

How the AEO Forecast Underestimates the Energy Efficiency Resource: Technology, Economic and Policy Perspectives

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Topics

- Efficiency in the AEO Reference case
- Energy and efficiency measure prices
- AEO Technology cases
- Modeling the industrial sector
- Policy perspectives
- Recommendations

Efficiency in the AEO Reference Case

- AEO analyzes a range of efficient technologies, adoption based on implicit discount rates
- Reference case likely modestly underestimates efficiency achievements
 - Missing current technologies and under represent future technologies
 - Don't account for non-energy benefits
 - Assume no new policies
 - Overestimate costs & somewhat underestimate energy prices

Examples of Missing Technologies

- Very efficient refrigerators – new LG residential unit beats federal standard by 30% at ~\$0 cost
- New packaged commercial refrigerators and vending machines save 40% or more
- Super T8 lighting, 1-lamp fixtures (AEO predicts lighting energy use increases)
- Duct sealing
- Declining prices on CFLs
- Proper HVAC installation and maintenance
- Efficient power supplies and set-top boxes

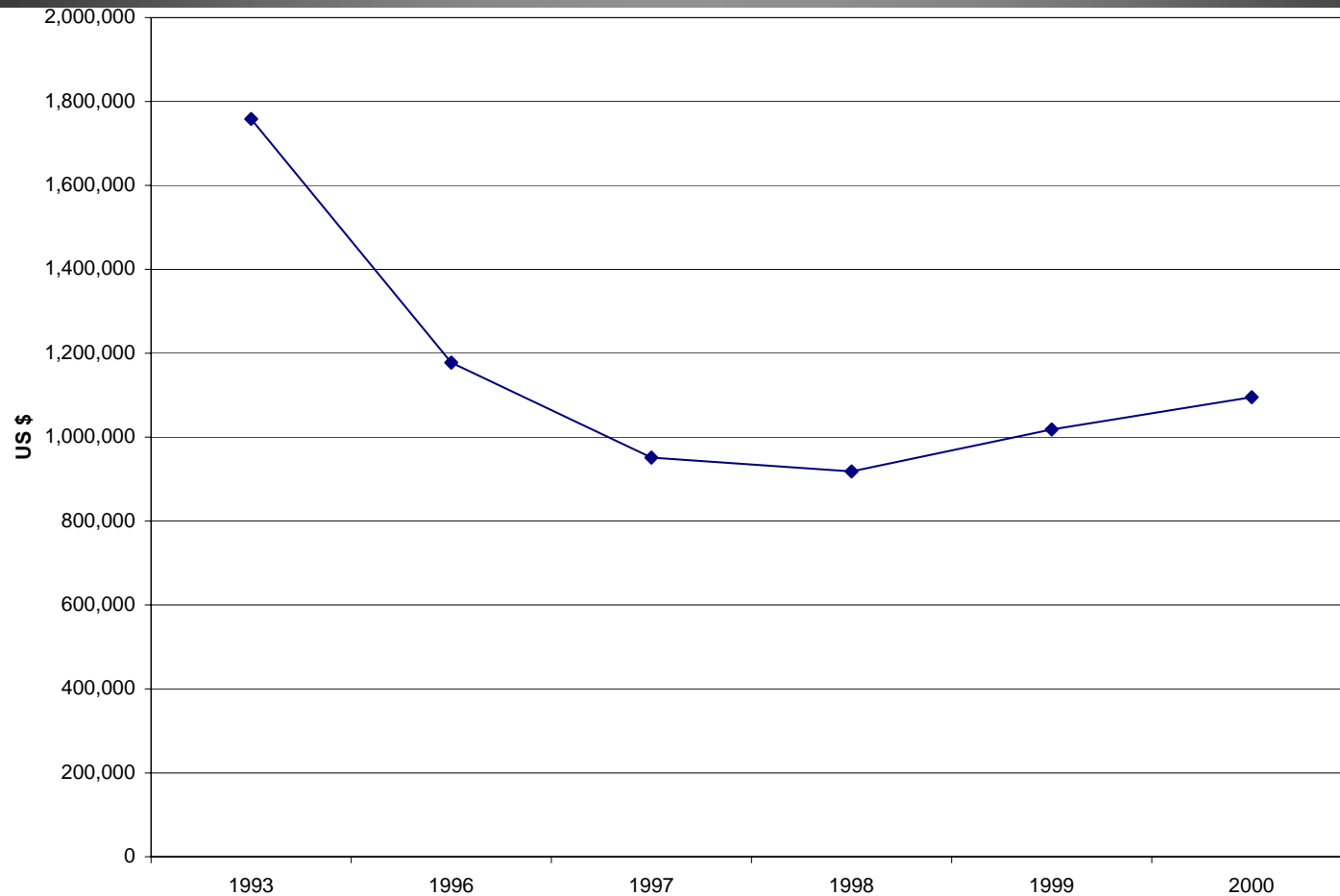
Non-Energy Benefits Can Affect Measure Adoption

