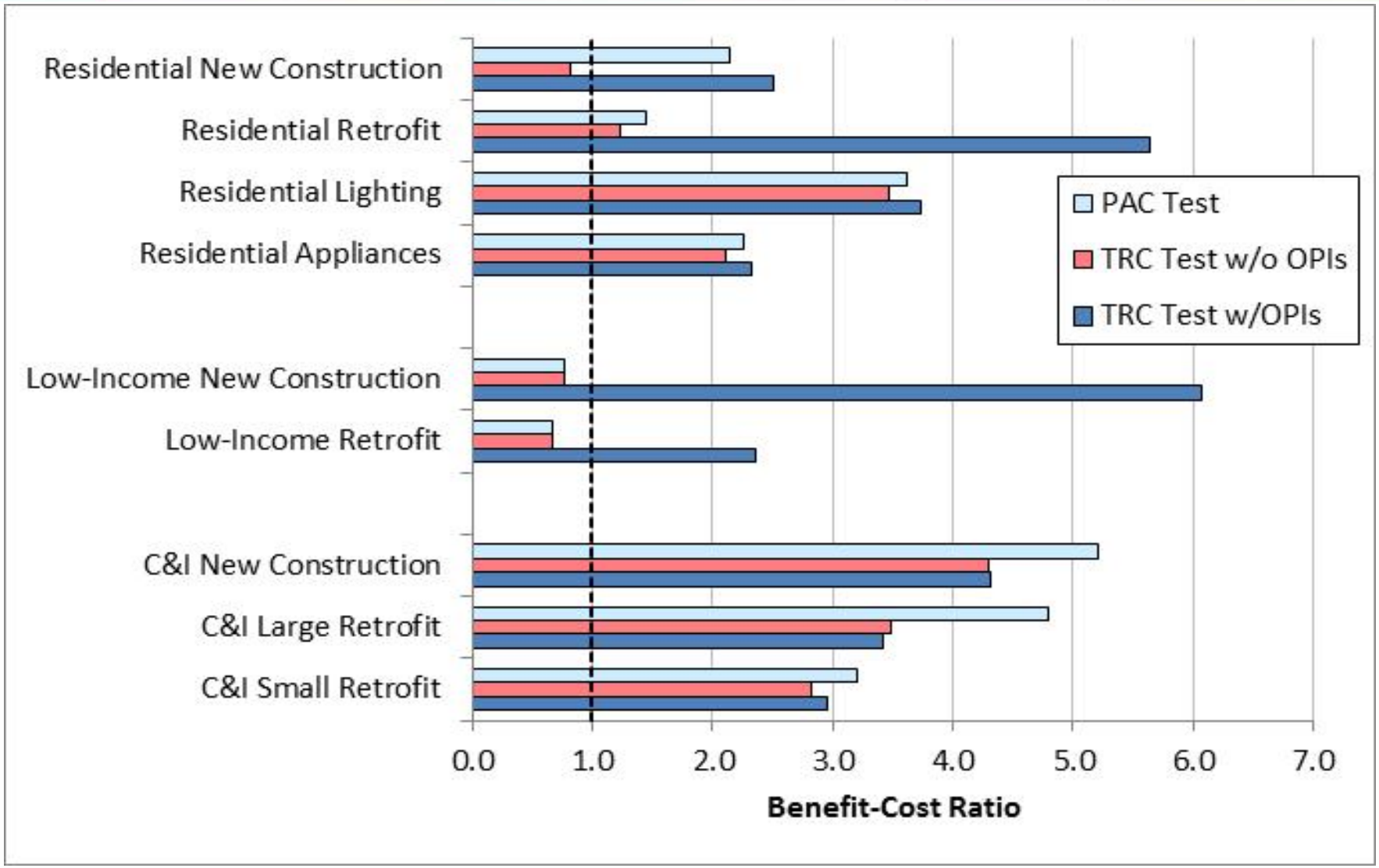
Public Policy Implications of OPIs

- Many of the participant OPIs help to justify key efficiency programs:
  - Low-income programs (maintenance, health, safety, other fuels).
  - Whole-house retrofit programs (maintenance, other fuels).
  - New construction programs (other fuels).
- These efficiency programs provide significant public policy benefits:
  - promoting customer equity,
  - assisting low-income customers,
  - serving a broad range of customers,
  - implementing comprehensive programs, and
  - reducing lost opportunities.

