The Costs and Benefits of State RPS Policies: Cost-Impact Studies, Actual Costs, and Cost Containment

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Oregon Renewable Energy Working Group
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Presentation Overview

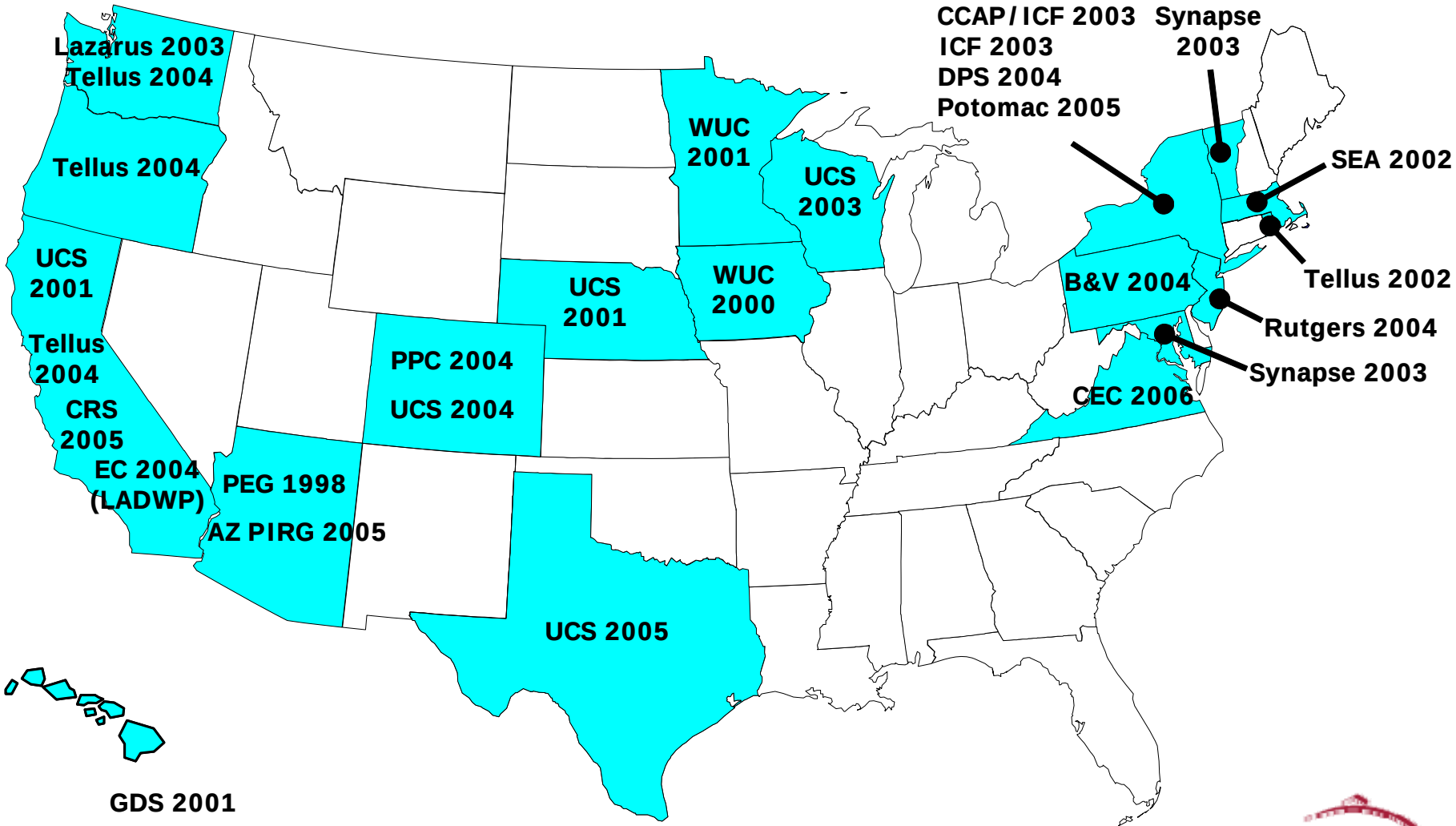
1. Review of State/Utility RPS Cost-Impact Studies
   A. Project Motivation and Scope
   B. Projected Renewable Resource and Direct Cost Results
   C. Projected Benefits
   D. Cost Study Methodologies and Assumptions
   E. Conclusions and Areas for Improvement
2. Actual Costs of State RPS Policies to Date
3. Approaches to Limit RPS Costs
4. Impact of RPS Design on Expected Cost

RPS Cost-Impact Projections: Project Overview

Objective: State RPS policies have become a major driver of renewable energy, but the adoption of new RPS policies hinges on expected costs and benefits. We review previous RPS cost studies to compare projected impacts and provide methodological guidance for future RPS cost analysis.

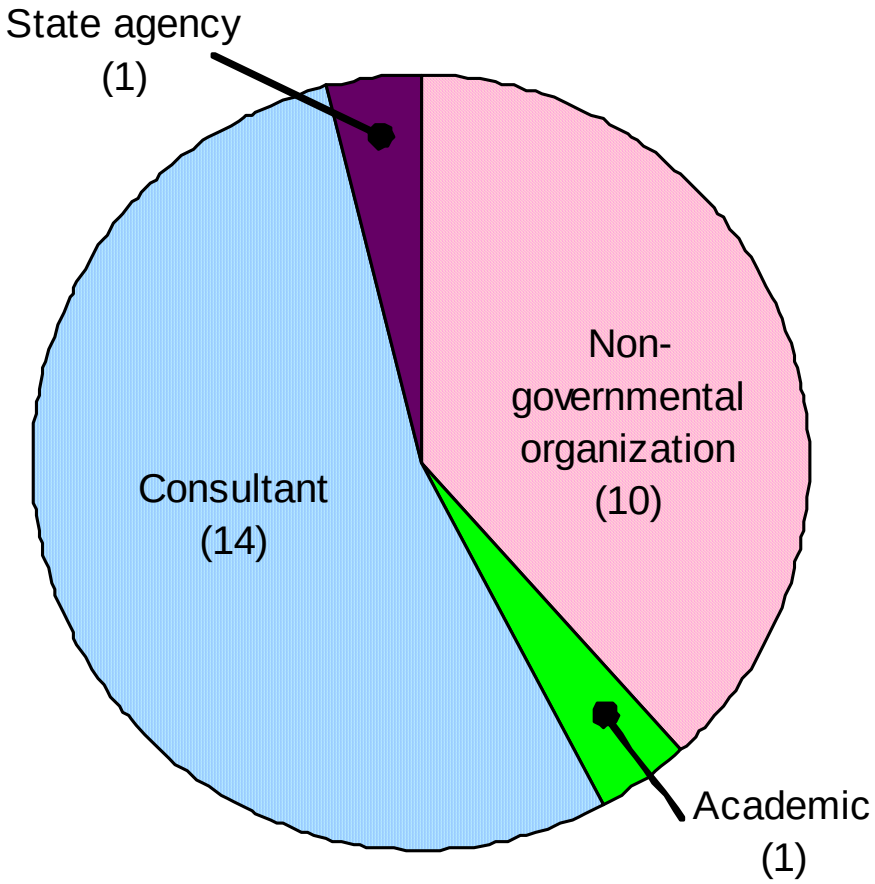
- **Project scope**
  - Survey of 26 RPS cost impact projections conducted since 1998
  - Sample includes state or utility-level analyses in the U.S.
- **Comparison of key results**
  - Direct or inferred retail rate impacts
  - Renewable deployment by technology
  - Scenario analysis; secondary cost impacts; and benefits
  - All results presented are taken from the first year that each RPS hits its ultimate target level (e.g. 2013 for New York, 2010 for California)
- **Comparison of study methodologies**
  - General modeling approaches; cost characterizations; and key assumptions

RPS Cost-Impact Study Sample: Who, When, and Where?

