ACEEE
American Council for an Energy-Efficient Economy

Energy Efficiency as a Resource in Integrated Resource Planning

Ethan A. Rogers
Senior Manager, Industry
ACEEE

Contemporary Issues Technical Conference

Indiana Utility Regulatory Commission

October 17, 2013

Agenda

- Overview
- Energy Efficiency: Lowest-cost resource
- Inclusion of demand-side resources in IRPs
- A viable and reliable resource
- Low risk option
- System Resiliency

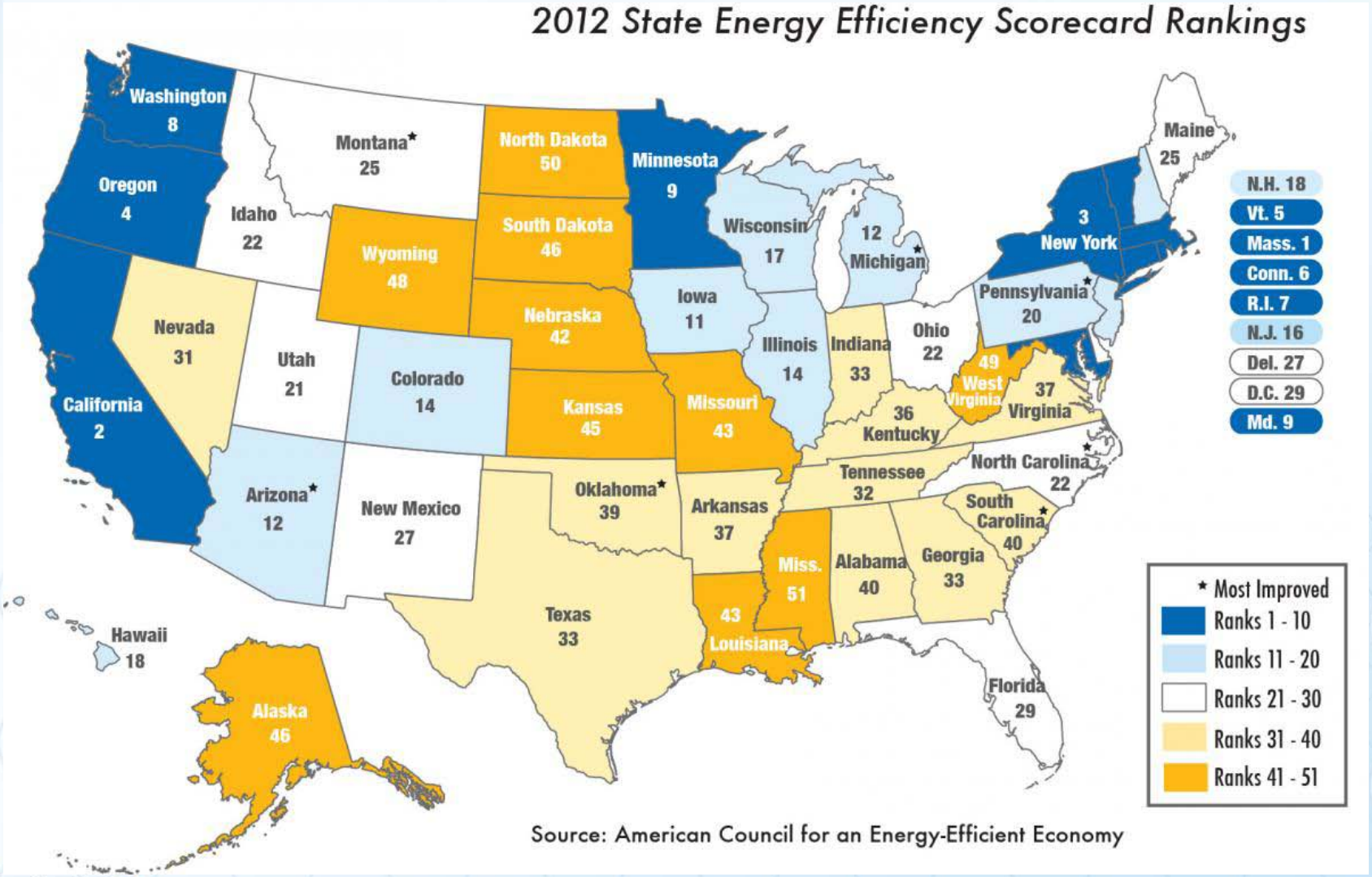
The American Council for an Energy-Efficient Economy (ACEEE)