Cost of Saved Energy – Example Programs



Impacts of OPIs on Cost-Effectiveness



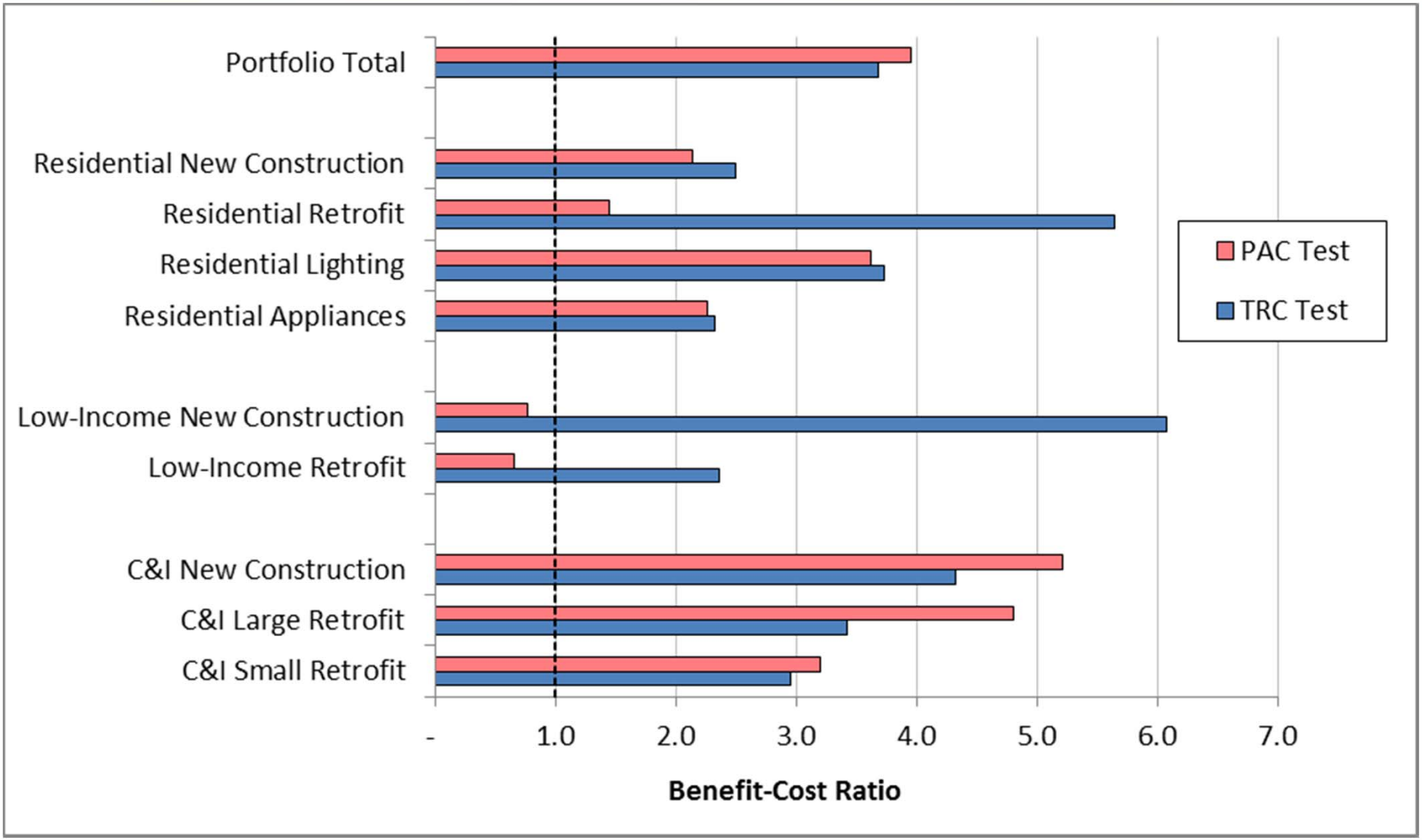
Current Treatment of Other Program Impacts

- While most states use the TRC test to screen efficiency programs, most of them do not fully account for OPIs.
- A recent ACEEE survey found that:
  - 36 states use the TRC test as the primary screen; but
  - only 12 of them quantify any type of participant OPIs; and
  - among those 12 states very few OPIs are accounted for.
- This means that many states currently conduct energy efficiency cost-effectiveness tests that are inherently skewed against energy efficiency.
- As indicated in previous slide, the impacts can be dramatic, and the impacts are primarily felt in the residential sector.
  - Results presented in this slide deck are for the actual energy efficiency programs for an actual New England utility.

Balancing Customer Costs with Public Policy

- Important concern: including OPIs in the TRC test may require utility customers to pay higher energy efficiency costs than otherwise;
  - Because utility customers will be paying for benefits associated with participants' other fuel savings, reduced maintenance, improved health and safety, etc.
- These higher costs can be justified by the importance of achieving public policy benefits, especially customer equity.
- Also, customers overall can be protected by applying the PAC test at the portfolio level. Example utility:
  - Spends: $195 million on EE programs.
  - Saves: $774 million present value revenue requirements.
  - Net Benefits: $578 million present value revenue requirements.