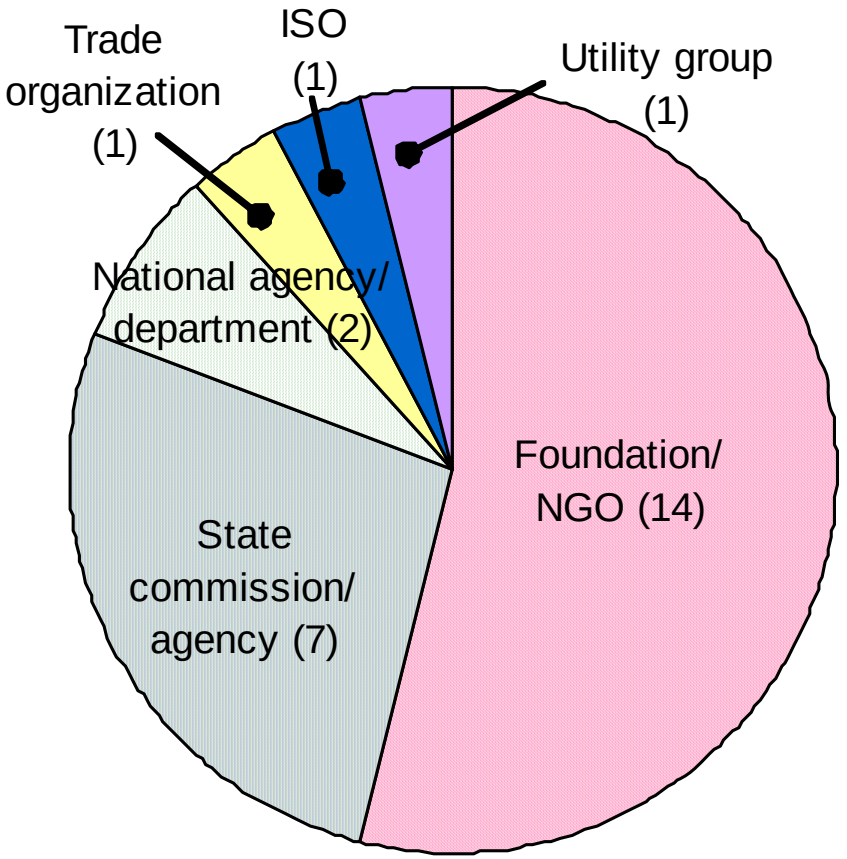


Author and Funding Entity Type

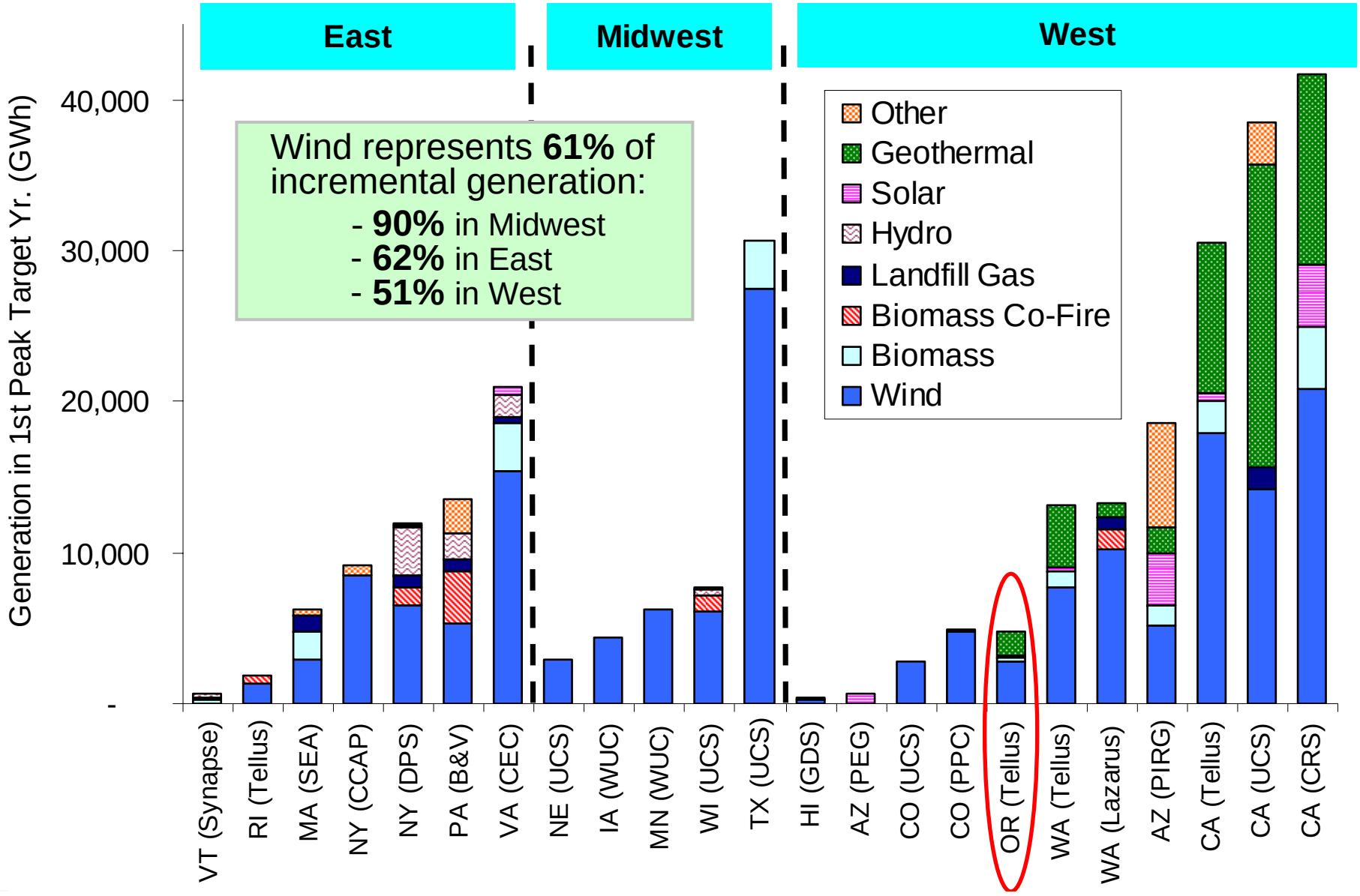
Author Type



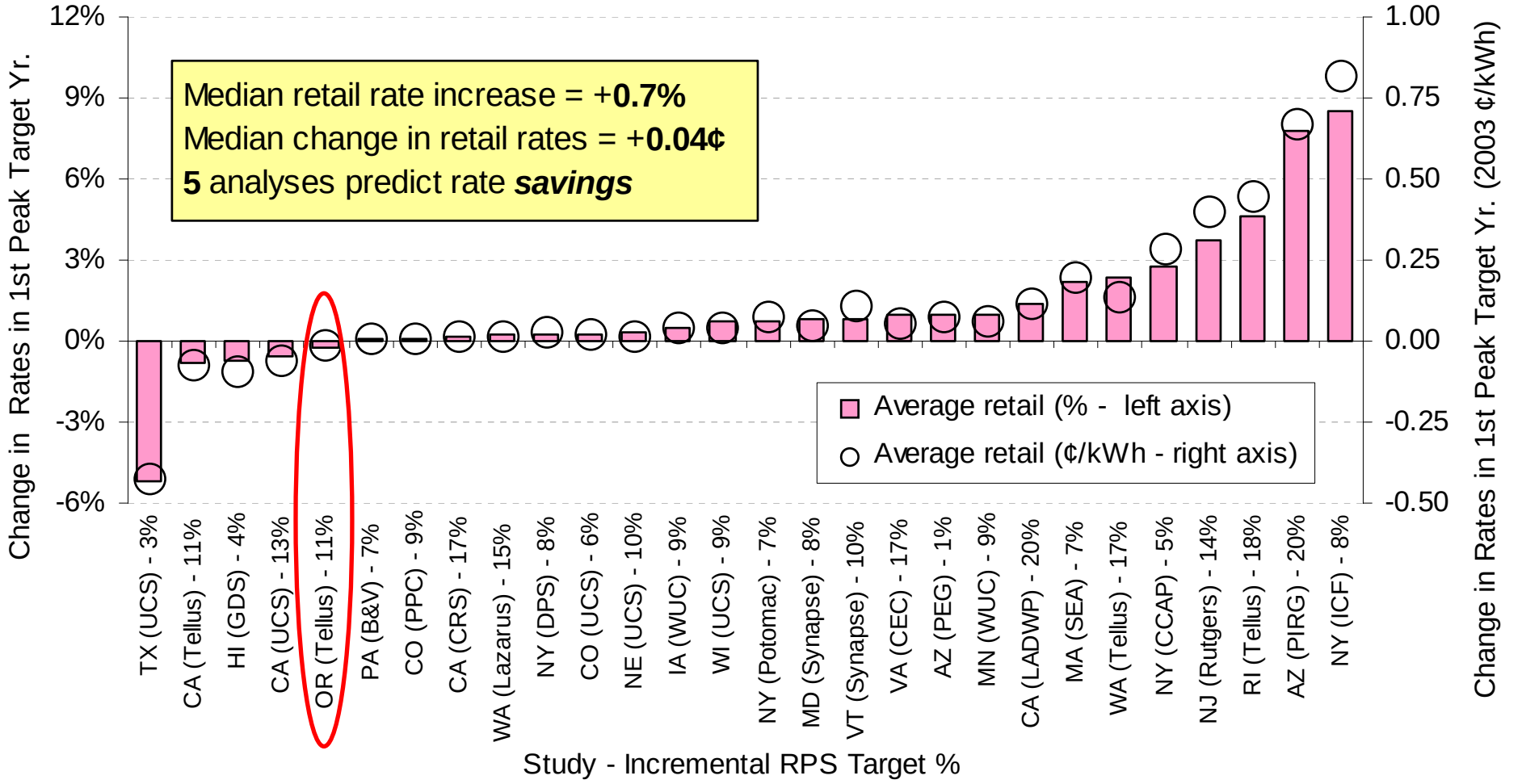
Funding Entity Type



Wind Expected to Fare Well, but Not to Dominate in All Regions

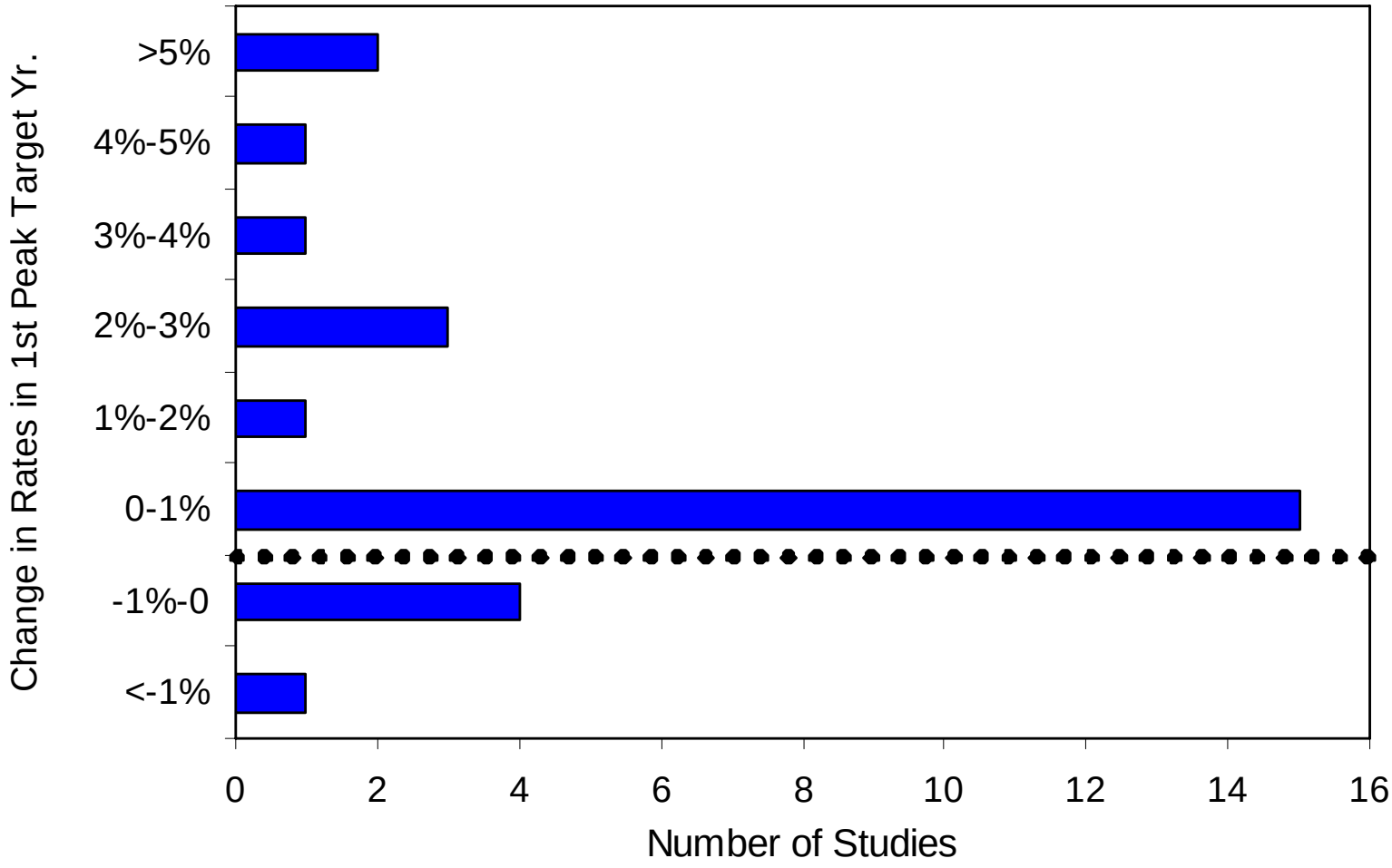


20 of 28* Analyses Predict Rate Increases of Less Than or Equal to 1%



* Number of analyses is more than 26 because results for each state in CA/OR/WA (Tellus) are shown separately

The Estimated Cost of RPS Policies is Typically Modest, But Varies Considerably by Study



