RAP | Energy solutions for a changing world

Energy Efficiency as a Long Term Investment Strategy

Kentucky SEEK Project

Presented by Richard Sedano

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Introducing RAP and Rich

- RAP is a non-profit organization providing technical and educational assistance to government officials on energy and environmental issues. RAP Principals all have extensive utility regulatory experience.
  - Richard Sedano directs RAP's US Program. He was commissioner of the Vermont Department of Public Service from 1991-2001 and is an engineer.

Planning is everything,
The Plan is nothing.

- Carl Weinberg

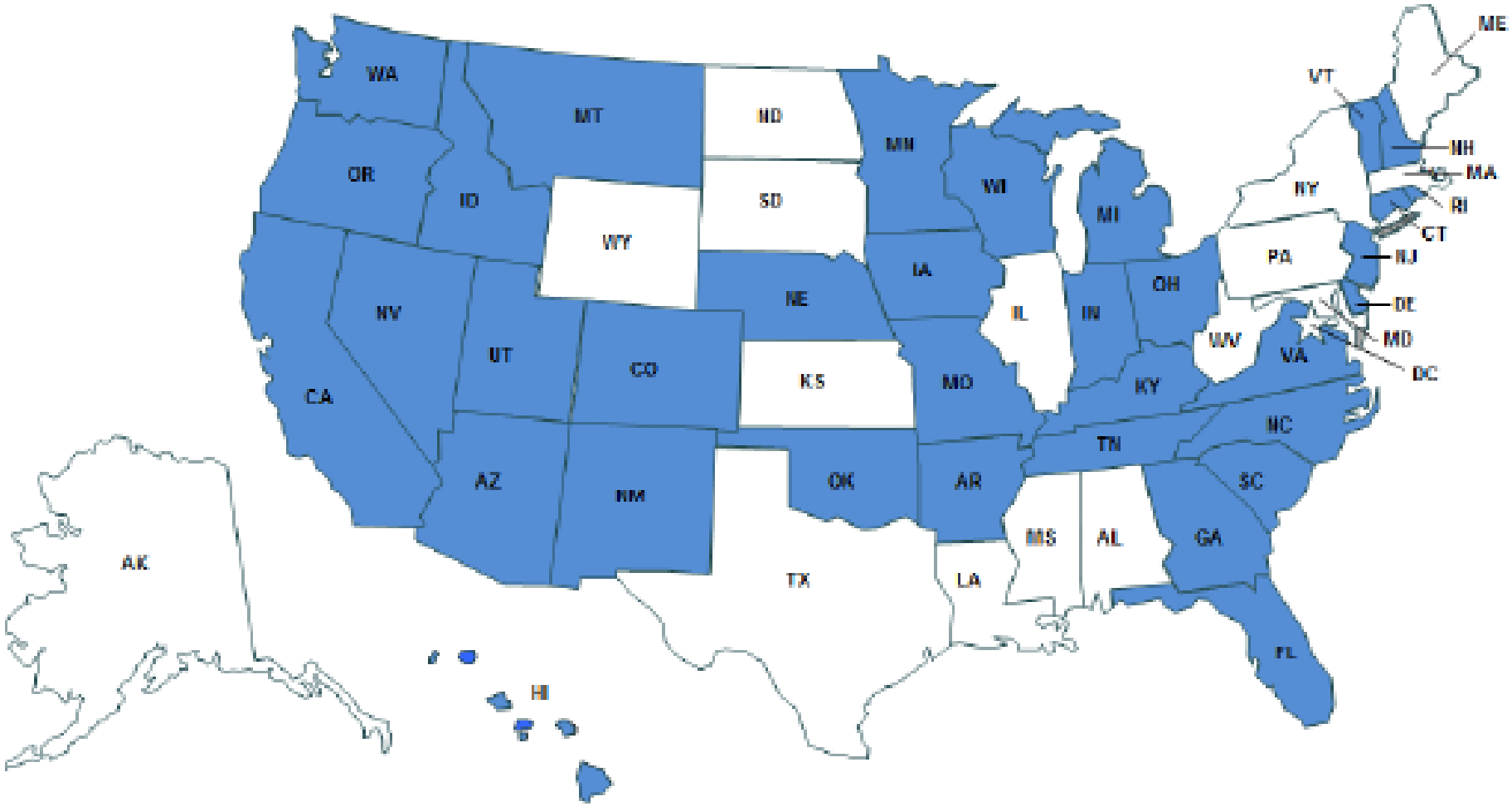
Outline for Today

- Integrated Resource Planning
  - Described
  - Energy efficiency role in the plan

- Half the states do IRP, some other countries also
  - In China, it is called Scientific Planning