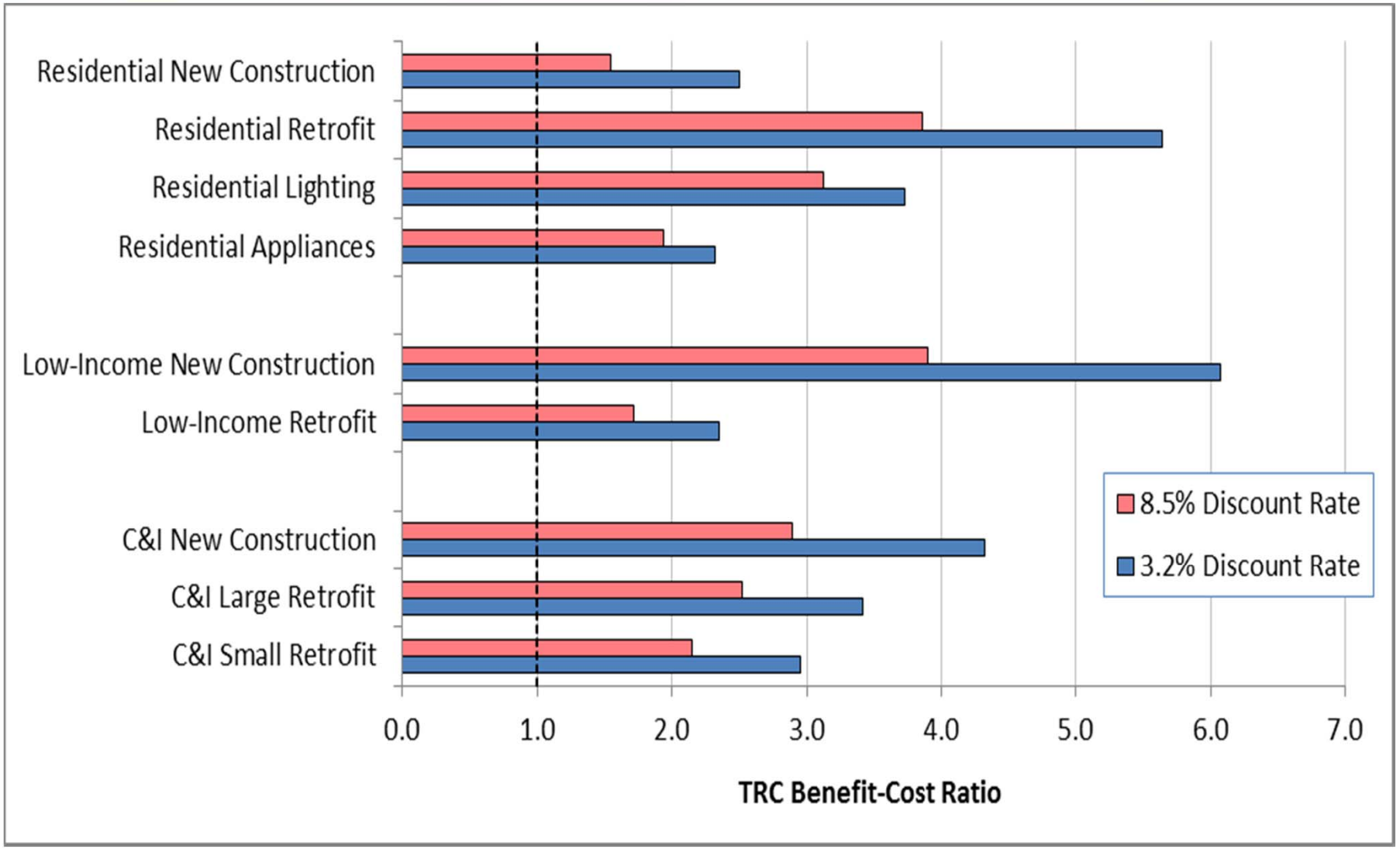
TRC Versus PAC; Portfolio and Program Level



Choice of Discount Rate

- For the PAC and TRC test, many states use the utility's weighted average cost of capital;
  - based on the notion that energy efficiency investments should be discounted with the same rate as supply-side investments.
- However, energy efficiency programs involve much less financial risk than supply-side investments.
  - Utilities typically have to raise capital to invest in supply-side resources, at the weighted average cost of capital.
  - Utilities that recover efficiency investments through system benefit charges or balancing accounts do not have to raise capital to invest in efficiency, and thus experience little financial risk.
- Therefore, states should use a low-risk discount rate when applying the TRC test or the PAC test.
  - We recommend a generic market indicator of a low-risk investment, such as the interest rate on long-term U.S. Treasury bills.