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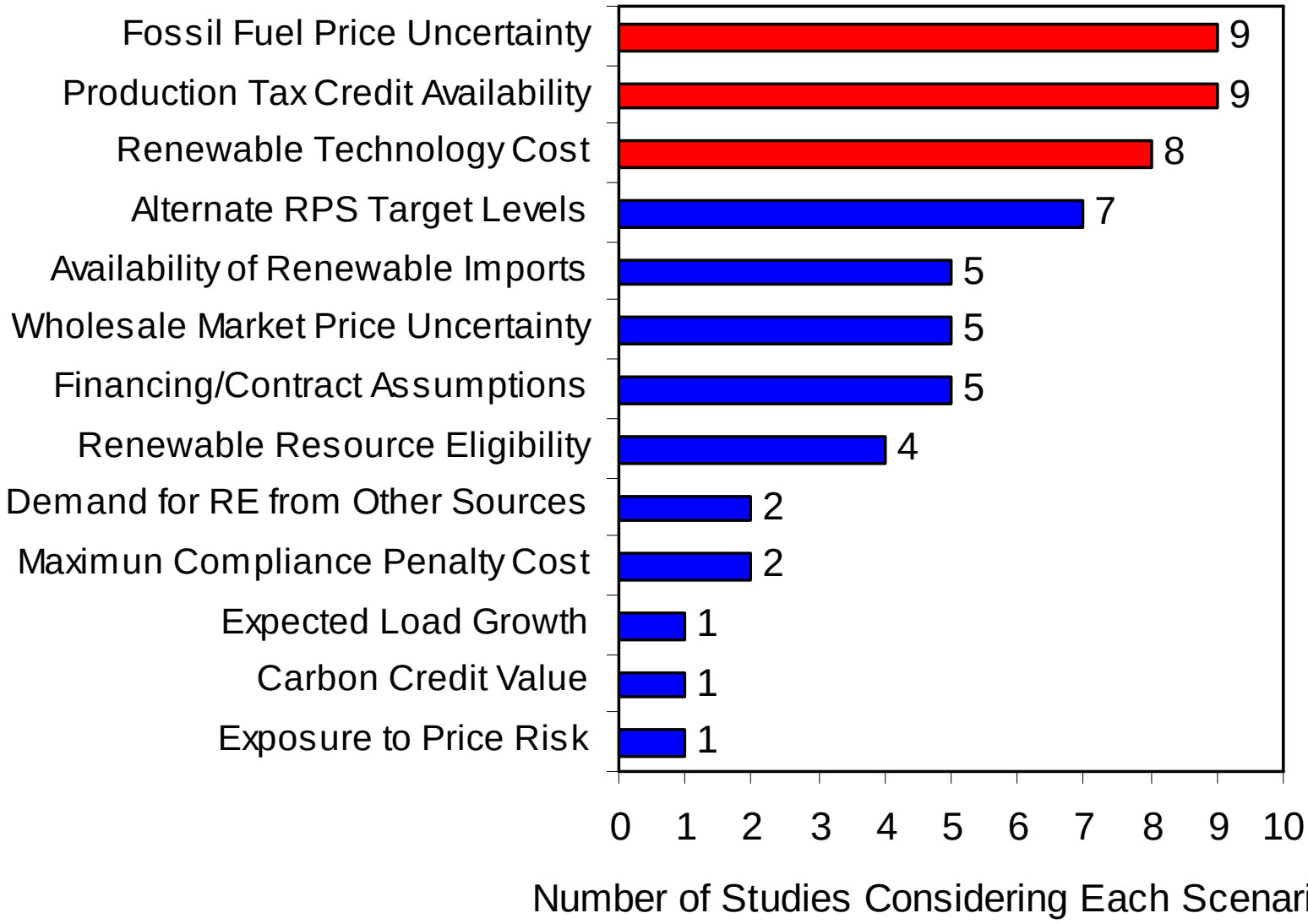
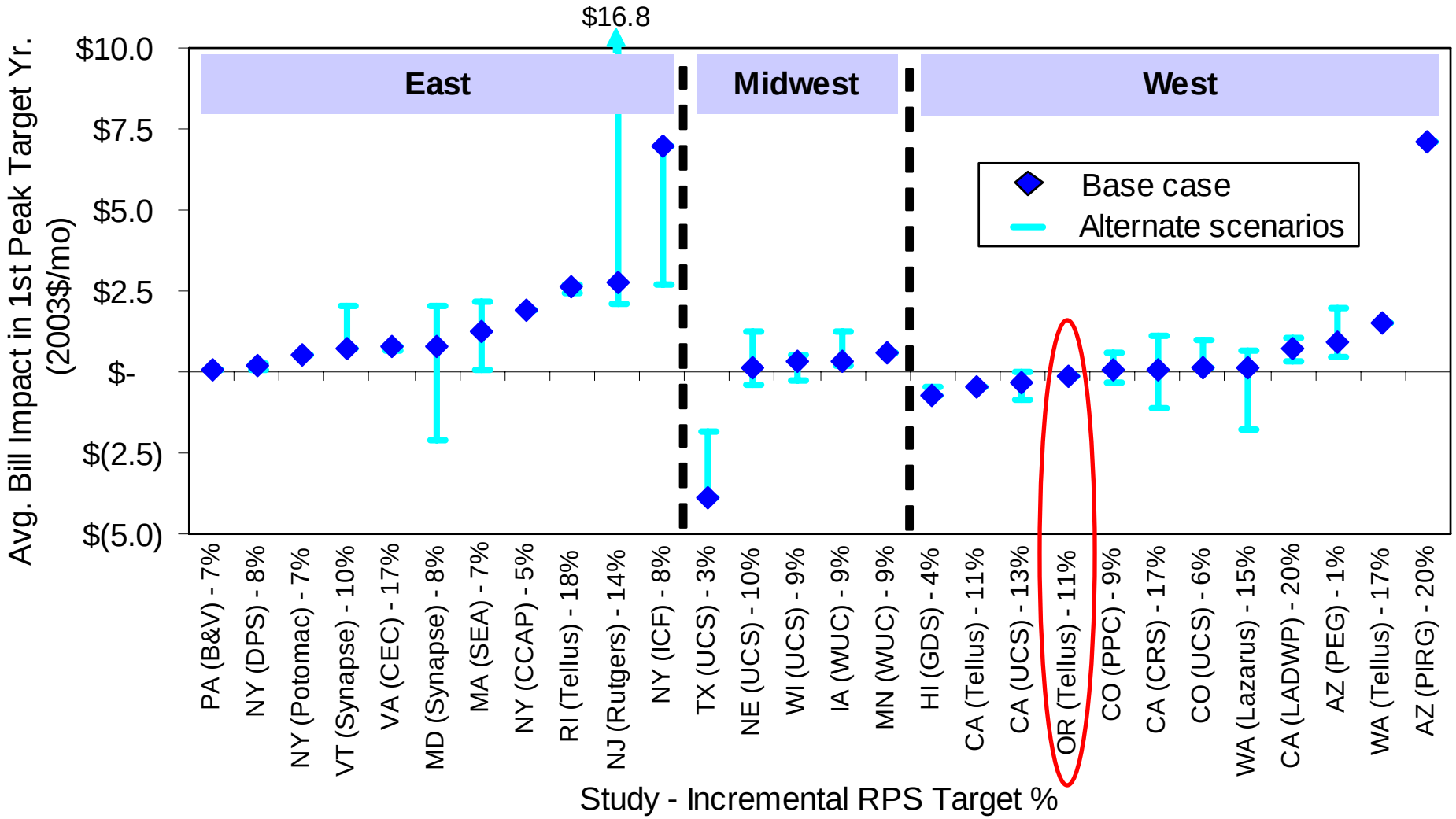
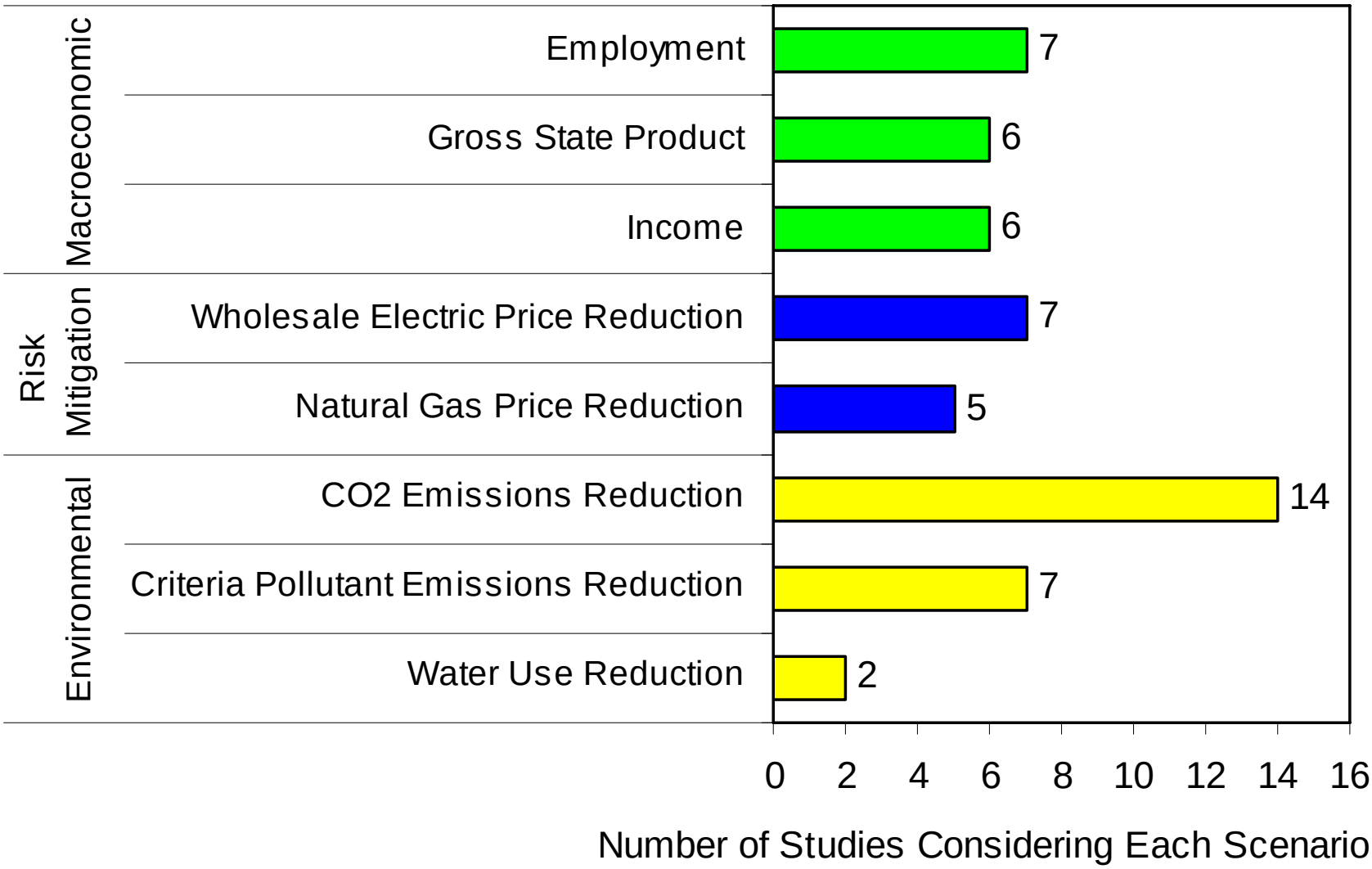
Scenario Analysis Is Often Used to Bound the Possible Impacts