U.S. STATES WITH INTEGRATED RESOURCE PLANNING OR SIMILAR PLANNING PROCESS

Effective December 2009

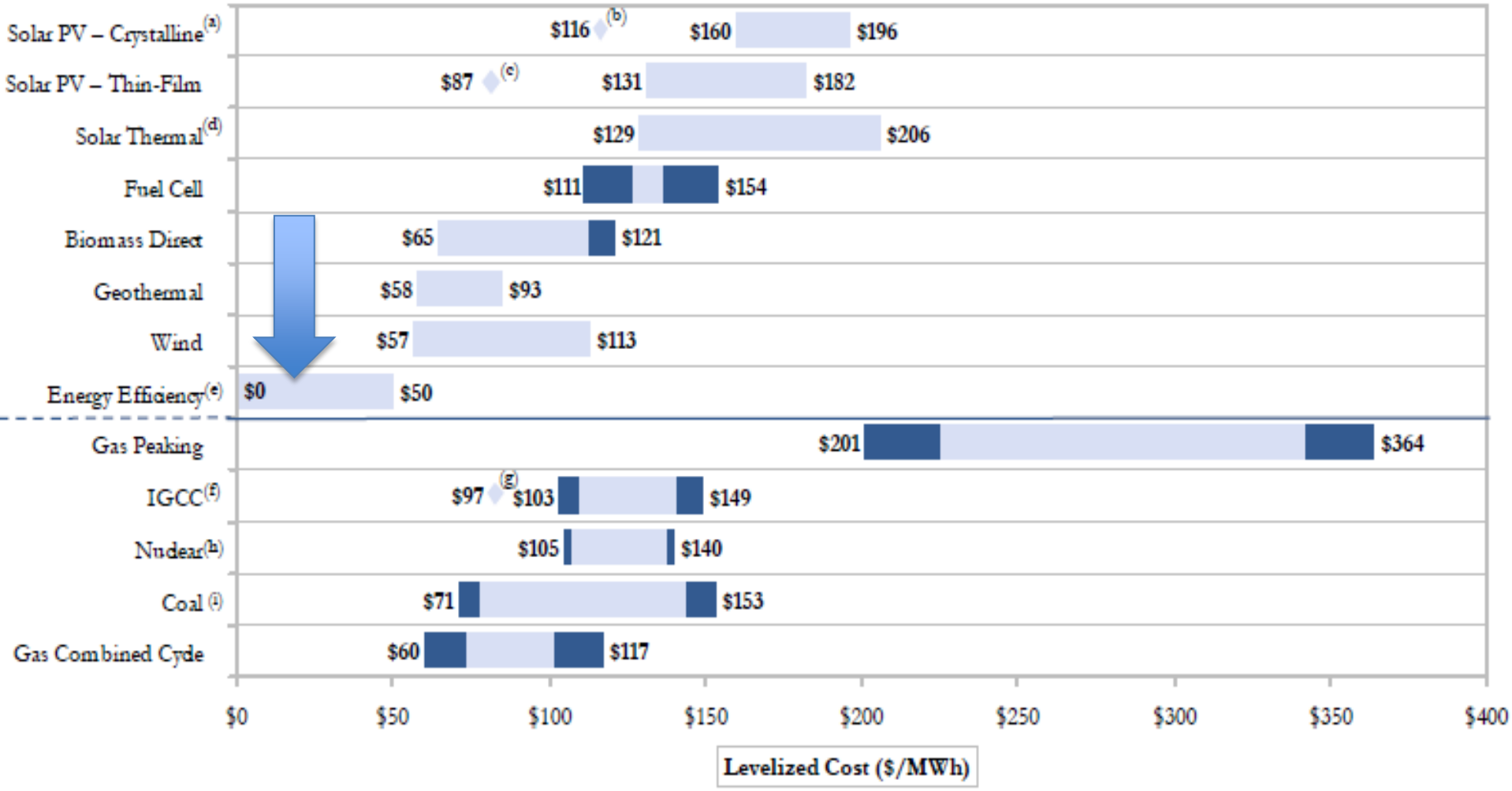


What is an IRP,
or whatever you want to call it?

A quality resource planning should include the following factors:

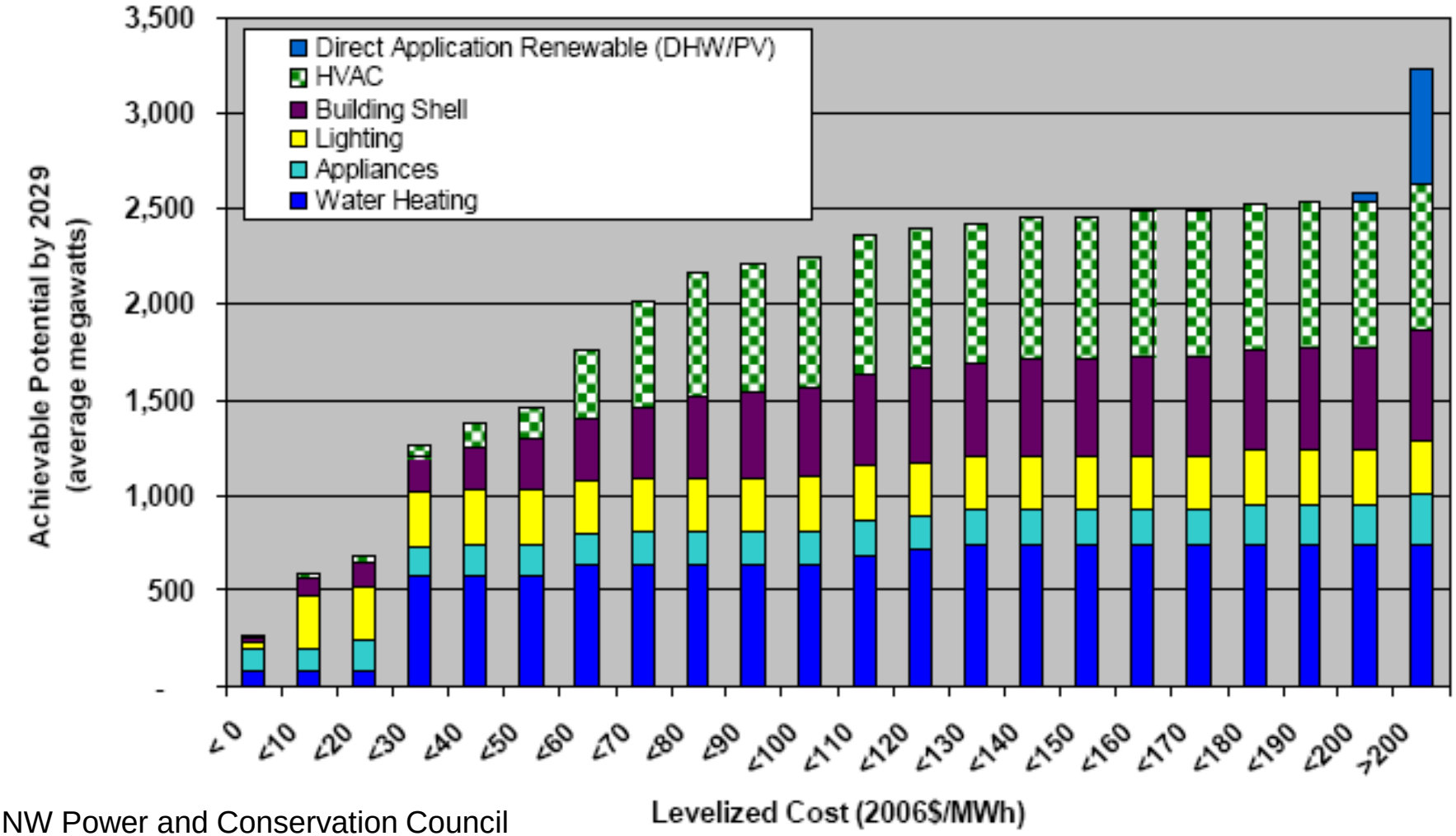
- a) Rational **economic assumptions**
- b) Evaluation of **supply and demand resources** using consistent economic criteria and bias projected over time
  - A forecast is not a prediction
  - Consider distinct scenarios (planners' choice)
  - Consider distinct sensitivities (risks, events out of planners' control)
- c) Quantification, where possible, of both **external costs and non-energy costs and benefits** of resources so that clean energy resources compete fairly against conventional resources;
- d) **Full consideration of resource options**, including relevant production, transmission, distribution, reserves costs and losses
- e) A **public participation** mechanism to ensure all relevant measures are considered and evaluated.
- f) Periodic **Review and acceptance** of a final plan document by the regulator