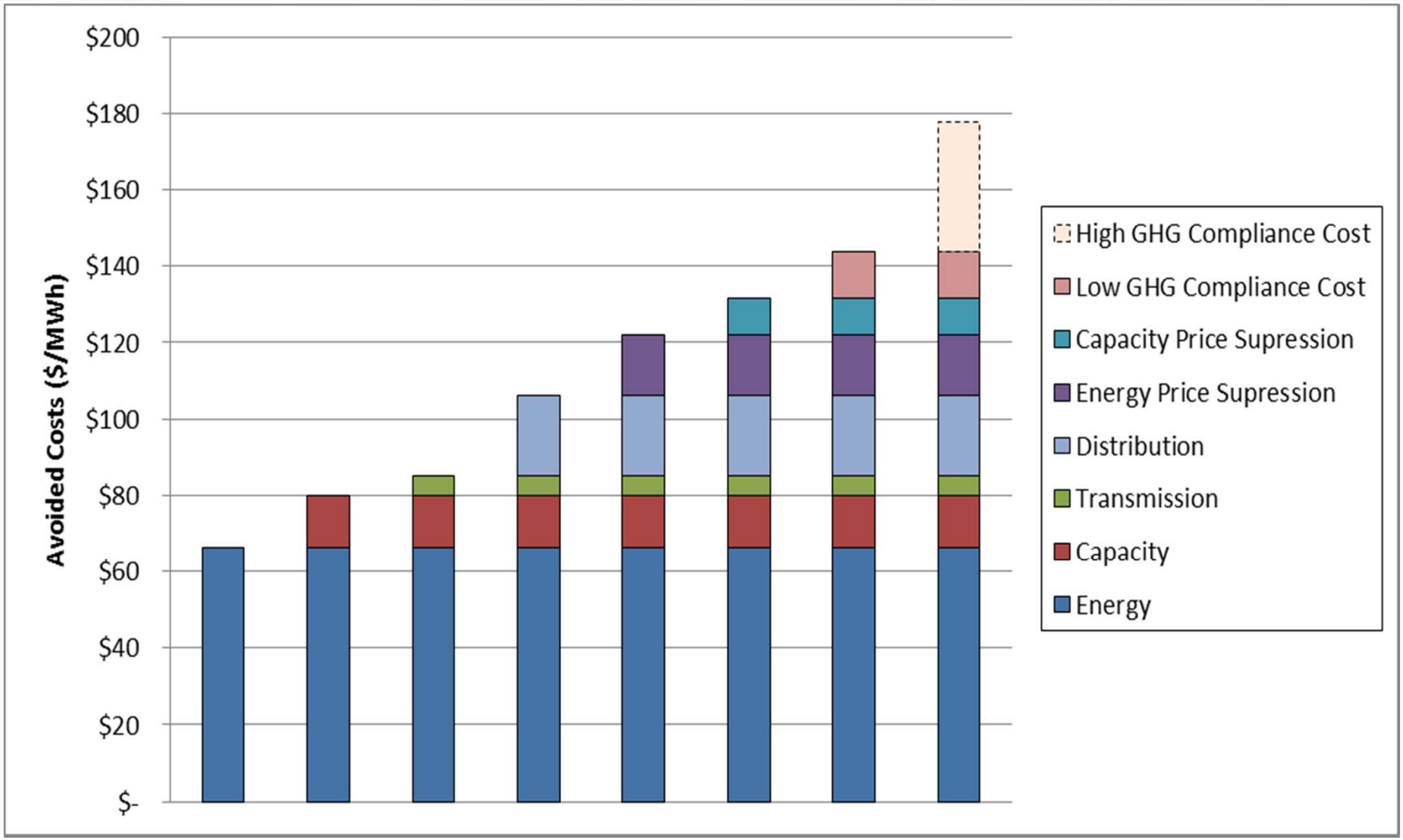
Cost-Effectiveness with Different Discount Rates