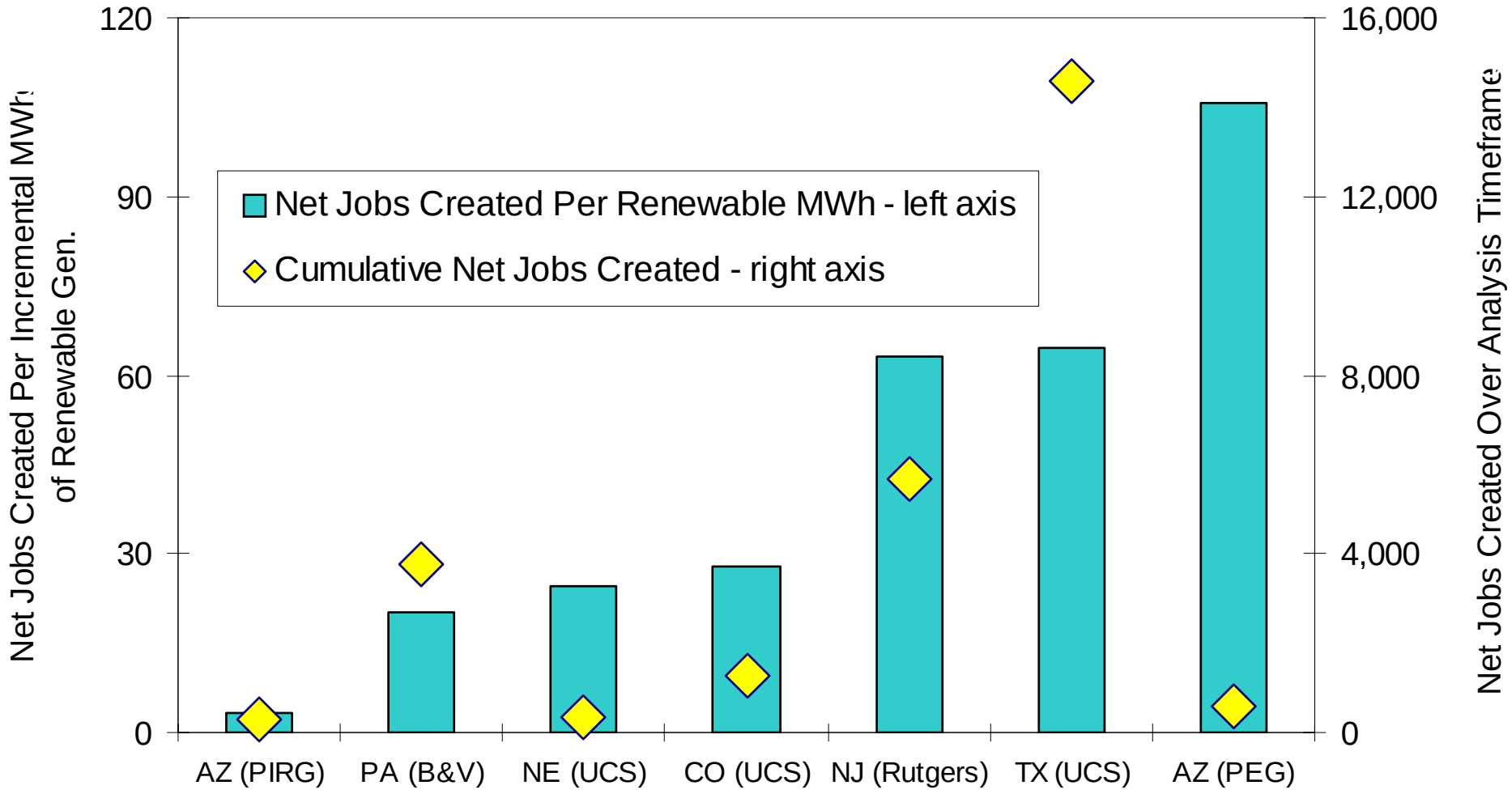
Projected Residential Electricity Bill Impacts are Lowest in Midwest and West



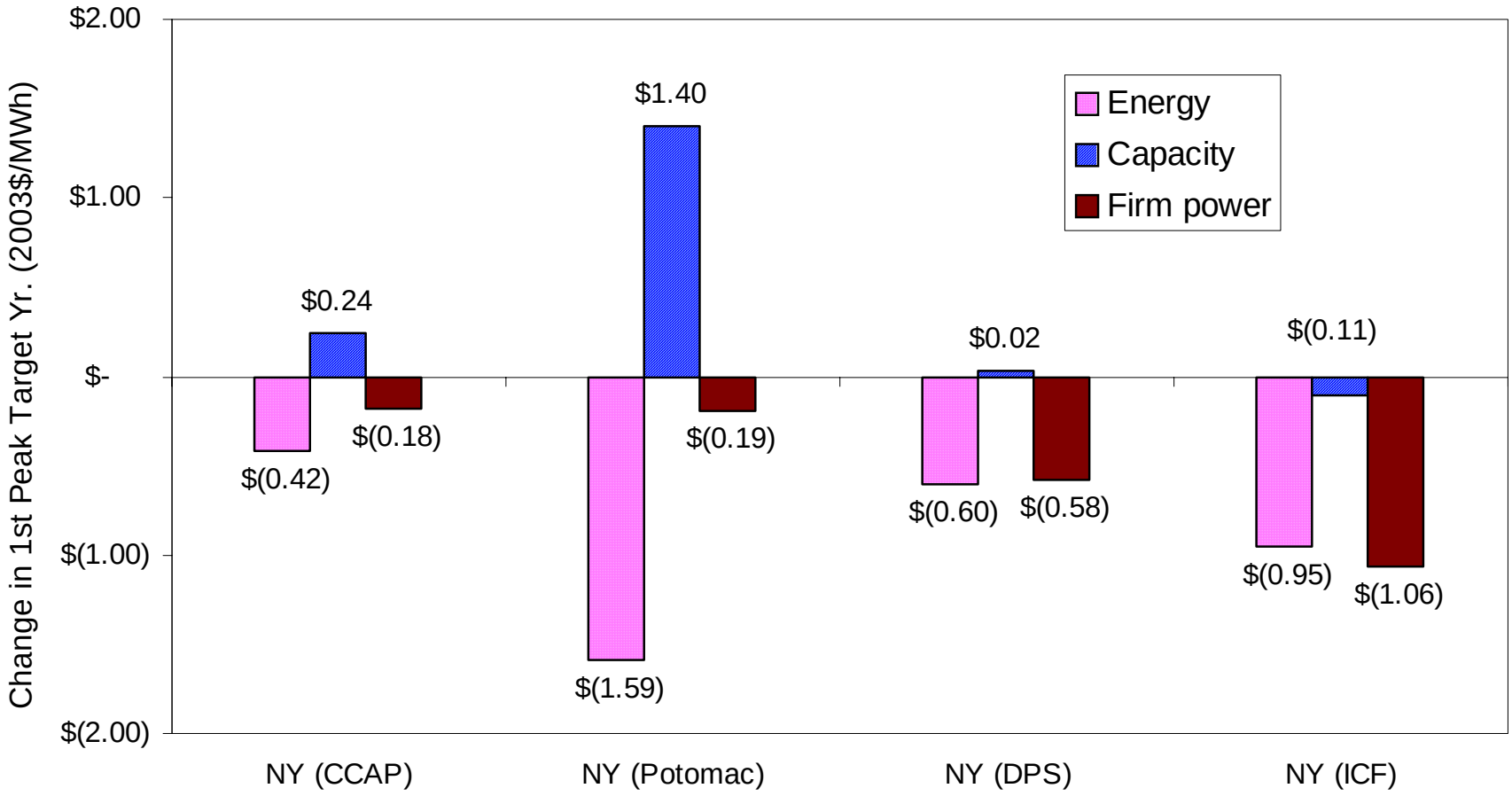
Many Studies Evaluate Potential Public Benefits



Studies Predict Varying Levels of Net Employment Gains

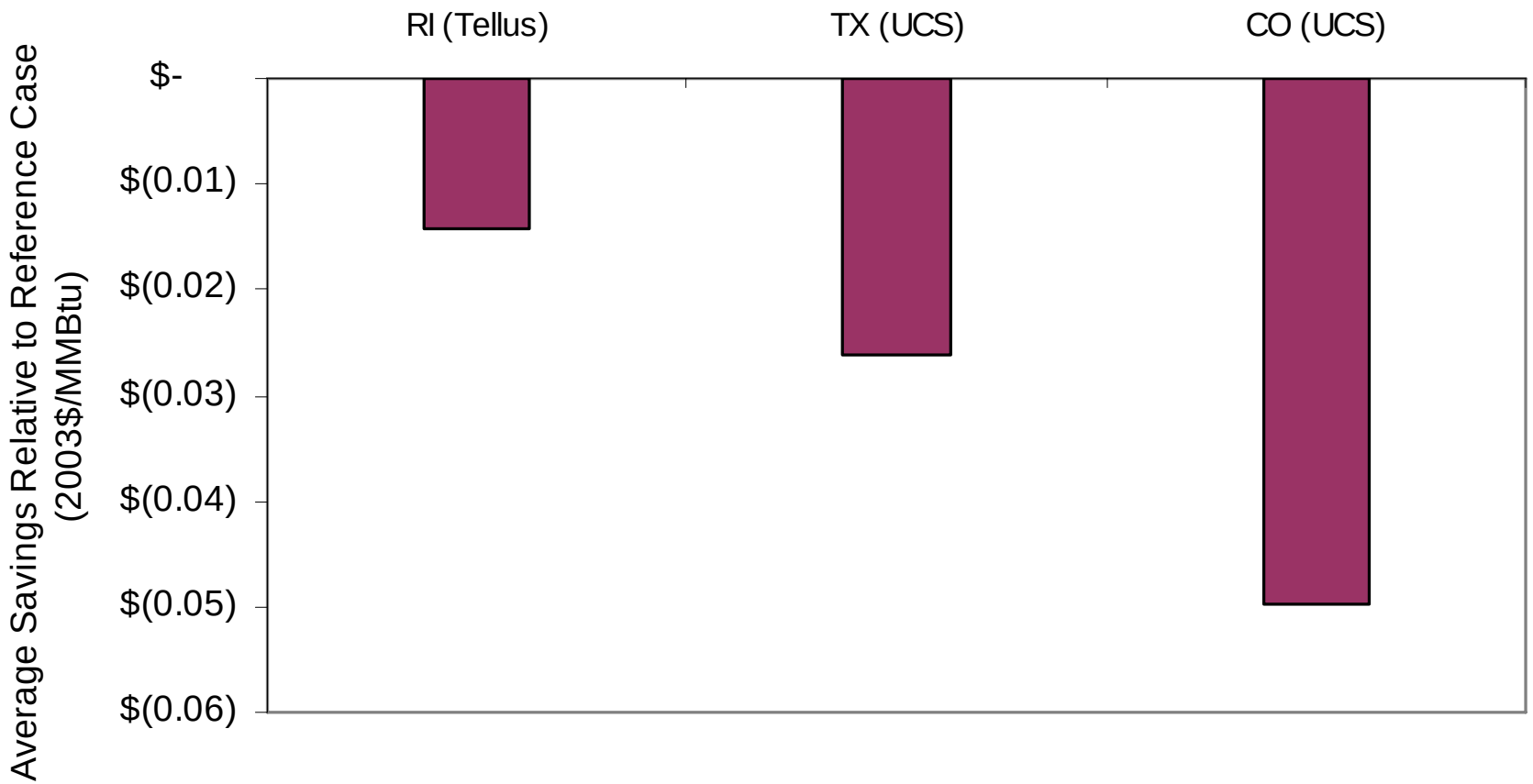


RPS May Put Downward Pressure on Market Prices, But Impacts Are Not Well Understood