More detail about energy efficiency in comparison with **new** supply



Source: Lazard. (February 2009). *Levelized Cost of Energy Analysis- Version 3.0*. http://blog.cleanenergy.org/files/2009/04/lazard2009_levelizedcostofenergy.pdf

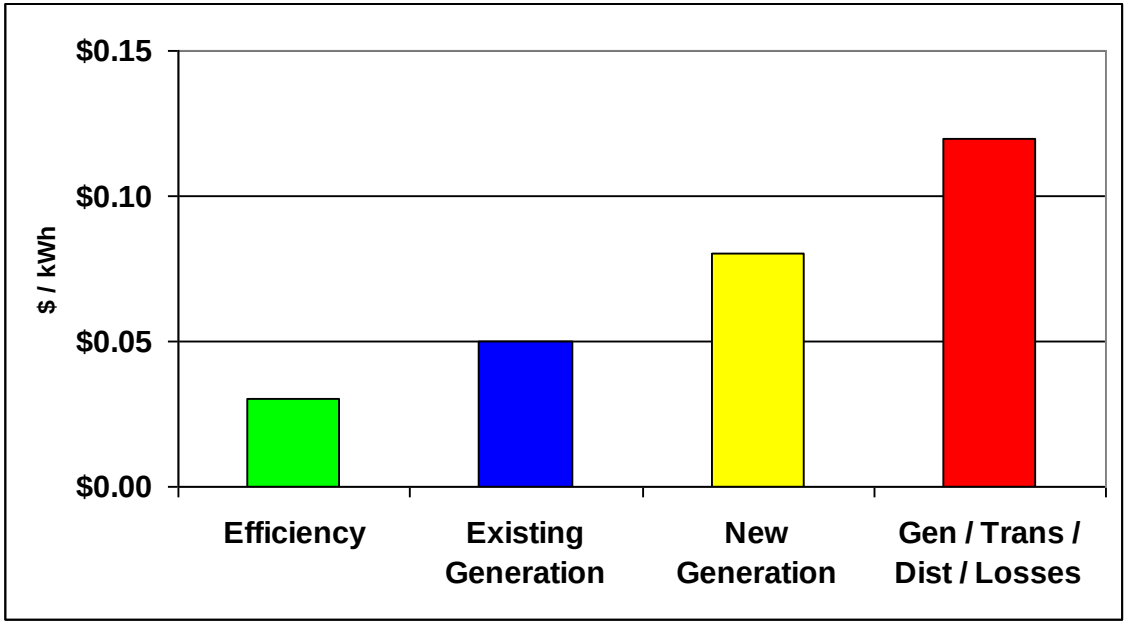
A "Real" Residential EE / RE Conservation Supply Curve



NW Power and Conservation Council

Cost of Energy Efficiency

- Mature energy efficiency programs are being delivered at a cost to consumers of **3 ¢** per kWh



Excess Capacity

- If a utility has excess capacity, does that mean there are no avoided capacity costs from energy efficiency?
  - If capacity can be **sold**, then there is an opportunity capacity cost to foregoing EE
  - If some capacity may be **retired** due to power market economics, aging, or regulation, then there are scenarios and sensitivities to study

Cost-Effectiveness

- States establish benefit-cost tests
  - Decide cost-effectiveness criteria
- Around US, typical EE portfolio produces benefits two times cost (**B/C ~ 2**)
  - This shows that long term costs could be reduced further by more EE investment now
    - More benefits, less cost, B/C > 1
  - Low **cost/kWh** indicates the same
  - More strategic uses of EE are available

Fuel Cost Forecast

Drives expected cost of fossil-generated energy, against which other options are compared.