- ACEEE is a nonprofit 501(c)(3) that acts as a catalyst to advance energy efficiency policies, programs, technologies, investments & behaviors.
- Nearly 50 staff based in Washington, D.C.
- Focus on end-use efficiency in industry, buildings, utilities & transportation
- Other research in economic analysis; behavior; national, state & local policy.
- Funding:
  - Foundation Grants (52%)
  - Contract Work & Gov. Grants (20%)
  - Conferences and Publications (20%)
  - Contributions and Other (8%)

www.aceee.org

ACEEE
American Council for an Energy-Efficient Economy

2012 ACEEE Energy Efficiency Scorecard

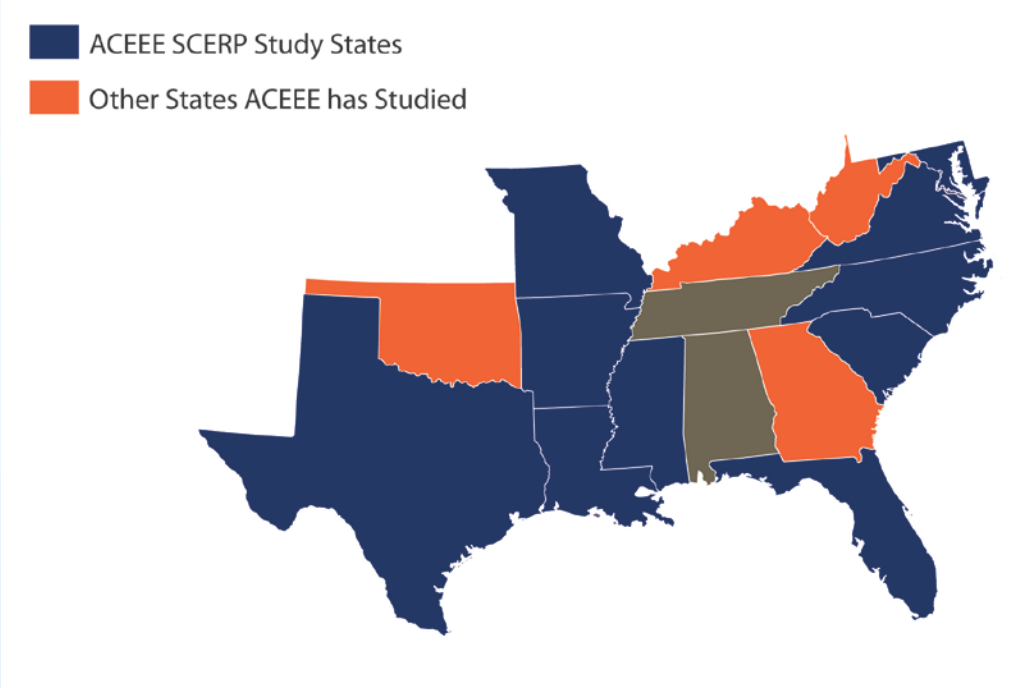


ACEEE
American Council for an Energy-Efficient Economy

ACEEE Engaged at the State-Level

- ACEEE is currently engaged in Illinois, Indiana, Ohio, Michigan, Minnesota, and Wisconsin.