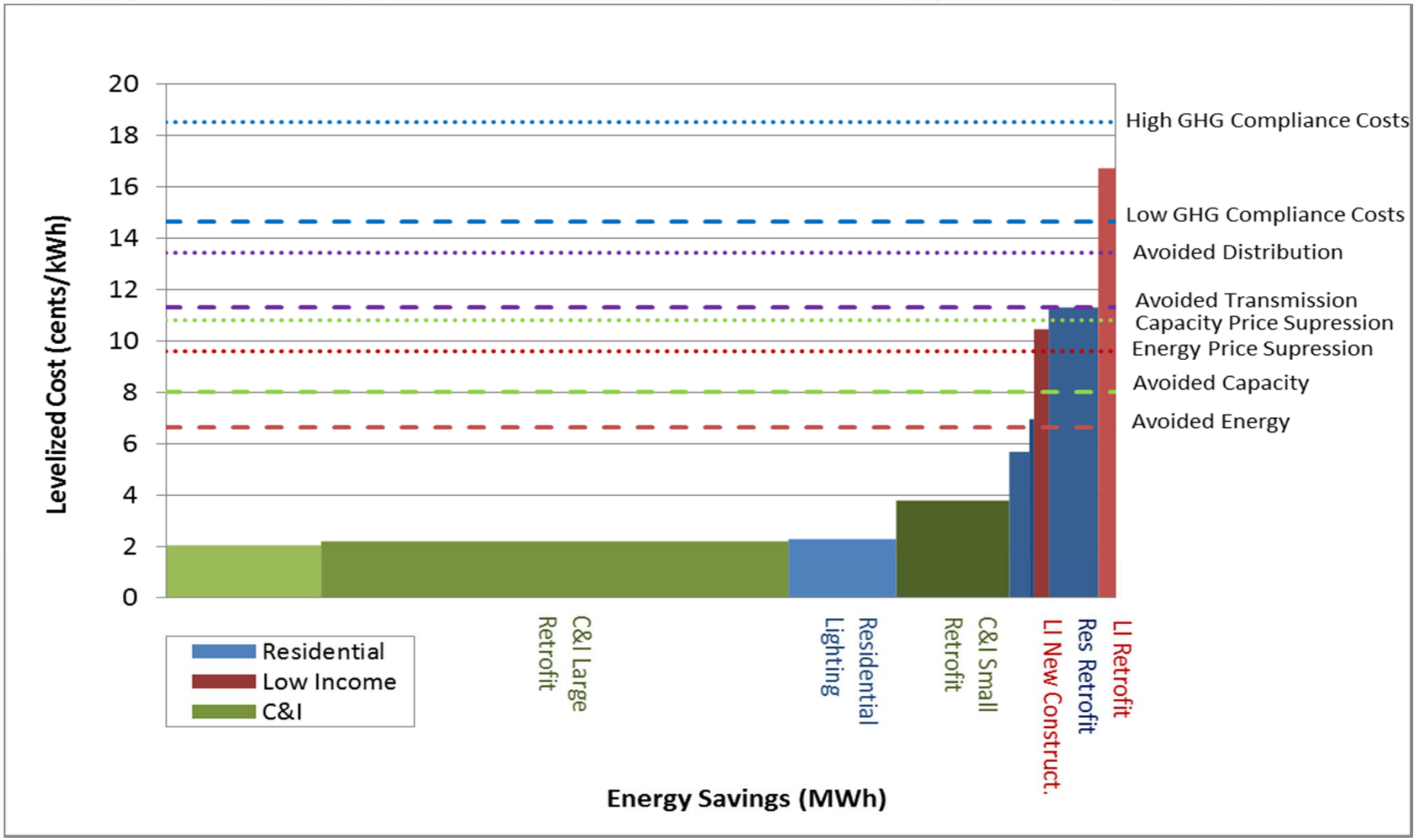
Calculation of Avoided Costs

- Energy efficiency programs result in several types of avoided costs, and each of them should be included in the screening analysis and calculated correctly:
  - Avoided energy costs.
  - Avoided capacity costs.
  - Avoided transmission and distribution costs.
  - Avoided environmental compliance costs.
    - Current and anticipated EPA regulations.
    - Current and anticipated climate change regulations.
  - Price suppression effects in competitive wholesale markets.
  - Marginal line losses.

Example of Avoided Costs, by Component



Avoided Costs & the Cost of Saved Energy



Avoided Environmental Compliance Costs

- These are costs that will be incurred by utility customers; they are not environmental externalities.
  - Thus, they should be included in the PAC, TRC and Societal tests.
- Many efficiency measures will be in place for 10, 15, 20 years or more.
  - EE screening should include the environmental regulations that are expected over the next 20 years at least:
  - Current and anticipated Federal climate change requirements.
  - Current and anticipated State requirements, if more stringent.
- For states with climate change regulations:
  - Efficiency should be compared on a comparable basis with other GHG mitigation options.
  - If an efficiency program is needed to comply with climate change regulations, then it is cost-effective by definition.

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.
  - Many states account for free-riders, but give less attention to spillover and market transformation effects.
- 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.