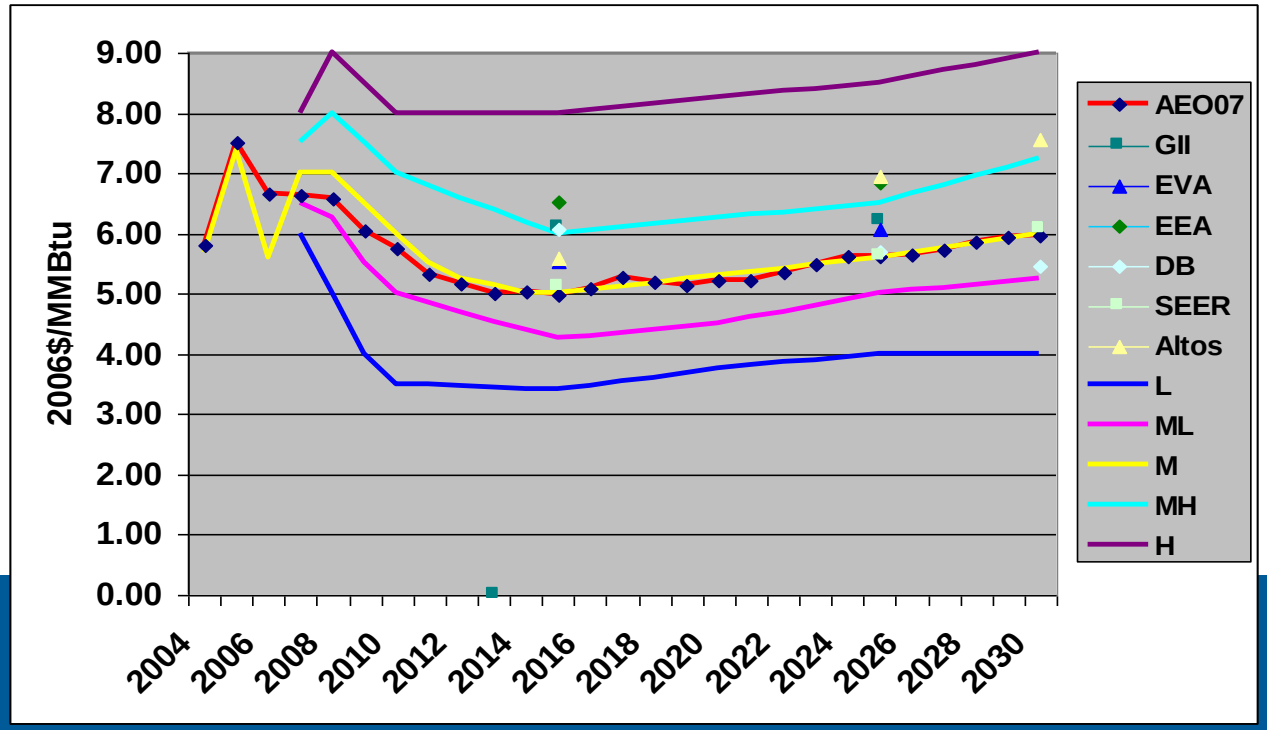
Up to 10-year futures available for gas

Forecasts have high degree of uncertainty; so sensitivity analysis is essential.

Hedging Strategies

•Long-term contracts for coal

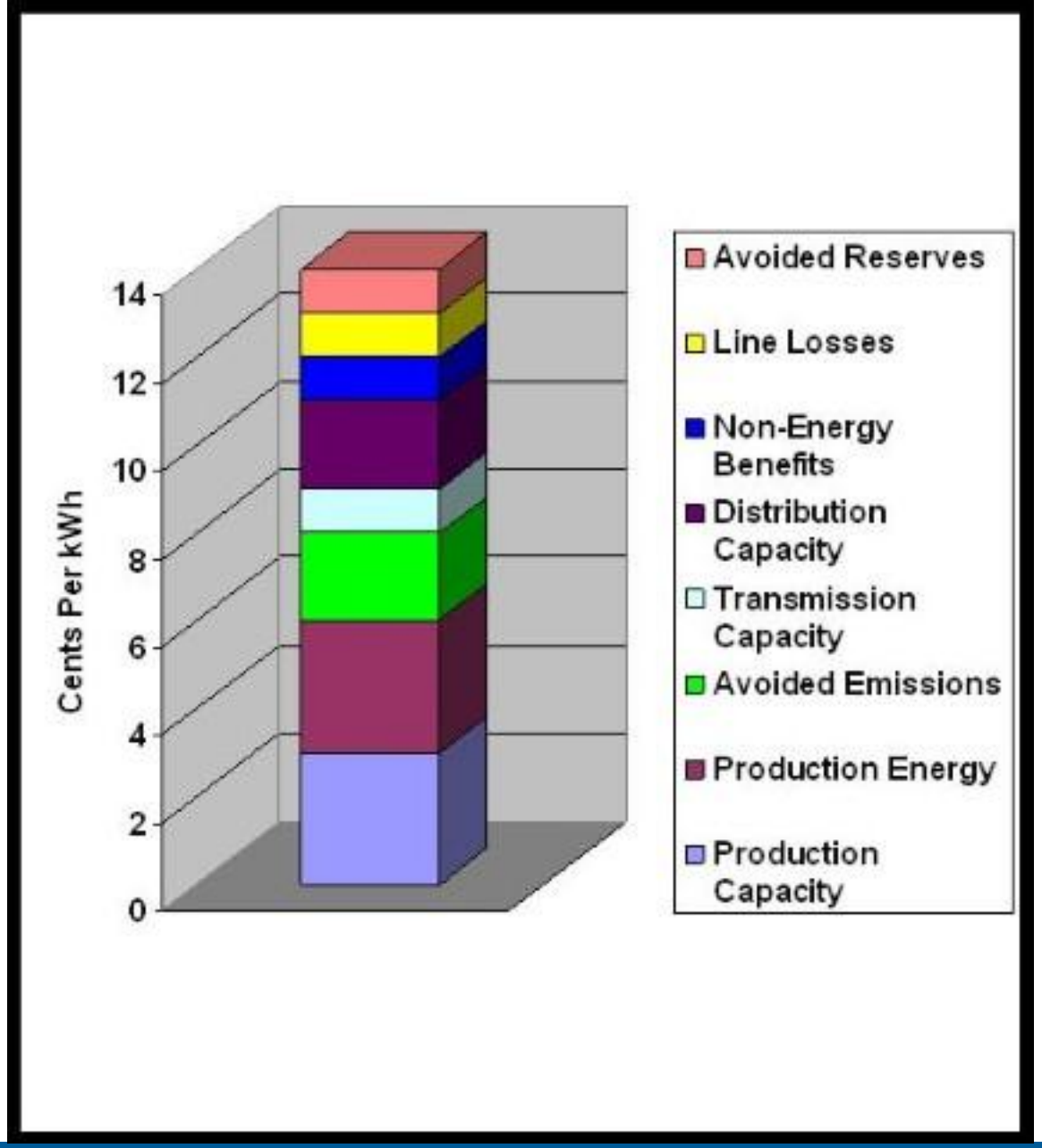
–Some utilities buying wells in the ground