- In the past 7 years, ACEEE actively involved throughout the Southeast



ACEEE
American Council for an Energy-Efficient Economy

ACEEE Engaged at the State-Level

State Economic Potential Studies

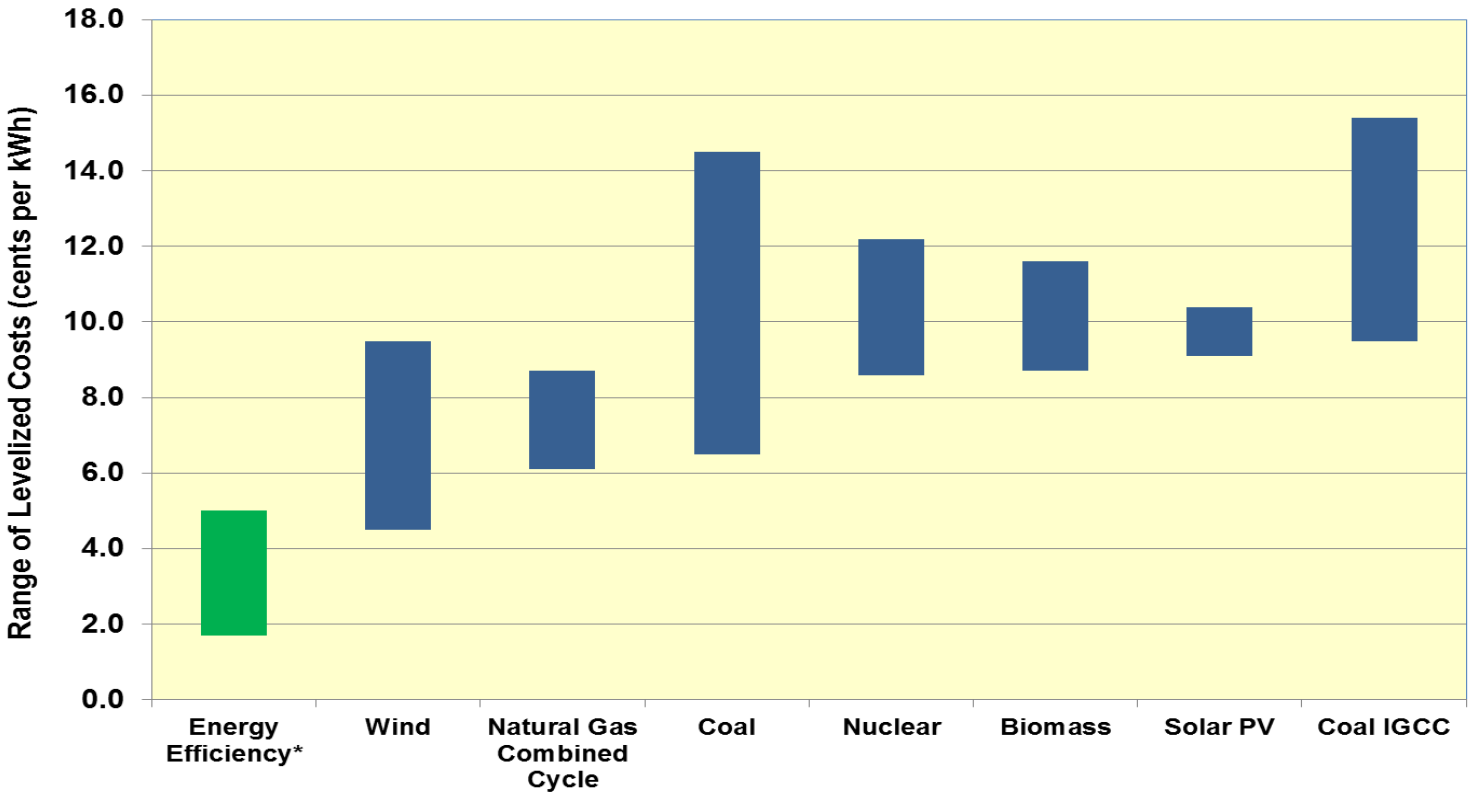
- Arkansas
- Florida
- Louisiana
- Michigan
- Missouri
- Mississippi
- North Carolina
- Ohio
- South Carolina
- Texas
- Virginia

ACEEE
American Council for an Energy-Efficient Economy

Energy Efficiency as a Resource for Integrated Resource Planning

Energy efficiency is a viable, reliable, predictable, and lowest-cost resource that can and should be included in generation and transmission planning.

Energy Efficiency: The Least-Cost Resource



*Notes: Energy efficiency program portfolio data from Molina 2013 (ACEEE forthcoming); All other data from Lazard 2013. High-end range of coal includes 90% carbon capture and compression.