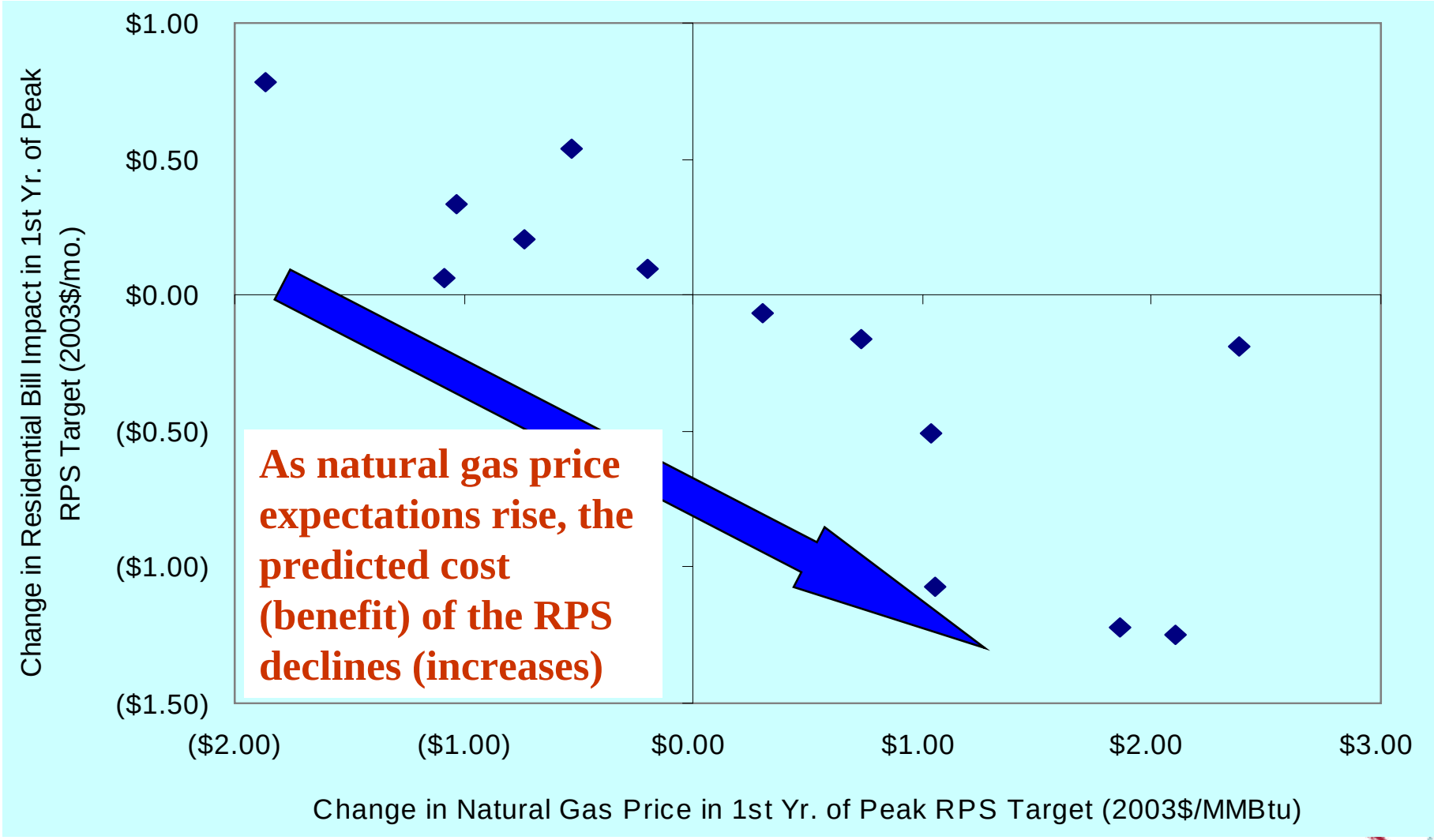
Note: CO (UCS), RI (Tellus), and TX (UCS) also model wholesale price reductions but do not provide detailed data

RPS May Put Downward Pressure on Natural Gas Prices

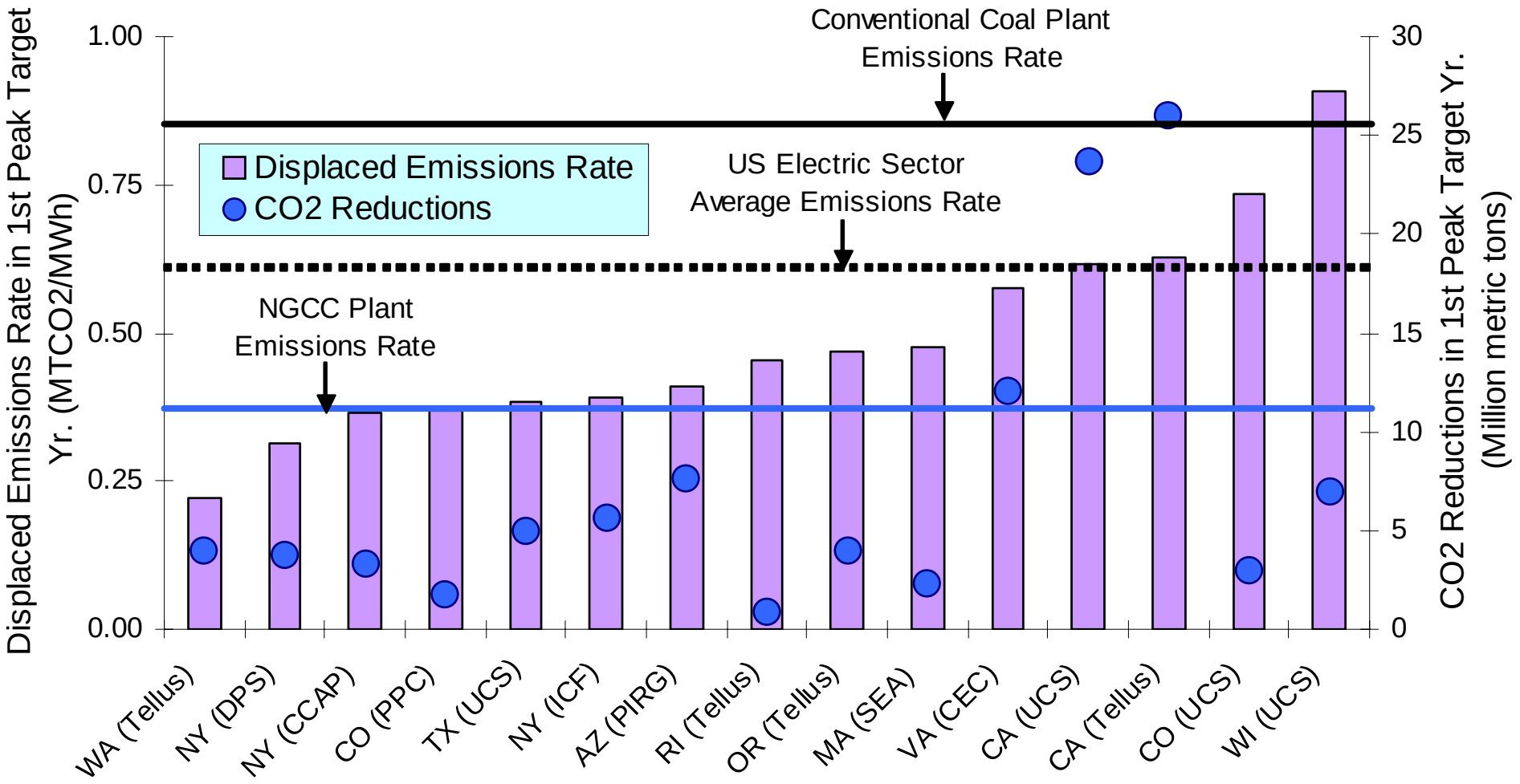


Note: NY (CCAP) and NY (ICF) also model NG price reductions but do not provide detailed data

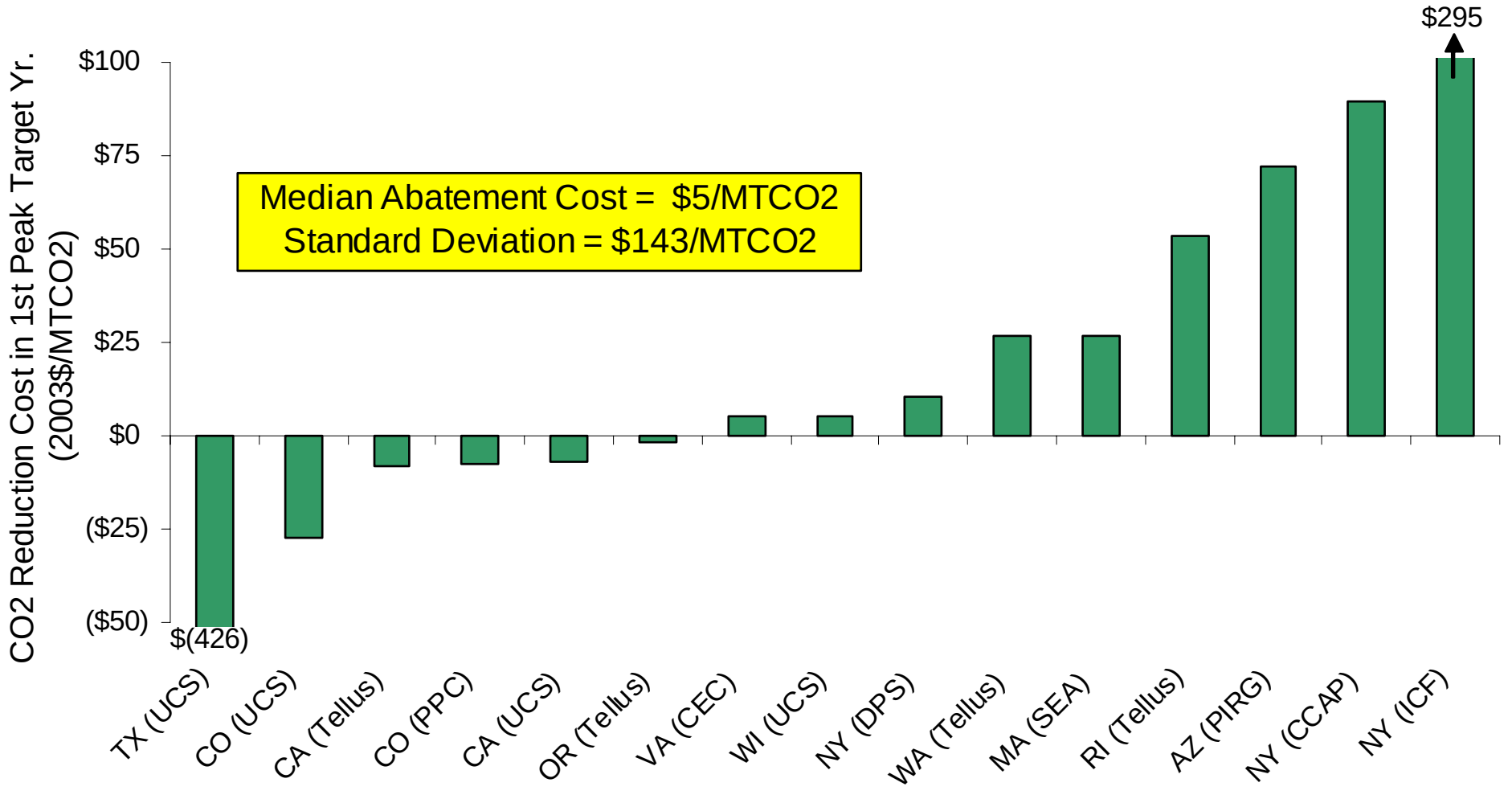
Renewable Energy As a Hedge Against Natural Gas Price Risk: Sensitivity Analysis Results