Planning Reveals Other Values

- Improved operations, reduced losses
- Wires and avoided capital
  - Especially associated with load growth
- Non-energy benefits
  - Water, other fuels, productivity
- Emissions
  - Reflecting potential changes in regulation

- Being thorough about avoided cost



Public Process Reduces Public Surprises

- Address important **dilemmas**
  - Near term rates vs. Long run costs
  - Risk assessment and evaluation
  - Cost vs. Environmental Quality
  - Cost vs. Local Resources, possible jobs
- Utilities not in the best position to make unilateral judgments about **social** matters
- Public officials and others benefit from sampling public views

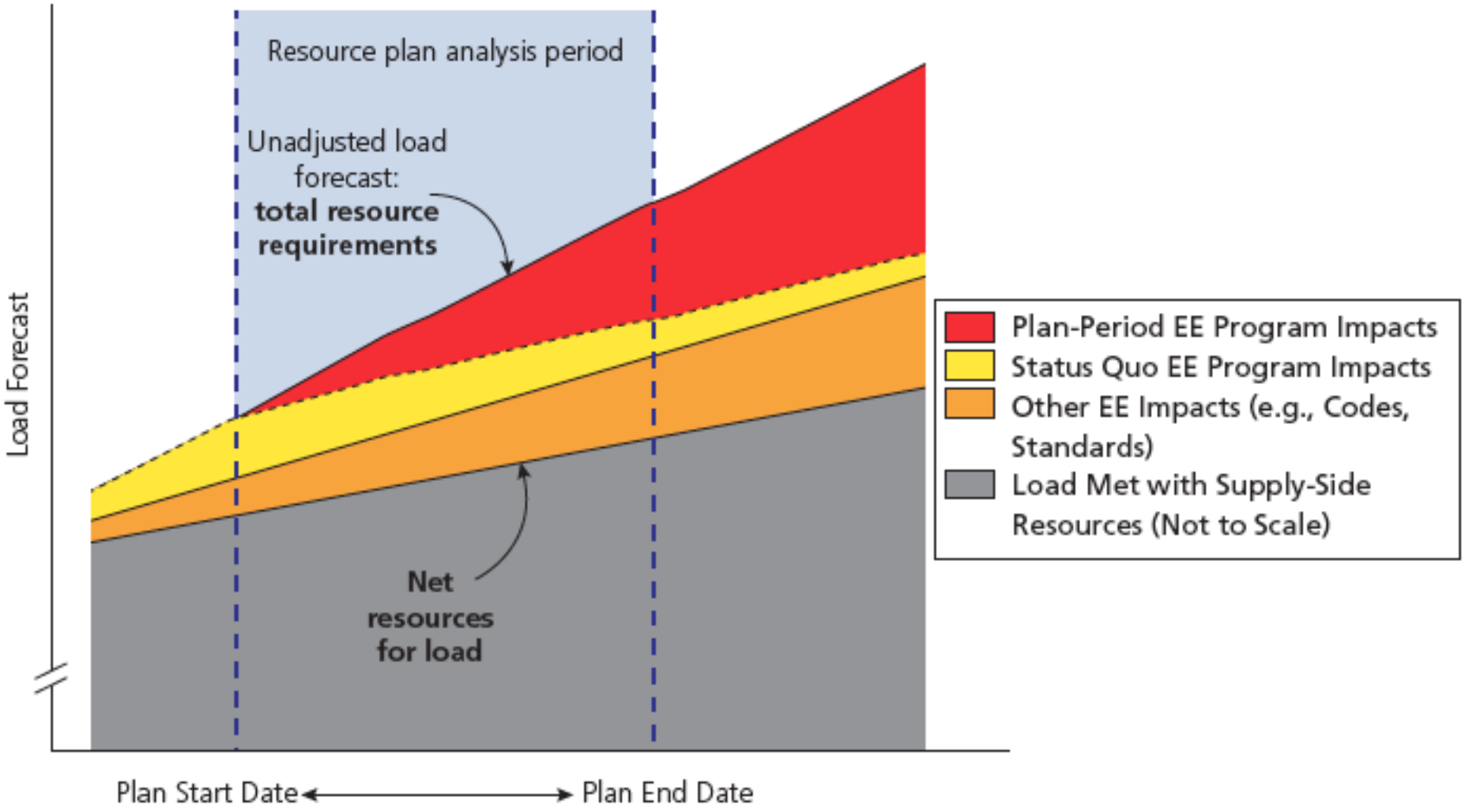
Distinguishing Scenario and Sensitivity

- Scenario: double energy efficiency
- Sensitivity: effects of double energy efficiency if real gas price forecast is twice as steep or flat
  - Monte Carlo: modeling combinations of variables
    - Northwest Power and Conservation Council considers over 700 different sensitivities and uses statistics to evaluate most important variables to raise or lower costs and risks