Methodology

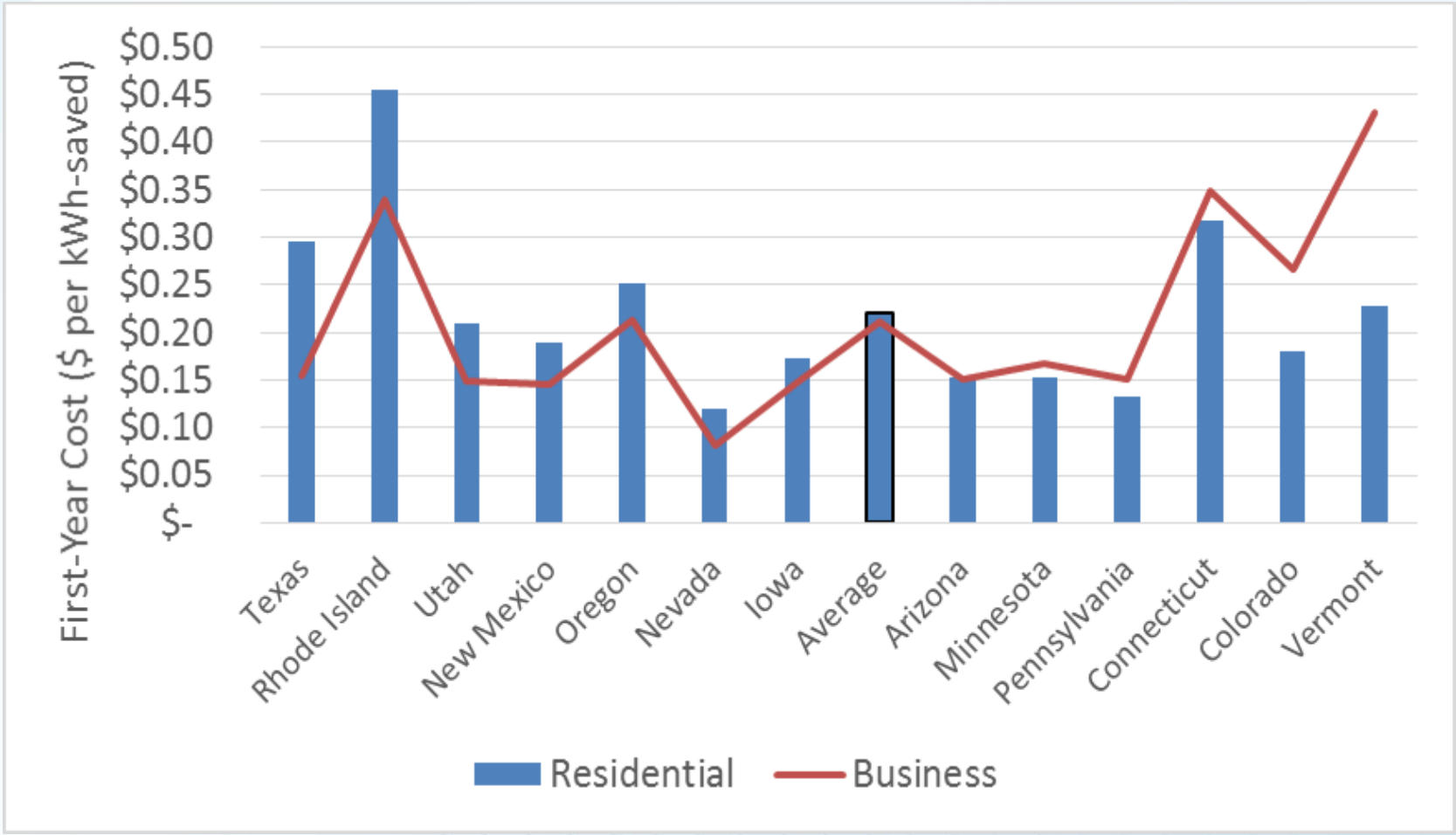
- Collected EE annual reports, evaluations of cost-effectiveness, data requests to PSCs or program administrators
- 17 states so far (multiple utilities); 2009-2012
- Compiled data, and applied common methodology to calculate first-year costs and cost of saved energy (CSE)

Data compiled
Energy efficiency savings (electricity and natural gas) as reported
net vs. gross
site vs. generation electricity impacts
by customer class
Program costs by type for EE only (admin, rebates, & shareholder incentives) (no DR or renewables)
Measure lifetimes by customer class
Benefit cost ratios

Methodology, cont.

Converted costs to real 2011$ (GDP deflators)
Selected at-site energy savings (converted as needed)
Selected net energy savings* for calculations
Derived first-year “acquisition” costs (program-year $ / program-year incremental savings)
Applied common real discount rate and reported measure lifetime* to calculate levelized cost of saved energy (CSE)