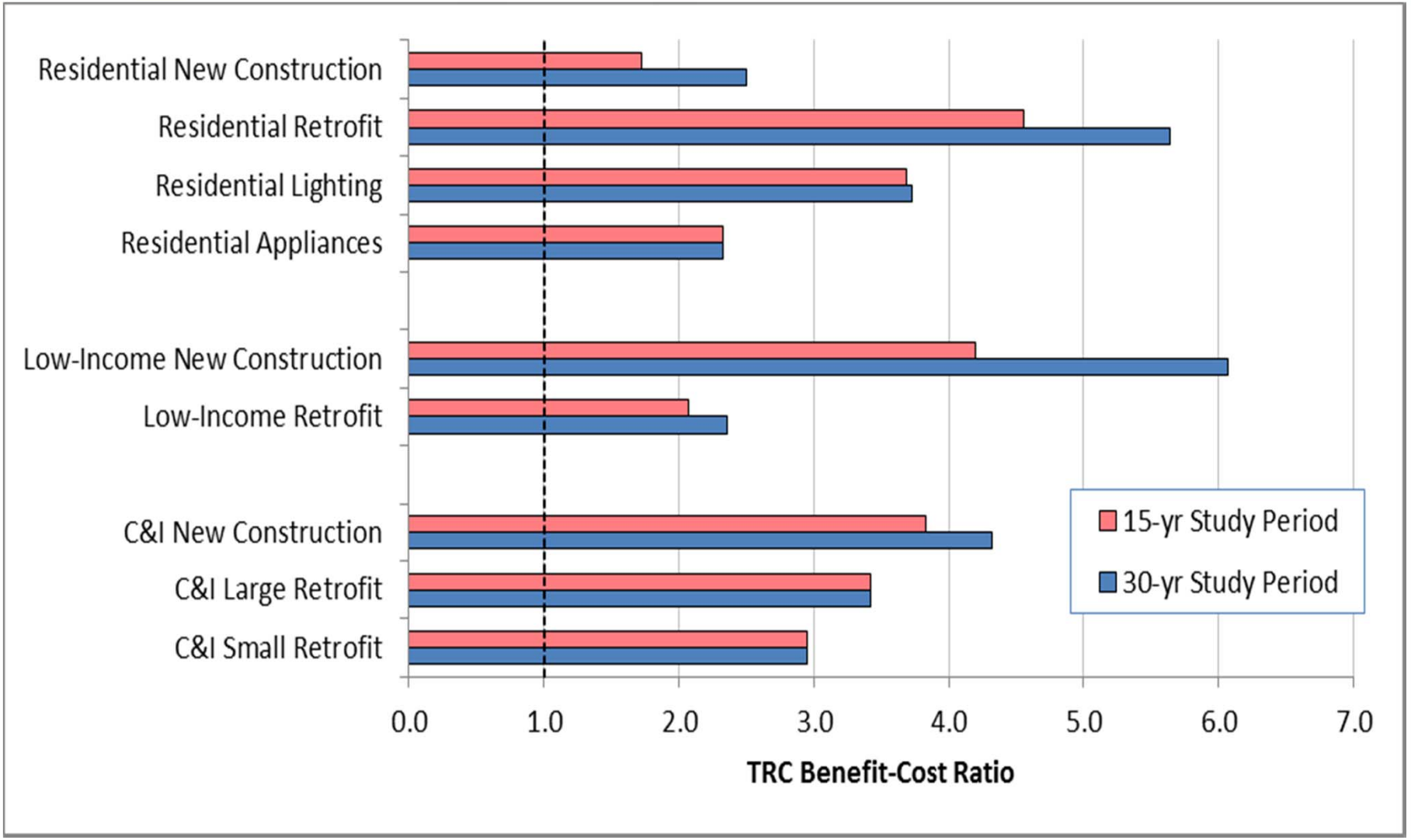
The Risk Benefits of Energy Efficiency

- Energy efficiency can mitigate various risks associated with resource 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.

Study Period and Measure Life

- 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.