Total and Net Forecasts

- **Total** energy forecasts represent the amount of supply and demand resources needed to meet the need of the service area
- **Net** energy forecasts represent the supply needed after demand resources are accounted for

Illustrating Total and Net



Energy Efficiency and Conservation

- Helps to be clear about these terms
- Energy efficiency: programs designed to influence consumption
  - Use less energy for the same of greater purpose
- Conservation: personal choices to use less energy

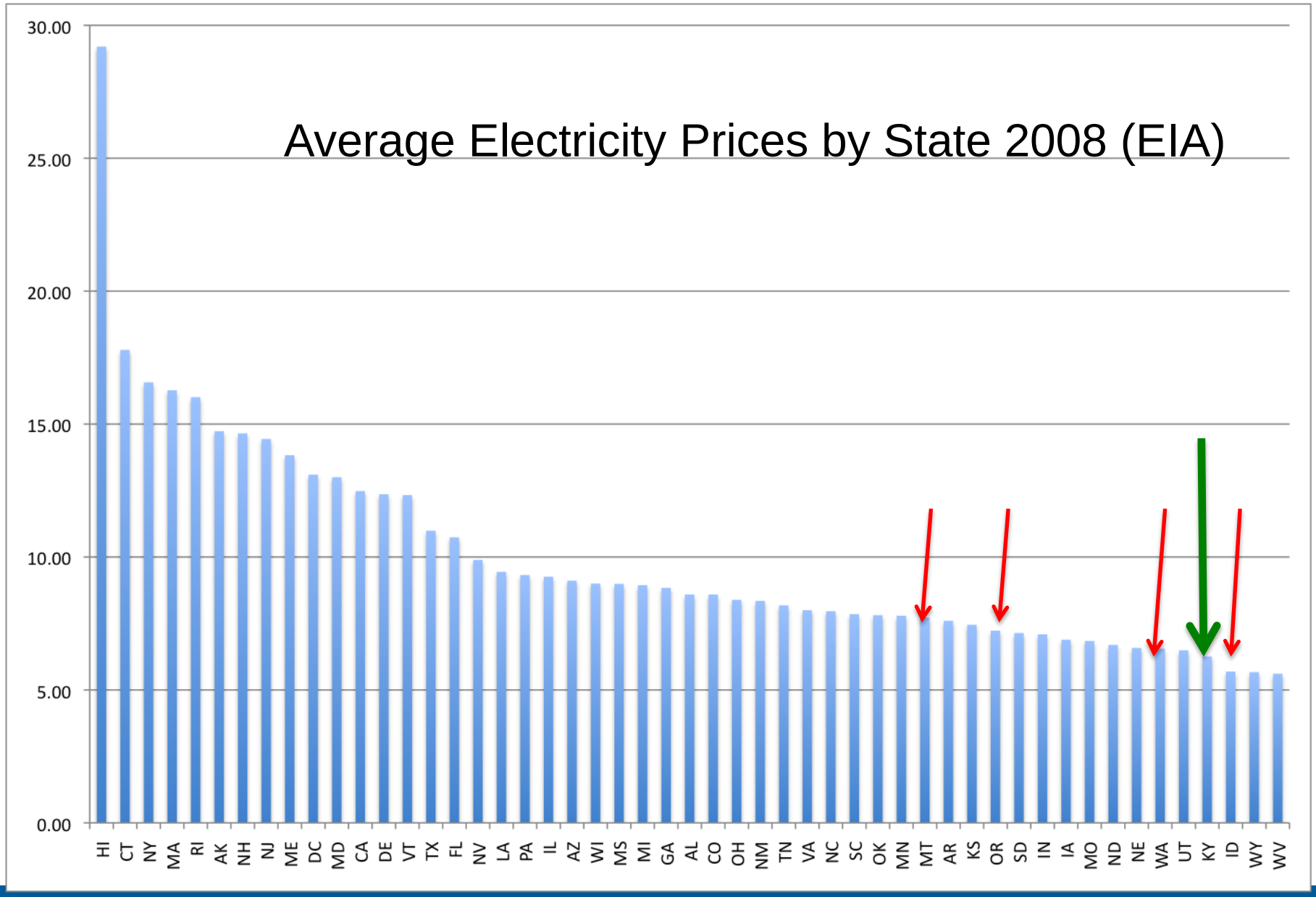
Programs Address Barriers to Energy Efficiency

- Awareness
- Information, Knowledge, Confidence
  - Customers, stores, contractors, suppliers, etc.
- Opportunity to make a decision
- Upfront cash (financing)
- Long run cash, competing uses (rebates and discounts)
- Split Responsibility (the renter's dilemma, applies also to new construction)

Northwest conserved 254 megawatts

- **Spokesman Review** October 12, 2011

- **The Pacific Northwest had a record year for energy conservation in 2010, saving enough megawatts to provide power for 153,900 homes. The 254 megawatts saved is the single largest one-year gain in energy efficiency in the past 30 years, surpassing the Northwest Power and Conservation Council's goal by 25 percent. The council tracks energy efficiency. Ratepayers saved approximately $135 million from energy efficiencies.** The savings are calculated based on surveys of the region's electric utilities, the Bonneville Power Administration and others. About half of the savings occurred at commercial businesses and industries. Improvements to residential lighting accounted for another 28 percent. Replacing water heaters, furnaces, washers and other appliances with energy- efficient models accounted for another 18 percent. More than 90 energy-efficiency measures are tracked, including installation of programmable thermostats, adding insulation and replacing machinery.