First-Year Cost by Customer Class

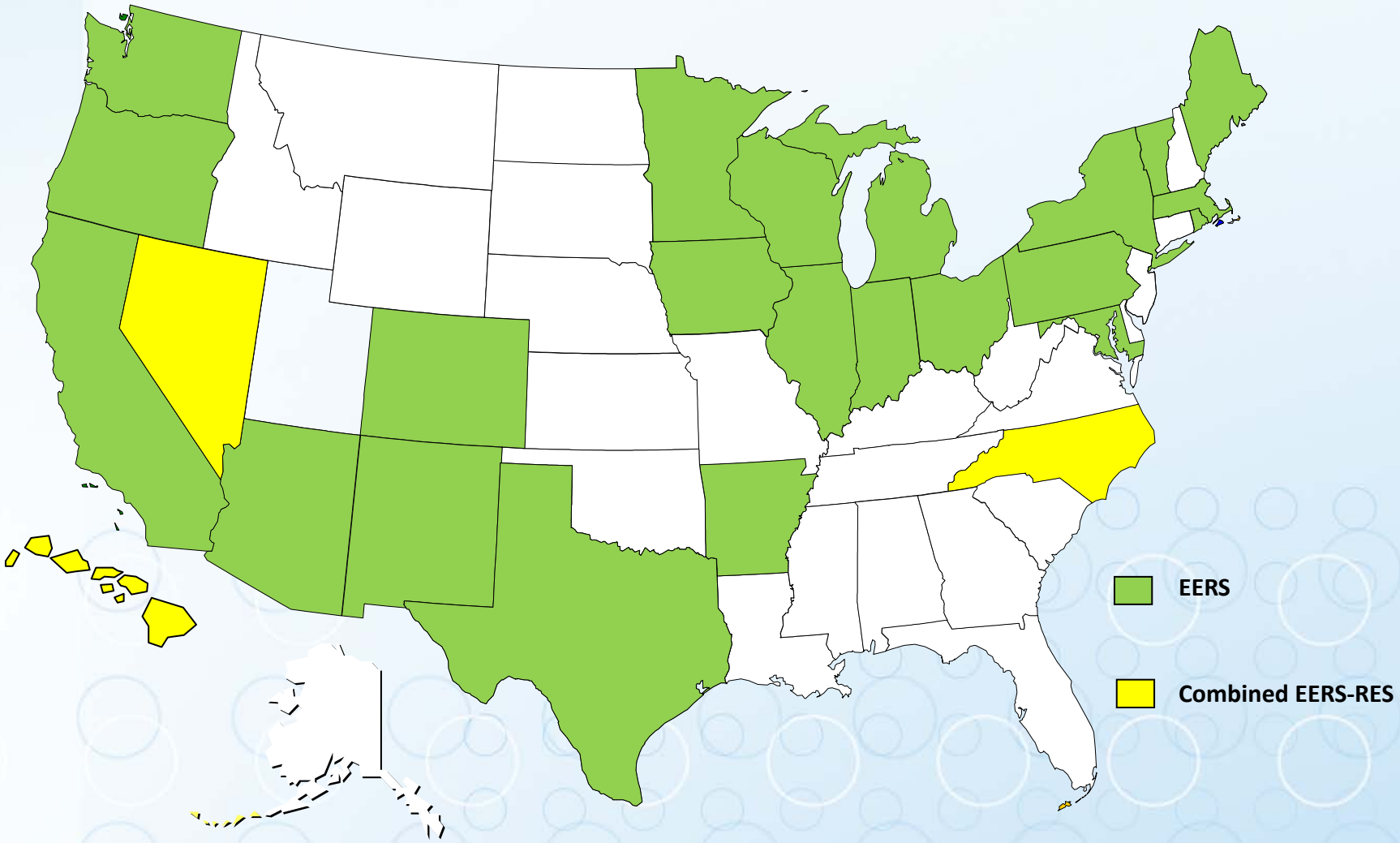


National Picture of Including energy efficiency in Planning

Demand Side Management / Demand Side Resources: demand response, customer-owned generation, and energy efficiency

- 30 States have some type of IRP requirement
- Six states had polices requiring fair consideration of energy efficiency in generation and T&D planning: CA, MT, OR, UT, WA, VT (as of 2009)

Energy Efficiency Resource Standards



ACEEE
American Council for an Energy-Efficient Economy

Inclusion of Demand Side Resources (DSR) in IRPs

1. Build DSR (as required by policy) into future load forecast
2. Evaluate supply and demand options against multiple load forecasts
3. Treat DSR as a resource equal to conventional generation

Inclusion of DSR in IRPs

(1) Build Demand Side Resources as specified in policy into future load forecast (e.g.: 2%/year)

- Strengths
  - Simple
  - Best with limited information on costs
- Weaknesses
  - Will not result in least-cost resource plan because it presupposes a certain level of DSR

Example: Colorado

- No competitive wholesale or retail electricity markets.
- Public Service Company of Colorado (Xcel) and Black Hills Energy are the two IOUs covered by IRP. They must file an IRP every 4 years for 20-40 year periods
- When calculating resource needs for planning, the utilities subtracts energy savings from base load forecast to get firm obligation
- Colorado has an EERS with goals for 2018 of 5% reduction of retail peak (MW) and 5% of retail sales (MWh) from 2006 baseline
- IOUs are also required to submit DSM filings with Commission