RPS Policies Are Estimated to Displace CO2 Emissions Primarily from Natural Gas Plants



Implied CO2 Abatement Costs Vary Widely

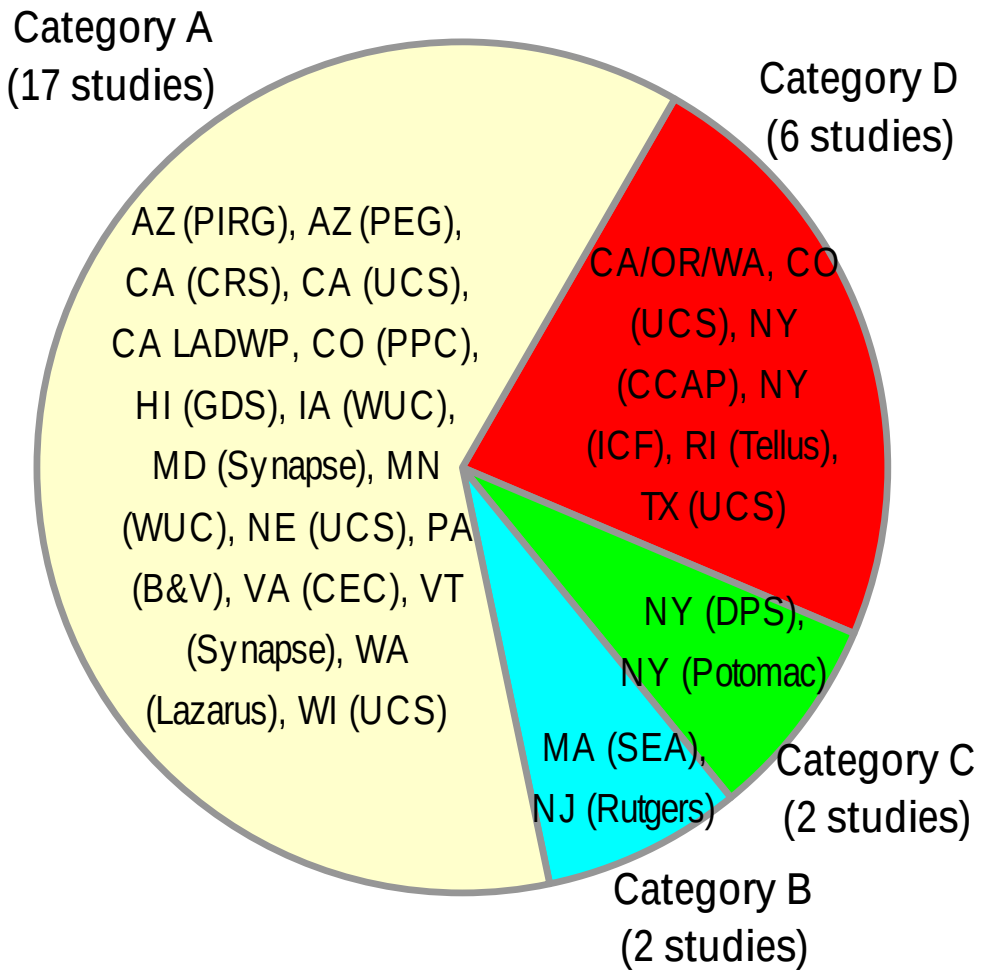


60% of these studies imply abatement costs of less than $10/metric ton

Four General Modeling Approaches Have Been Used

Four broad categories:

- **Category A:** Linear spreadsheet model of both RE + avoided utility cost
- **Category B:** Linear spreadsheet model of RE + generation dispatch model of avoided utility cost with base-case resource mix
- **Category C:** Linear spreadsheet model of RE + generation dispatch model of avoided utility cost with implied RPS mix
- **Category D:** Integrated energy model



Assumptions Matter More than the Selection of the Model

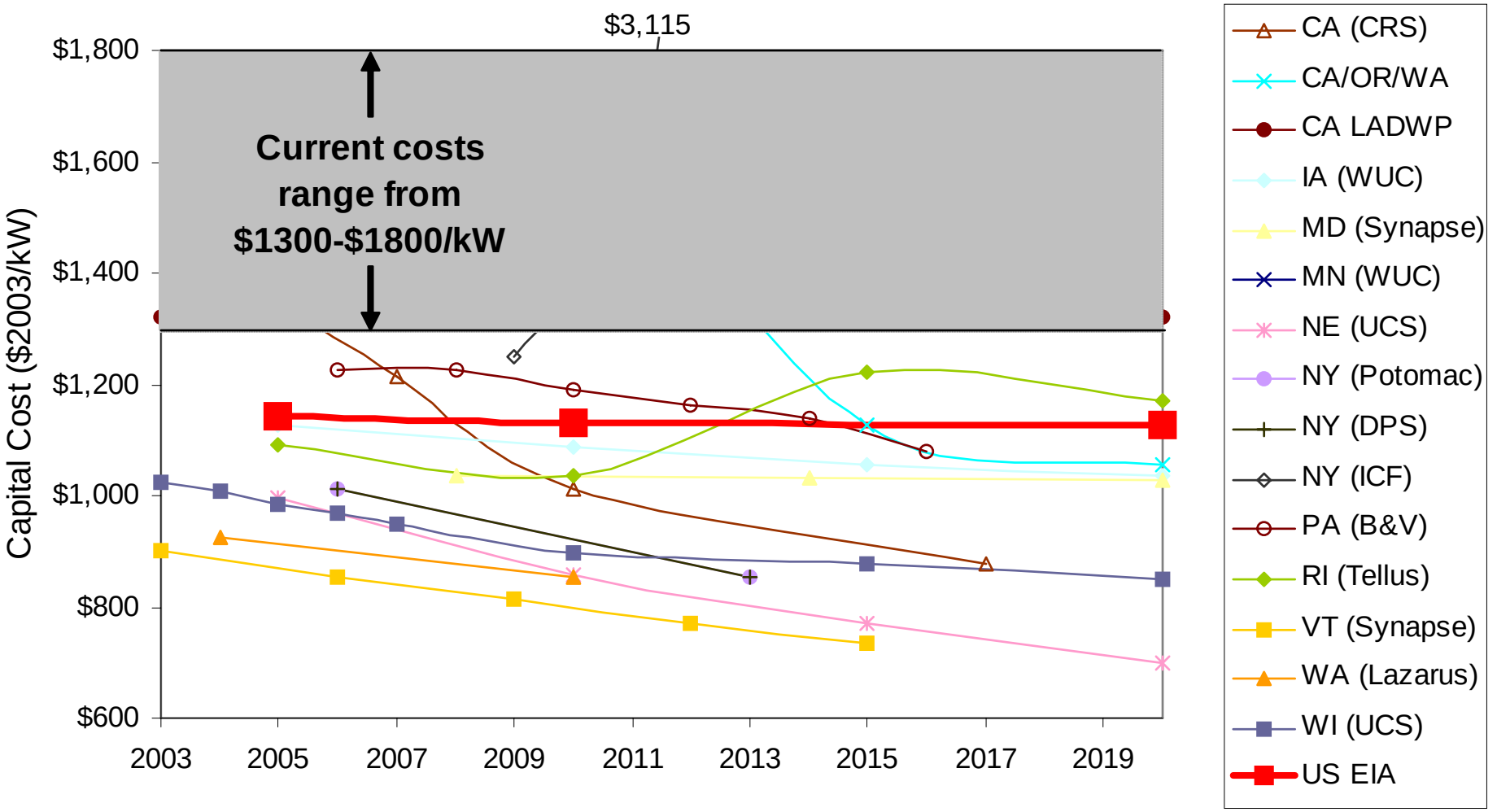
UNDER-ESTIMATION OF COSTS

- Wind capital cost assumptions appear low in many cases
- Transmission/integration costs not always considered fully
- Lack of consideration of RE demand from other sources
- Increased likelihood that RE displaces coal, not gas, not considered fully
- Expectations in some cases of long-term PTC availability