Average Electricity Prices by State 2008 (EIA)
30.00
25.00
20.00
15.00
10.00
5.00
0.00
HI CT NY MA RI AK NH NJ ME DC MD CA DE VT TX FL NV LA PA IL AZ WI MS MI GA AL CO OH NM TN VA NC SC OK MN MT AR KS OR SD IN IA MO ND NE WA UT KY ID WY WV

Northwest Includes Places with Low Rates, EE helping to keep it that way

- Irrespective of historical advantages and choices…
  - Future investments will be expensive compared with current investments (MC>AC)
- Planning assess future choices
  - Energy efficiency has favorable attributes in future investment decisions

Measurement and Verification Important

- Planners need to be able to rely on savings
- Sound M&V practices exist
- Utilities and Regulators need to be active managers to assure they are implemented

Cumulative Effects of Energy Efficiency

Planned for 6 states

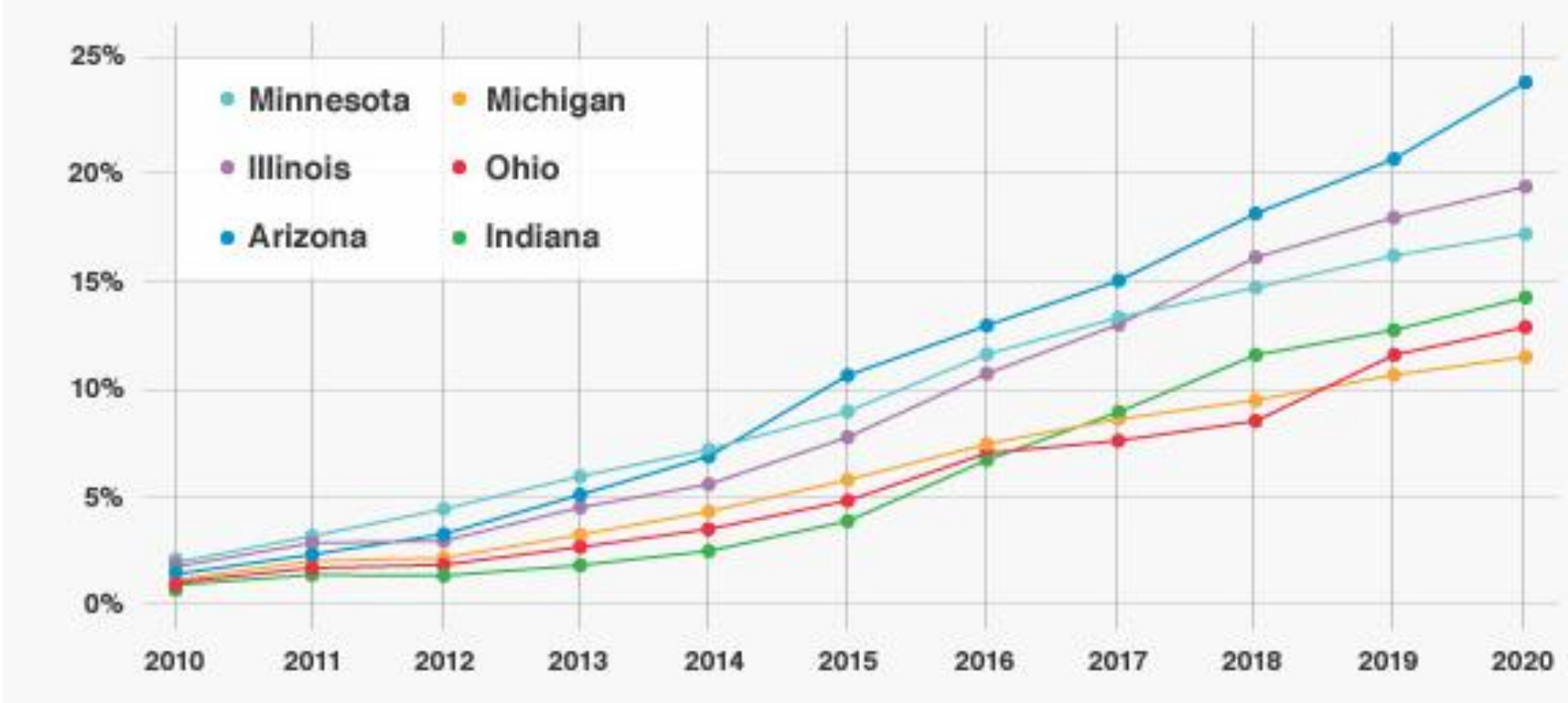
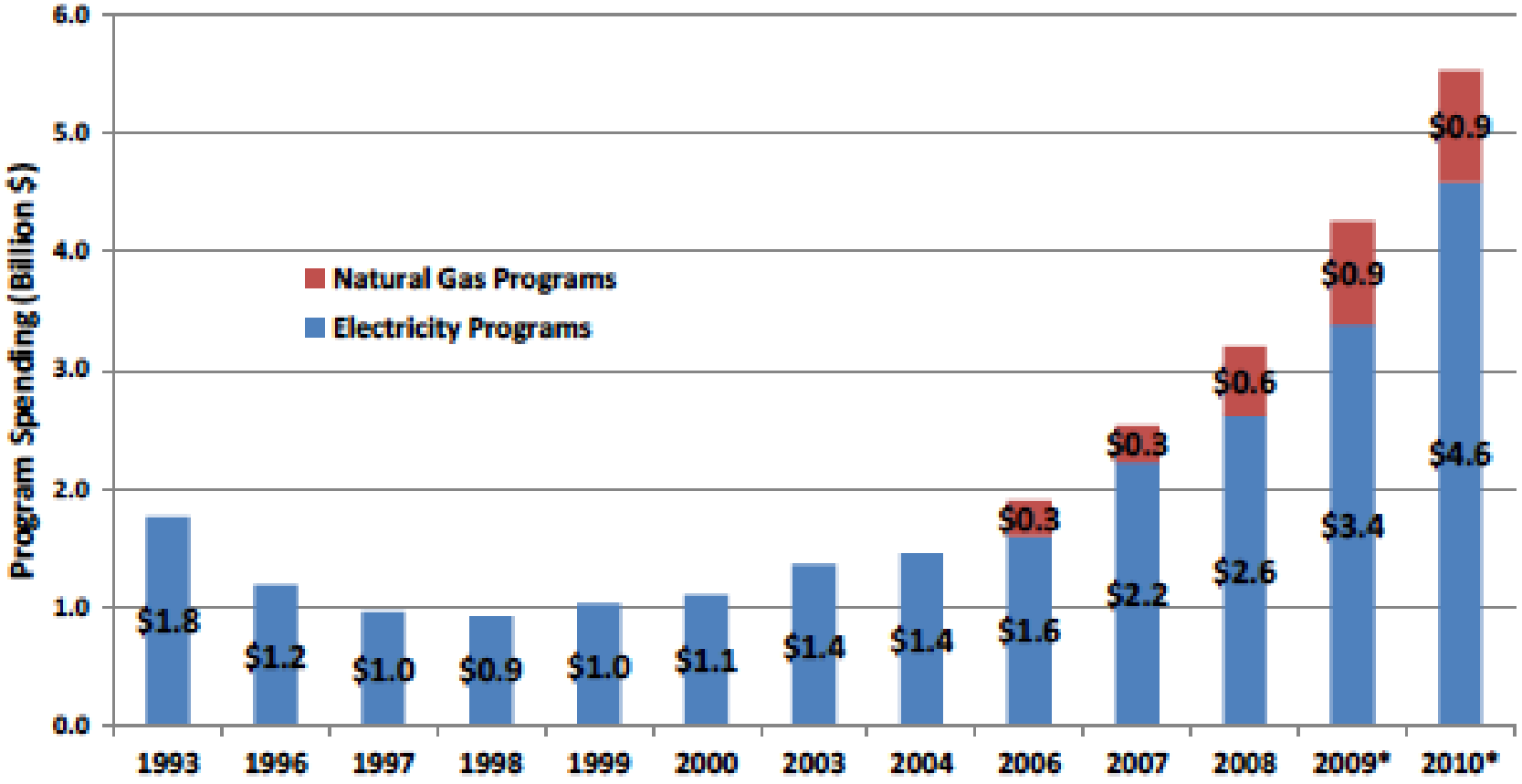