Inclusion of DSR in IRPs

(2) Evaluate various mixes of supply-side and demand-side against multiple load forecasts

- Minimum Efficiency Scenario
  - Only as much DSR as required by policy
- More Efficiency Scenario
  - Based on increased investments
- Cost-Effective Efficiency
  - Includes all cost-effective energy measures
- *Pro: considers overall system costs*
- *Con: presupposes complete information*

Example: PacifiCorp 2011 IRP

Provides service in California, Idaho, Oregon, Utah, and Washington. Developed or participated in development of plans for each state. Developed an overarching plan for corporation

- Defined 67 separate scenarios for portfolio development covering a range of alternative transmissions configurations, greenhouse gas regulation costs, natural gas prices, renewable energy requirements and costs, load forecasts, and DSR availability.
- Each portfolio was modeled using three natural gas price forecasts
- 100 simulations were examined
- Selected a preferred portfolio based on low average costs and low worst-case cost
- *Energy efficiency represents the largest resource added through 2030 (2,500 MW).*

Inclusion of DSR in IRPs

(3) Forecast future energy demand and assume no DSR beyond ongoing programs and polices

- DSR is treated as a resource equal to conventional generation for planning purposes
- Strengths
  - Results in a true least-cost plan
  - highest levels of energy efficiency
  - Provides useful information about the true value of demand-side resources as an alternative to supply-side resources

Example: Northwest Power and Conservation Council

- NPCC develops IRPs for Bonneville Power Administration (BPA) that give DSR equal standing
- The 2010 IRP for BPA evaluated the costs and risks of thousands of possible portfolios against 750 different future load scenarios over 20-year planning horizon.
- It determined that 85% of growth could be met through efficiency.
  - (1200 MW over first 5 years, 5,900 over 20 years).
  - Since 1980, BPA has realized 4,000 MW in savings worth $1.8 billion.

Example: Con Edison, New York

Distribution network nearing capacity in 2003

- Decided that DSR would be compared on an equal basis to supply side resources
- Contracted with energy service companies to procure 80 MW of savings at benefit/cost ratio of 2.8
- Saved utility over $223 million in capital expenditures

Best Practices

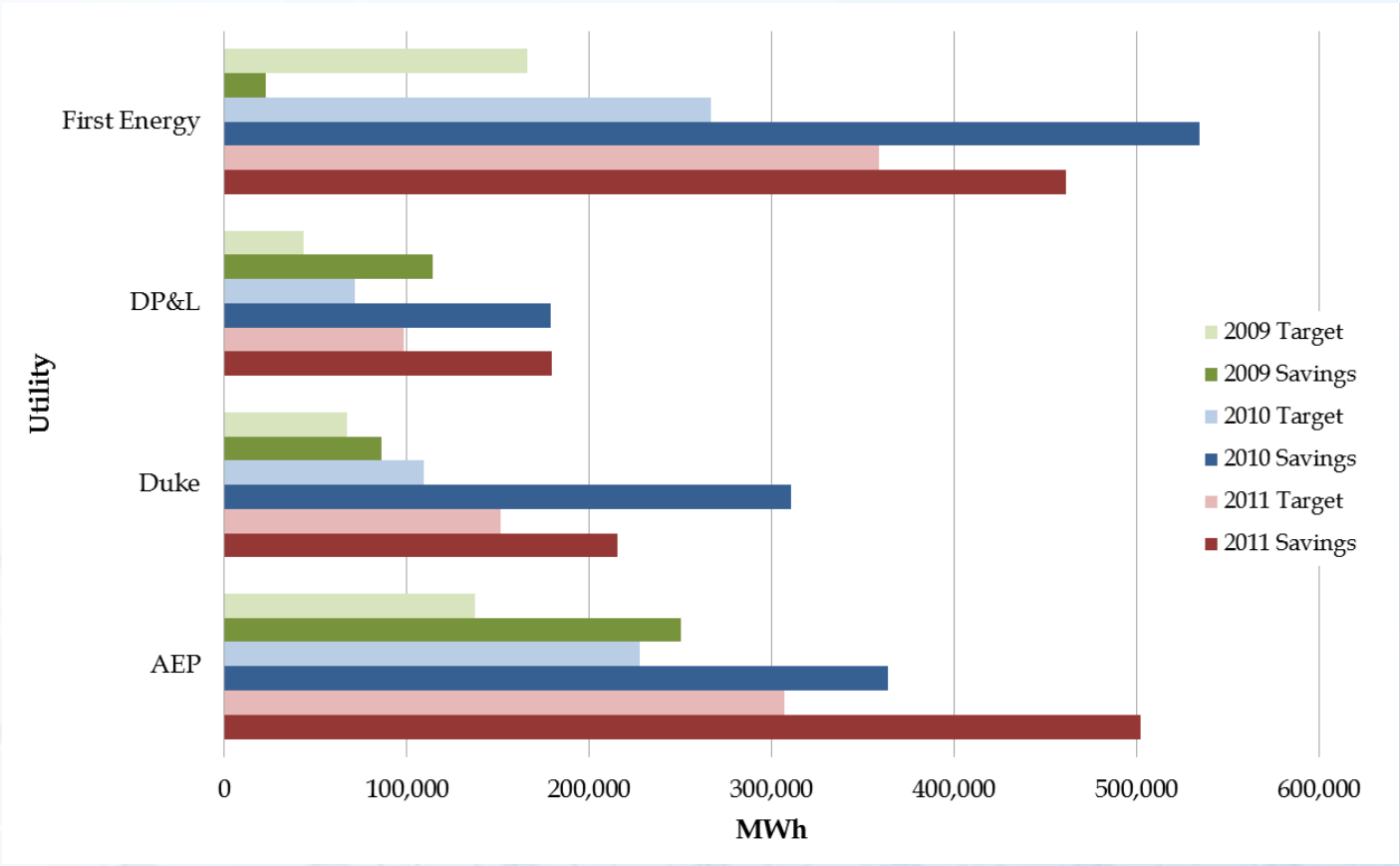
- Credible load forecast
- Credible information about costs and availability of resources
- Fair and equal consideration of all resources
- Modeling
- Risk analysis
- Stakeholder participation
- Coordination with regional planning