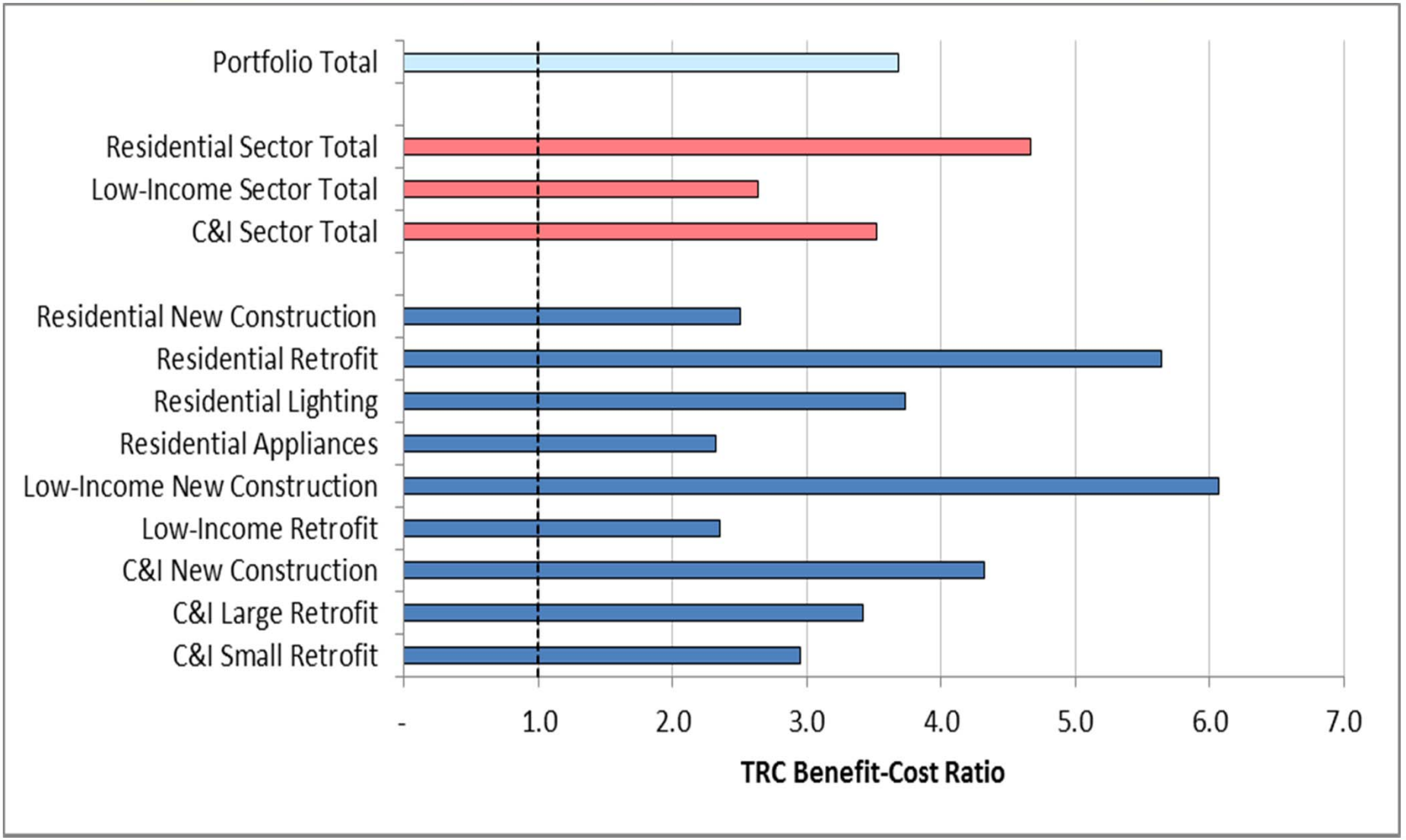
Cost-Effectiveness with Different Study Periods



Screening Level

- Some states require screening of each efficiency measure, while others require screening at the program level, and others require screening at the portfolio level.
- States should not require energy efficiency screening at the measure level.
  - This is overly restrictive.
  - Some measures have benefits in terms of encouraging customers to participate in programs or adopt other efficiency measures.
- Furthermore, 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.
  - They should not be screened using the TRC test.

Cost-Effectiveness at Different Screening Levels



Best Test(s) to Use for Screening EE Programs

- We recommend that the Societal Cost test be used as the primary test to screen energy efficiency programs.
  - It includes the broadest range of costs and benefits, and
  - It provides the best measure of public policy benefits that are of great importance to regulators.
- We recommend that all states that choose not to rely on the Societal Cost test use the TRC test instead.
  - If the TRC test is used, it must include OPIs, to be internally consistent.
  - Also, including OPIs helps to account for public policy implications. Other fuel savings and low-income benefits are the priority OPIs.
- If regulators choose to not account for participant OPIs, the PAC test is preferable to the TRC test.