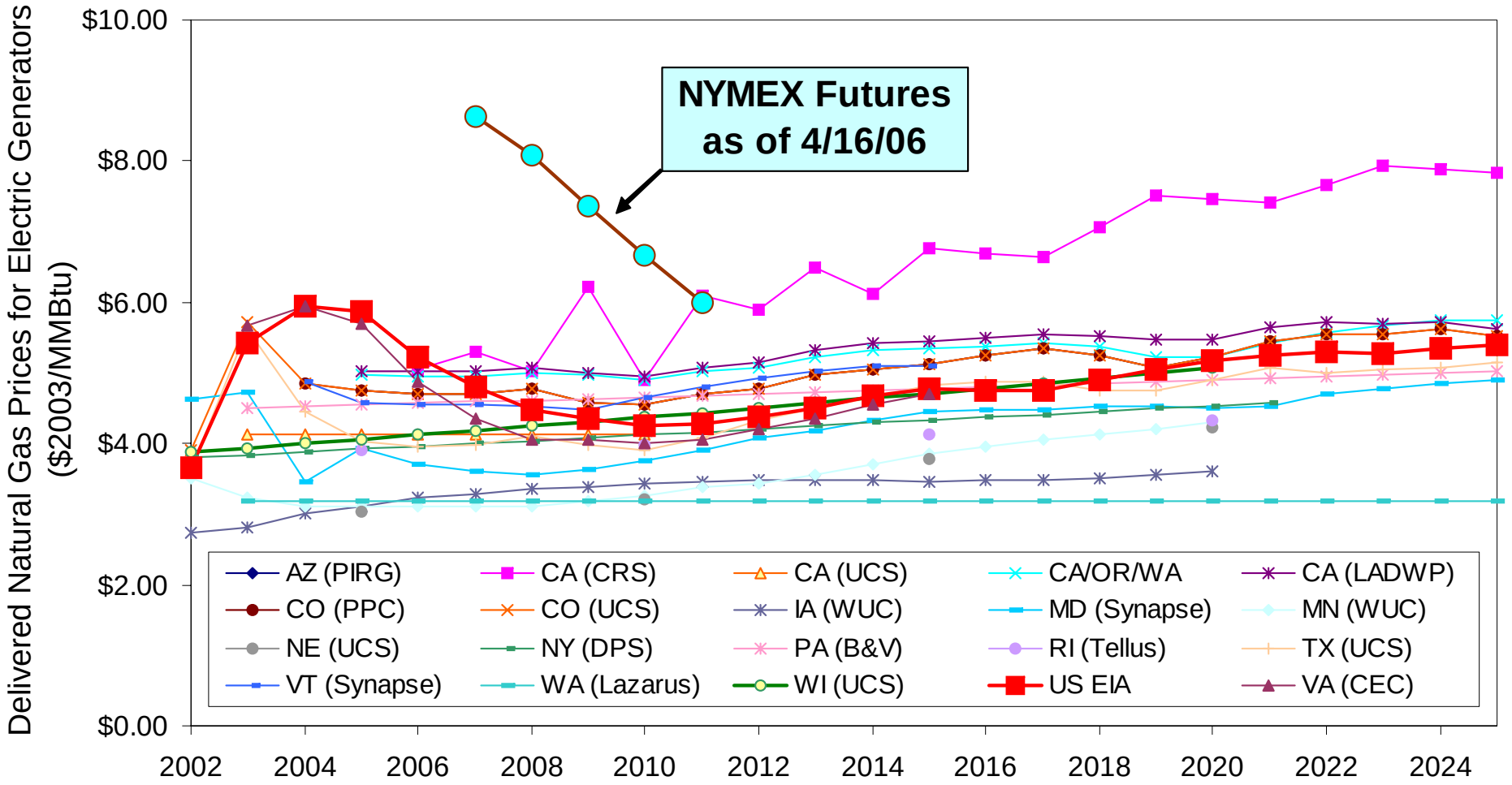
OVER-ESTIMATION OF COSTS

- Reliance on natural gas price forecasts that appear too low
- Secondary electric and gas price impacts ignored in many cases
- Potential for future carbon regulations not considered
- Expectations in many cases that PTC will be extended for a very limited period, or not at all

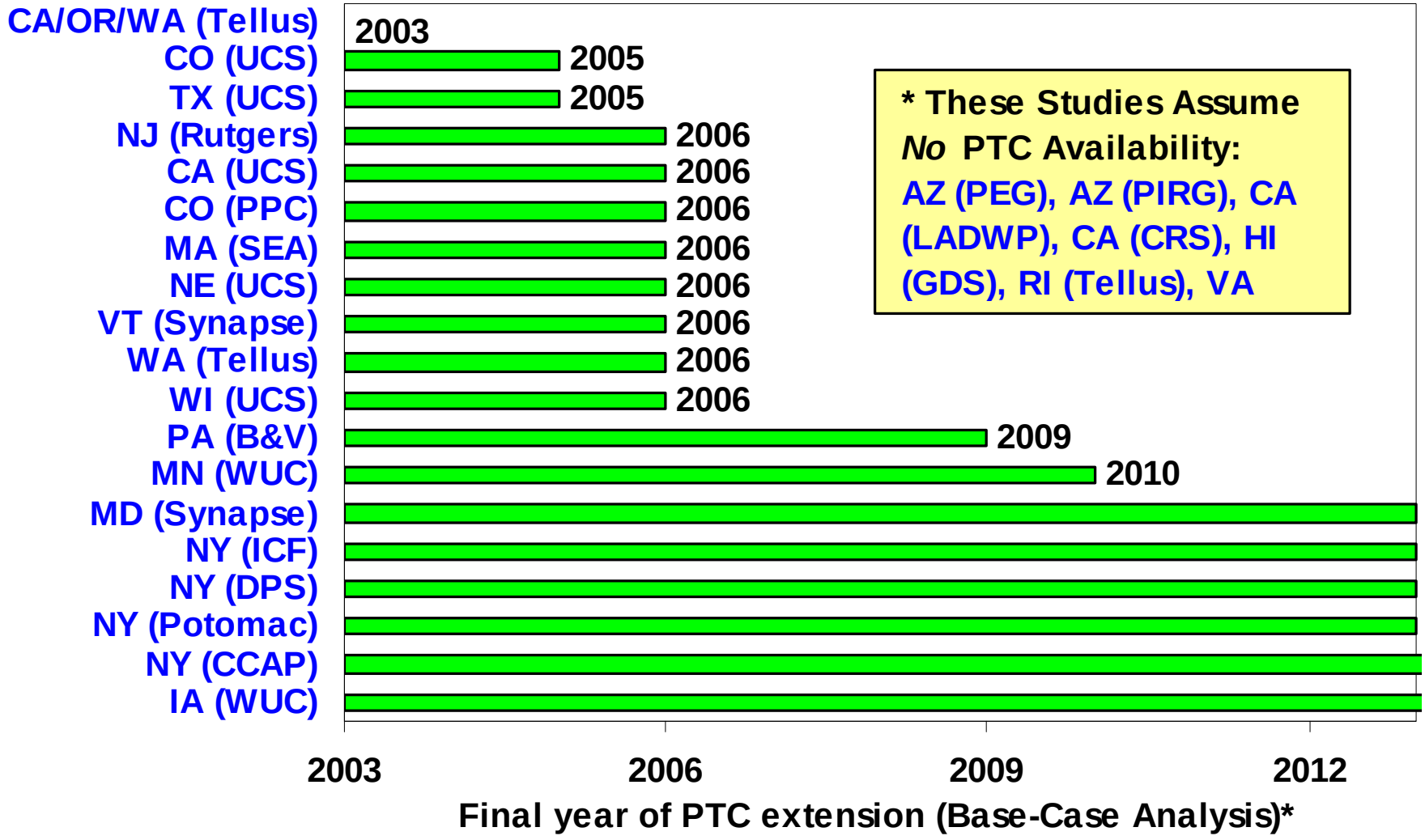
Wind Capital Cost Assumptions Range from $750/kW to $3,000/kW in 2010-2015



Most Studies' Natural Gas Price Projections are Probably Too Low



Inconsistent PTC Assumptions Reflect Substantial Political Uncertainty



Many Studies Appropriately Consider the Secondary Costs of Renewable Generation

Cost Variable	Number of studies	Studies
Capacity value	18	AZ (PEG), CA (CRS), CA/OR/WA (Tellus), CO (PPC), CO (UCS), IA (WUC), MD (Synapse), MA (SEA), MN (WUC), NE (UCS), NY (CCAP), NY (DPS), NY (ICF), NY (Potomac), PA (B&V), RI (Tellus), TX (UCS), WI (UCS)
Transmission cost	13	CA (CRS), CA (UCS), CA/OR/WA (Tellus), CA LADWP, CO (PPC), CO (UCS), IA (WUC), MA (SEA), MN (WUC), NE (UCS), TX (UCS), VT (Synapse), WI (UCS)
Integration cost	10	CA (CRS), CA/OR/WA (Tellus), CO (PPC), CO (UCS), IA (WUC), MN (WUC), NJ (Rutgers), TX (UCS), WA (Lazarus), WI (UCS)
Admin. & transaction cost	4	CA (UCS), MA (SEA), WA (Lazarus), WI (UCS)

But as renewable penetrations reach higher levels, some of these costs need to be more carefully considered

Conclusions from the Cost Studies

- Projecting RPS costs is inherently uncertain, but… despite uncertainties, majority of studies project modest cost impacts
- Recent trend toward studies that forecast not just direct costs and environmental benefits, but also macroeconomic and hedge benefits
- Studies use variety of methods/data sources to calculate costs and benefits: a standard study "template" has not yet emerged
- Assumptions for primary and secondary costs and benefits likely to be more important than what model is used
- Sophistication of models used, and range of secondary impacts and public benefits considered, affect the cost of undertaking a study: $100k will buy a very thorough study

Some Possible Areas of Improvement…

- **Improved Treatment of Transmission/Integration Costs:** need better estimates of these costs w/high RE penetrations
- **Competing RPS Requirements:** consider how potential RPS policies in nearby states would affect RE resource supply and cost
- **Natural Gas Price Forecasts:** benchmark to NYMEX in early years
- **Coal as the Marginal Price Setter:** at high natural gas prices, need to consider possibility that RE will increasingly offset coal
- **Greater Use of Scenario/Risk Analysis:** natural gas and wholesale price uncertainty, PTC availability, wind capital costs
- **Consideration of Future Carbon Regulation:** consider impacts in the event that future carbon regulations are established
- **More Robust Treatment of Public benefits:** greater efforts to quantify the magnitude of hedge and macroeconomic benefits

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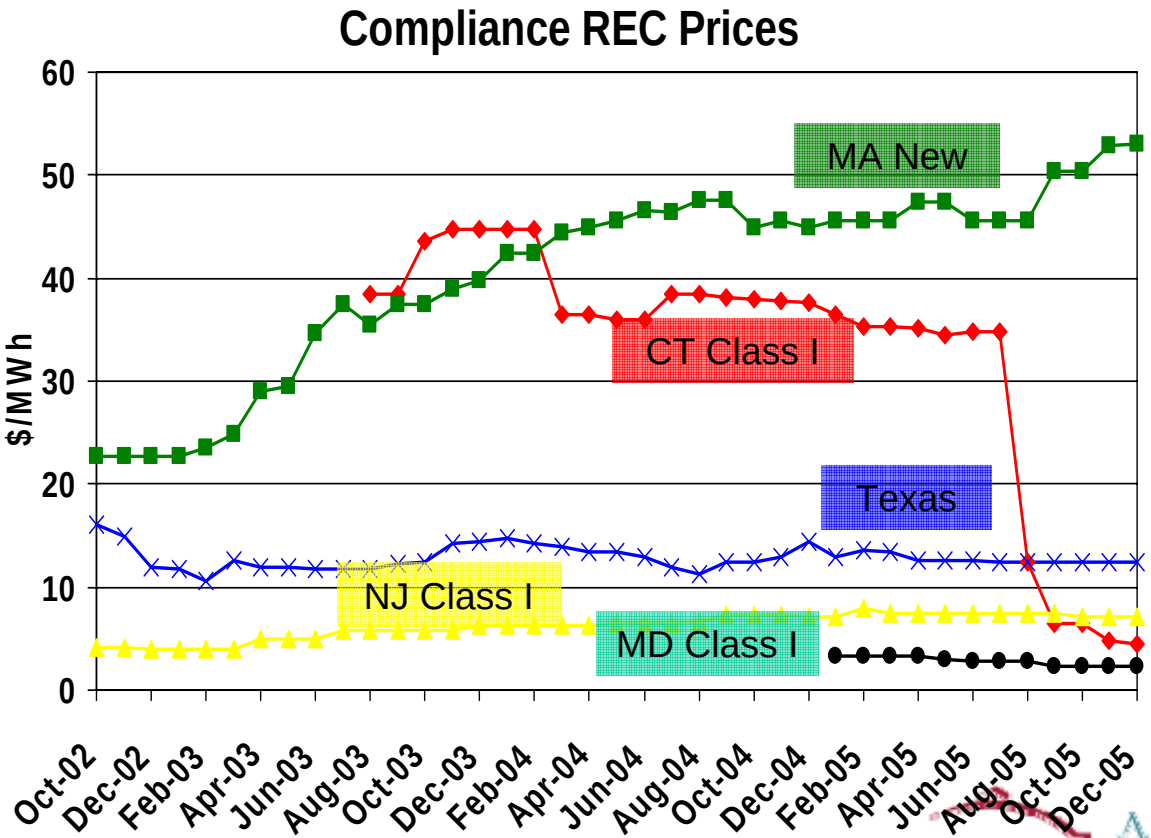
Actual Costs of RPS Policies