Best Practices

- Create levelized cost curves for demand side resources that are comparable to the levelized cost curves for supply side resources
- Use simulation models that evaluate the cost and risk of multiple possible portfolios under dozens or even hundreds of future scenarios

Energy Efficiency: Viable, Reliable and Predictable

Targets and Results in Ohio



ACEEE
American Council for an Energy-Efficient Economy

Example: Ohio

- Industrial EE the low-cost resource
- AEP using industrial savings to exceed targets & keep program cost down
- Utility programs helping to make industrial EE projects happen
- Industrial EE projects are reducing bills & moderating future wholesale price increases

Ohio’s Success with SB221 Efficiency

- Collectively utilities exceeded goals for first 3 years. AEP estimated program costs of just under 2¢ per kWh
- AEP 2009-2014 customer costs $436 million: customers saving $1.483 billion: **$1 billion net savings to customers**

Impacts of Energy Efficiency on Wholesale Electricity Markets

	Economic Savings (Million $2012)
Wholesale Energy Cost Savings	$3,370
Wholesale Energy Price Mitigation Savings	$880
Wholesale Capacity Price Mitigation Savings	$830*
Total Savings	**$5,080**
Utility Program Administration Costs**	$2,800

* Includes savings from 2015/2016 auction and estimates of savings from 2020/2021 auction.
** Utility program investments will deliver savings beyond 2020. However, we only count program savings through 2020.