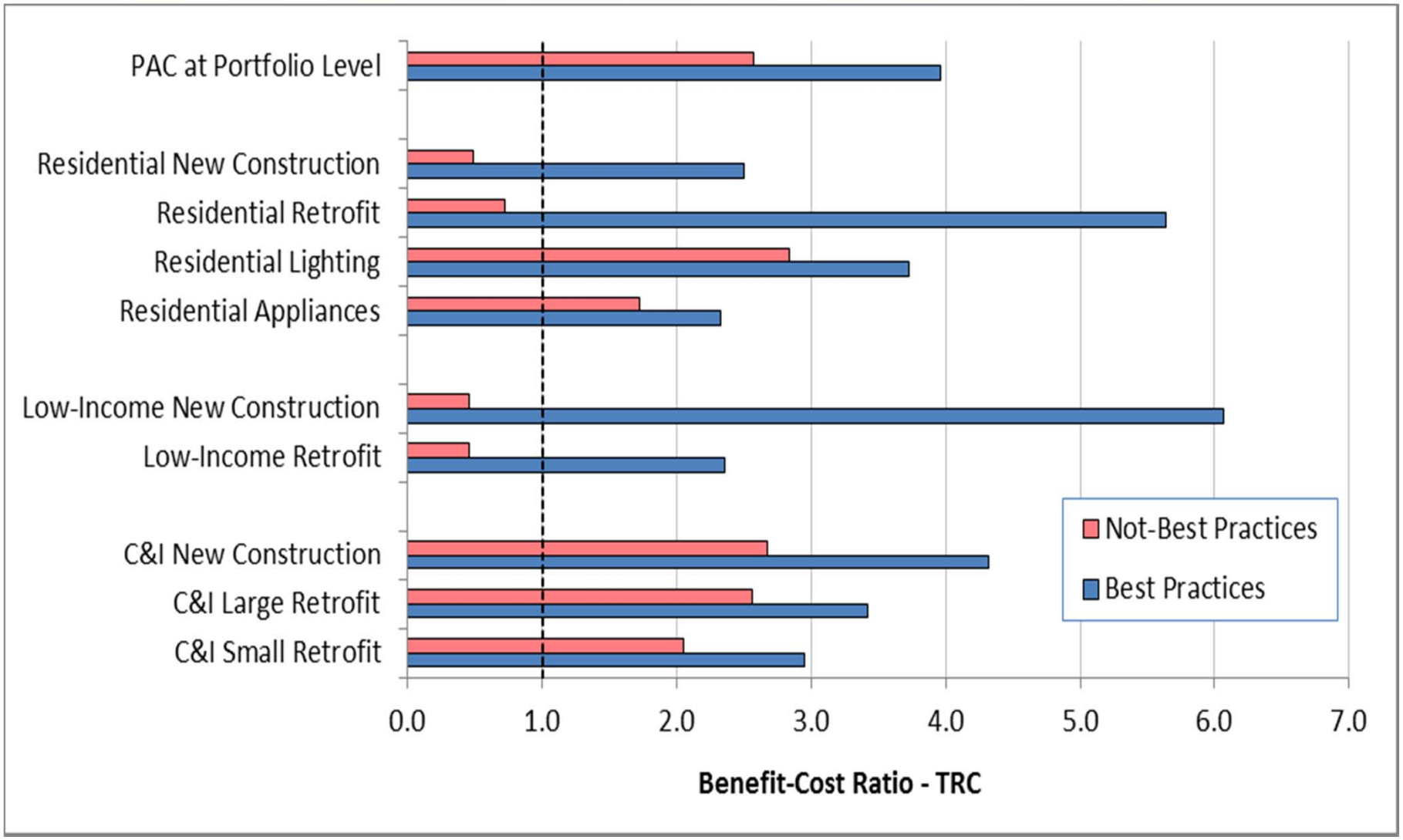
Using the PAC to Consider Utility Customer Costs

- Important concern: including OPIs in the TRC test may require utility customers to pay higher energy efficiency costs than otherwise.
  - Because utility customers will be paying for participants' OPIs.
- This concern can be addressed by applying the PAC test at the portfolio level.
- Our example actual utility (uses TRC test with many OPIs). The PAC test at the portfolio level indicates:
  - EE Costs: $195 million per year on total portfolio of EE programs.
  - EE Benefits: $774 million in present value revenue requirements.
  - Net Benefits: $578 million in present value revenue requirements.
  - All utility customers on average are clearly better off, simply from a utility cost (revenue requirements) perspective.

Best Practices Versus Not-Best Practices

- We run two scenarios using our example actual utility.
  - Both scenarios use the TRC test.
- Best practices:
  - All avoided costs from slide 17 (except high GHG costs).
  - Screened at the program level.
  - OPIs currently in use in Massachusetts.
  - Risk-adjusted discount rate of 3.2 percent.
  - Study period is 30 years.
- Not-Best practices; all of the above, except:
  - No OPIs are included.
  - Discount rate is WACC, equal to 8.5 percent.
  - Study period is 15 years.
- Results: key residential programs become uneconomic.

Best Practices Versus Not-Best Practices



Report Information

- *Best Practices in Energy Efficiency Program Screening: How to Ensure that the Value of Energy Efficiency is Properly Accounted For*.
- Prepared by Synapse Energy Economics. Tim Woolf, Erin Malone, Kenji Takahashi, and William Steinhurst.
- On Behalf of the National Home Performance Council.
- July 23, 2012.
- Available at:
  - www.synapse-energy.com.
  - www.nhpci.org.