Actual costs and benefits not widely collected and reported, because: (1) policies have been operating for a short duration; (2) lack of publicly available data on long-term contract prices; (3) challenges in estimating secondary costs/benefits

RECs Markets: In markets where RECs or surcharge sets above-market cost, 2006 rate impacts estimated to be at most: ME (0.1%), MD (0.1%), NY (0.1%), CA (0.3%), CT (0.2%), AZ (0.4%), NJ (0.1%), MA (1.1%)

Contract Markets: In many markets where bundled contracts predominate, RPS may provide savings or at worst modest rate increases: TX, CA, NM, MN, CO, MT (unclear in WI, NV)



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RPS Cost Cap Mechanisms in Use in Other RPS States (1)

- **Retail Rate/Revenue Cost Cap**
  - Colorado (1% of total annual electric bills, by customer class)
  - New Mexico (1% in 2006, increasing 0.2%/yr, until 2% in 2011)
  - Washington (proposed; 4% of retail revenue on incremental cost)
- **Bundled Contract Price Caps**
  - New Mexico ($49/MWh wind and hydro; $62.54/MWh biomass and geothermal; $150/MWh for solar <10 kW, $100/MWh >10 kW)
  - Hawaii (avoided cost)
  - Montana (115% of avoided cost for non-restructured suppliers; 100% for restructured suppliers)
- **Alternative Compliance Payments (freely available)**
  - Massachusetts ($55.13/MWh, adjusted for inflation)
  - New Jersey ($50/MWh for Tier 1 and Tier 2; $300/MWh for solar)
  - Rhode Island ($50/MWh, adjusted for inflation)

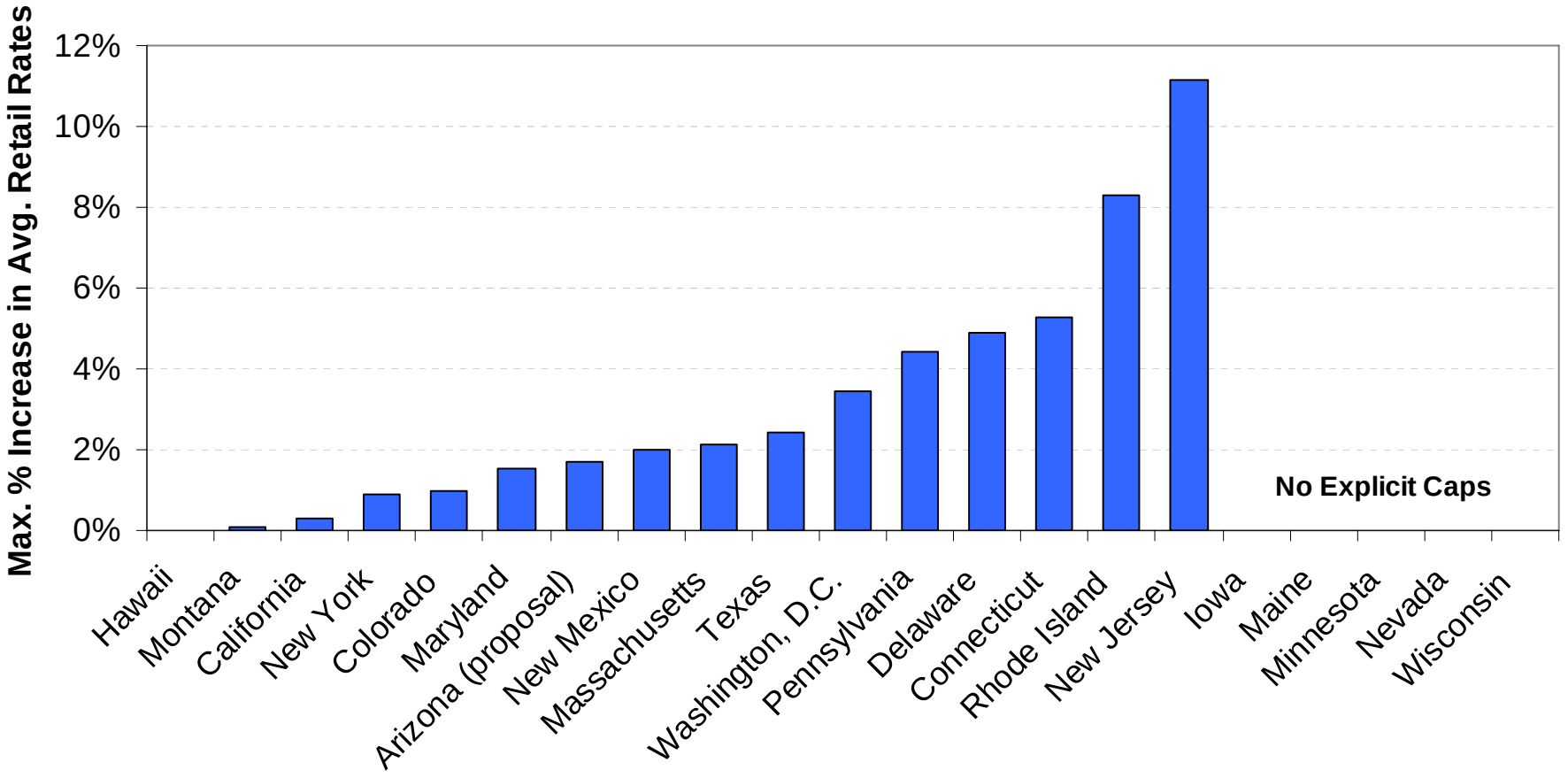
RPS Cost Cap Mechanisms in Use in Other RPS States (2)

- **Alternative Compliance Payments (available/recoverable in rates if least cost measure and/or insufficient available RE)**
  - Delaware ($25/MWh; subsequent payments increase by $10/MWh to a maximum of $50/MWh)
  - District of Columbia ($25/MWh Tier 1; $10/MWh for Tier 2; $300/MWh for solar)
  - Maryland ($20/MWh for Tier 1; $15/MWh for Tier 2; $8/MWh for Tier 1 industrial process load customers, steadily dropping to $2/MWh by 2017 and thereafter, $0/MWh for Tier 2)
- **Financial Penalty (for competitive suppliers, will act as cost cap; not so for regulated utilities because RE contract costs are recoverable, regardless of the cost level)**
  - Connecticut ($55/MWh)
  - Texas ($50/MWh or 200% of average REC price)
  - Pennsylvania ($45/MWh; 200% of average REC price for solar)

RPS Cost Cap Mechanisms in Use in Other RPS States (3)

- **Customer Class Bill Impact**
  - New Mexico ($49,000 for large customers with consumption over 10,000 MWh, rising $10,000/year to $99,000 in 2011
  - Maryland, Delaware, Maine exempt certain customer loads altogether
- **Renewable Energy Fund Limitation**
  - Arizona
  - California
  - New York
- **Force Majeure**
  - Pennsylvania, Minnesota, Nevada, Maine, many others

Maximum Cost Impacts, Based on Cost Caps



Notes: Actual costs likely to be significantly below maximum costs, in many cases. Assumes that RPS costs will be capped at ACP (or penalty amount in restructured markets). Only includes SBC limits in a some states (e.g., CA), not separately adding any additional incremental transmission or integration costs that might exist.

Cost Cap Options: Lessons Learned

- **General:** Cost cap/penalty should exceed expected cost of compliance
- **Retail Rate Cap:** Possible in still-regulated markets; will inevitably impose calculation difficulties and debates
- **Contract Price Caps:** Used infrequently, and calculation difficulties may exist depending on application; reasonableness of RE costs depend on cost of alternatives, making the cap a moving target
- **Alternative Compliance Payments:** Useful and common in restructured markets because avoids contested regulatory proceedings; can be useful in regulated markets, but may need to ensure that ACP payments are least-cost compliance option, which imposes some regulatory complexity
- **Non-Recoverable Penalty:** Not a cost cap for still-regulated providers
- **RE Fund Limitation:** Creates undue complexity; not recommended
- **Customer-Class Based Cap:** Recommend considering exemptions, not cost caps, if such treatment is necessary
- **Force Majeure:** Can create considerable uncertainty in application; use with care, define with precision, and limit application

Use of Collected Funds from Penalty/ Alternative Compliance Payments

- **Funds can be used to serve multiple purposes…**
  - support renewable energy
  - support the general fund
- **Most – but not all – programs recycle any collected funds to support renewable energy**
  - typically by depositing funds into existing or new state renewable energy fund

Cost Recovery for Regulated Utilities

- Prudently incurred costs should be recovered, and this should be made clear in RPS legislation
  - Not all compliance costs should necessarily be deemed prudent (e.g., purchasing high-priced RECs on the short-term market, when low cost renewables are available under long-term contracts; or using the ACP when less expensive compliance options exist)
- Contract pre-approval is often an element of state RPS policies in still-regulated markets, as are various planning and competitive solicitations requirements
- Some states provide a specific cost recovery mechanism beyond regular rate recovery, e.g.
  - pre-authorized pass-through of certain costs
  - system-benefits charge
- Some states are additionally investigating the development of a utility profit incentive for purchasing RE (e.g., Colorado, Hawaii)

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Design Elements that Will Affect Compliance Costs

- Percentage targets and timeframes
- Resource eligibility
- Geographic eligibility and delivery requirements
- Set-asides for solar or other resource types
- Flexible compliance mechanisms (RECs, banking, borrowing, settlement periods)
- Encouragement for long-term contracting

Conclusions

- Expected cost of other state RPS policies is modest; benefits are not insignificant
- Oregon could do its own cost study
- Actual RPS costs in other states have, in general, been relatively low
- Cost caps and RPS design can be tailored to avoid adverse cost impacts
- But… it is true that an RPS *may* increase retail electricity rates