Ohio 2015/2016 Wholesale Capacity Costs & Savings

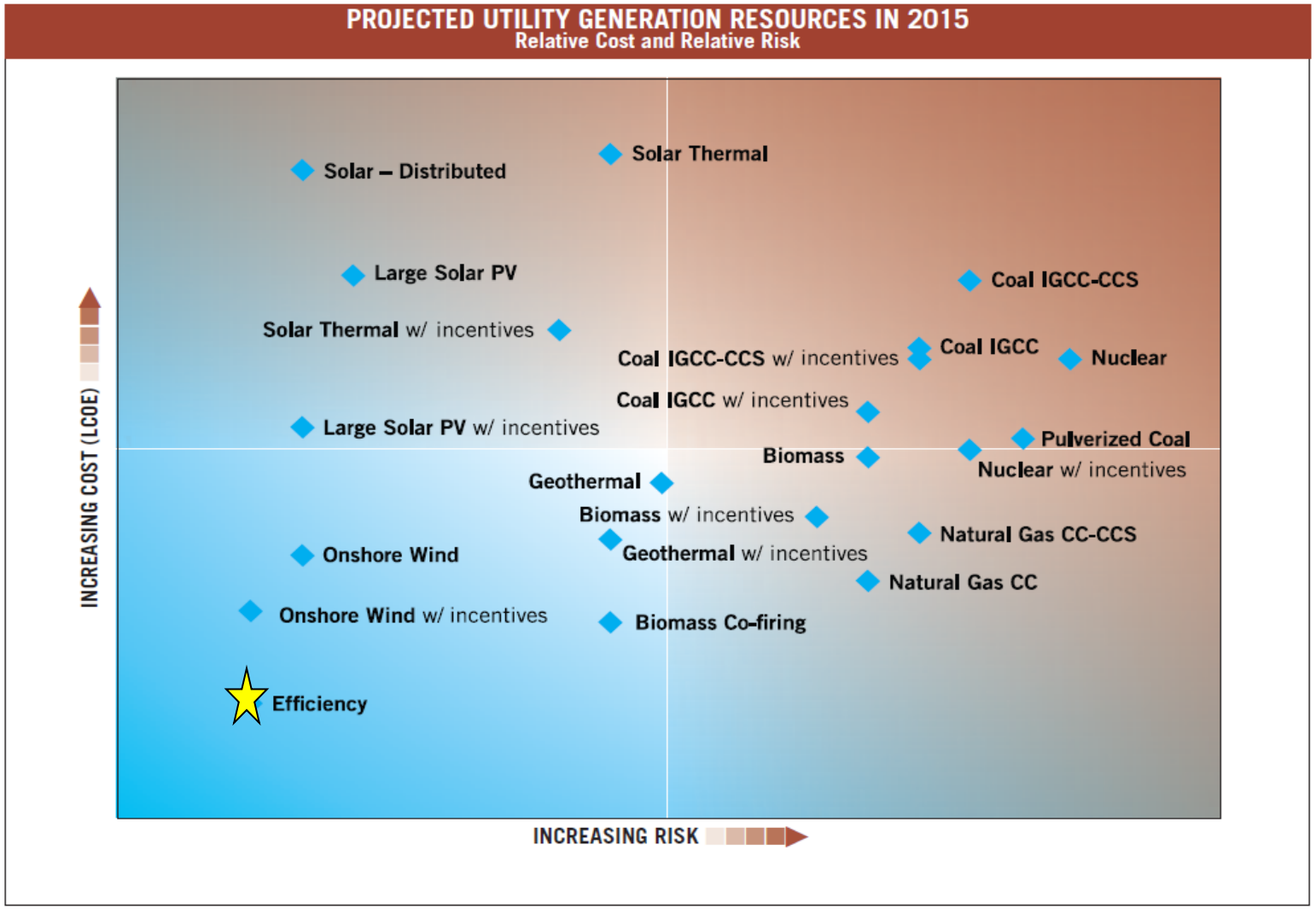
Zone	Actual Auction Capacity Costs (M$)	Capacity Costs with Additional EE (M$)	Capacity Cost Savings (M$)	Capacity Cost Savings (M2012$)
ATSI	$1,368	$883	$484	$452
All Others	$717	$666	$51	$47
Ohio Total	**$2,084**	**$1,549**	**$535**	**$499**

ACEEE
American Council for an Energy-Efficient Economy

Ohio Analyses Results Show

- Growing investments in EE are economically justifiable despite recent drop in natural gas prices
- Utilities have been meeting and exceeding their annual savings targets mandated by Ohio's EERS and have done so cost-effectively
- Energy efficiency resources bid into PJM market can depress electricity prices, generating economic benefits for participants and non-participants alike
- The financial benefits to customers from utility energy efficiency investments exceed the energy efficiency program costs by a substantial margin

Low-Risk Resource



Source: CERES. *Practicing Risk-Aware Electricity Regulation.* April 2012

Grid Resiliency

- As distributed assets, DSR can be strategically sited for the grid
  - Load balancing (location)
  - Load balancing (time)
- When high-efficiency distributed generation such as CHP is included
  - Frequency and Volt/VAR control

System Resiliency

- Distributed nature enables quicker recovery
- Public safety
- Reduces customer economic losses
- DSR can keep critical facilities on-line during outages

Universal Benefits

- Lowest-Cost Resource
  - For customers
  - For resource planning
- Price Suppression
  - Short-term and long-term
- Low risk investment
- Grid Reliability and Resiliency

Concluding Thoughts

Do not ask, *"do demand-side resources pay for themselves?"*

But ask, *"are DSRs likely to be less costly than other alternatives for meeting customer demand?"*

Thank you!

Ethan A. Rogers
Senior Manager, Industry
erogers@aceee.org
202-507-4751

Visit ACEEE on the Web:
www.aceee.org

ACEEE
American Council for an Energy-Efficient Economy