Figure ES-2. State-Level Energy Efficiency Program Spending or Budgets by Year, 1993–2010



*All values actual program spending (EIA Form 861) except for 2009 and 2010, which are budgets (CEE Annual Industry Reports).

Notes: Includes ratepayer-funded programs. Natural gas efficiency program spending is not available for 1993–2004.
Sources: Nadel et al. (2000); York and Kushler (2002), (2005); Eldridge et al. (2008 and 2009)

2011 ACEEE State Energy Efficiency Scorecard

Leadership and Mixed Messages: EE giving as good as it's getting

- Energy Efficiency is popular and cheap!
  - Resisting rollbacks (most increases going)
  - Southeast US is opening to EE
  - FERC policy shifts favor EE
  - Some braking forces remain
    - RIM test remains strong in a few states
  - Utility administrators report being expected by state regulators to do more to justify EE expenses than is necessary for other costs, and

Growing recognition of EE importance, but what does that mean for utility oversight?

- Address lost contributions to fixed cost?
- Address overall corporate incentives regarding sales?
- Address energy efficiency performance?
- Address overall corporate incentives regarding investment?
- Address overall corporate incentives about performance?

Table 8-1. Example Summary Table for Long-Term Energy Efficiency Impacts

Energy Efficiency Strategy Summary Cumulative Impacts of EE Strategies Implemented Starting in 2006	2010		2015		2020	
	GWh	MW*	GWh	MW*	GWh	MW*
EE Strategy Impacts						
Cumulative EE Strategy Impacts[1]	4,579	254	11,953	664	22,914	1,273
Forecast Total Resource Requirements (TRR)[2]	106,136	5,307	114,339	5,717	123,176	6,159
EE Strategies as Percent of TRR	4%	5%	10%	12%	19%	21%
EE Strategies as Percent of TRR Growth (since 2006)	75%	83%	83%	93%	99%	110%
Impact of EE Strategies on Forecast Load Growth						
Average Annual growth in TRR (Since 2006)	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%
Net Resources for Load (NRL)[3]	101,558	5,052	102,386	5,053	100,262	4,886
Average Annual Growth in NRL	0.6%	0.5%	0.3%	0.2%	0.1%	-0.1%
Percentage Reduction in Growth Rate	62%	69%	77%	86%	95%	107%

Notes: MW is the summer-peak capacity. (1) EE strategy savings include EE programs, EE standards, and building codes; are cumulative since 2006; and include losses. (2) Total resource requirements include system losses, but do not include demand reductions from energy efficiency strategies or reserve margins. (3) Net resources for load includes demand reductions from all EE strategies. Reserve margins are not included.

About RAP

The Regulatory Assistance Project (RAP) is a global, non-profit team of experts that focuses on the long-term economic and environmental sustainability of the power and natural gas sectors. RAP has deep expertise in regulatory and market policies that:

- Promote economic efficiency
- Protect the environment
- Ensure system reliability
- Allocate system benefits fairly among all consumers

Learn more about RAP at www.raponline.org

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Evaluating and Accepting an IRP

- Evaluating a resource planning process should weigh each of these factors.
- The "**Minimum Acceptable**" performance level should involve use of existing data for all relevant resources.
- A "**Beyond Target**" performance level would involve development of new data to significantly expand the reach of existing resource planning, proving up new resources and new resource evaluation techniques.