- Clothes washers that clean better
- Weatherization measures that improve comfort, are easier to clean, or reduce fabric fading
- Lighting systems that improve worker satisfaction and productivity
- Industrial process improvements that improve quality and/or thru-put

New Policies Excluded from Reference Case

- Pending federal legislation
- New efficiency standards & building codes
- Increased funding for utility DSM programs
- Targeted EE/DR to address reliability and load pockets
- State, national and private efforts to reduce carbon emissions

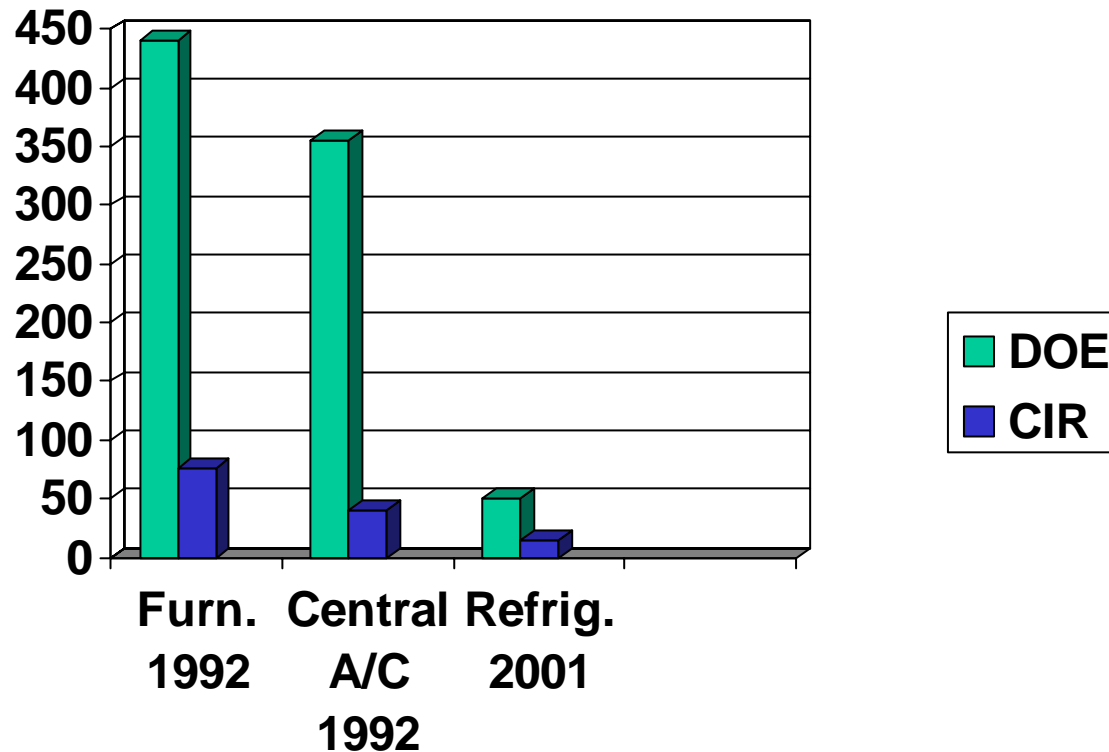
Utility Sector Energy Efficiency Spending



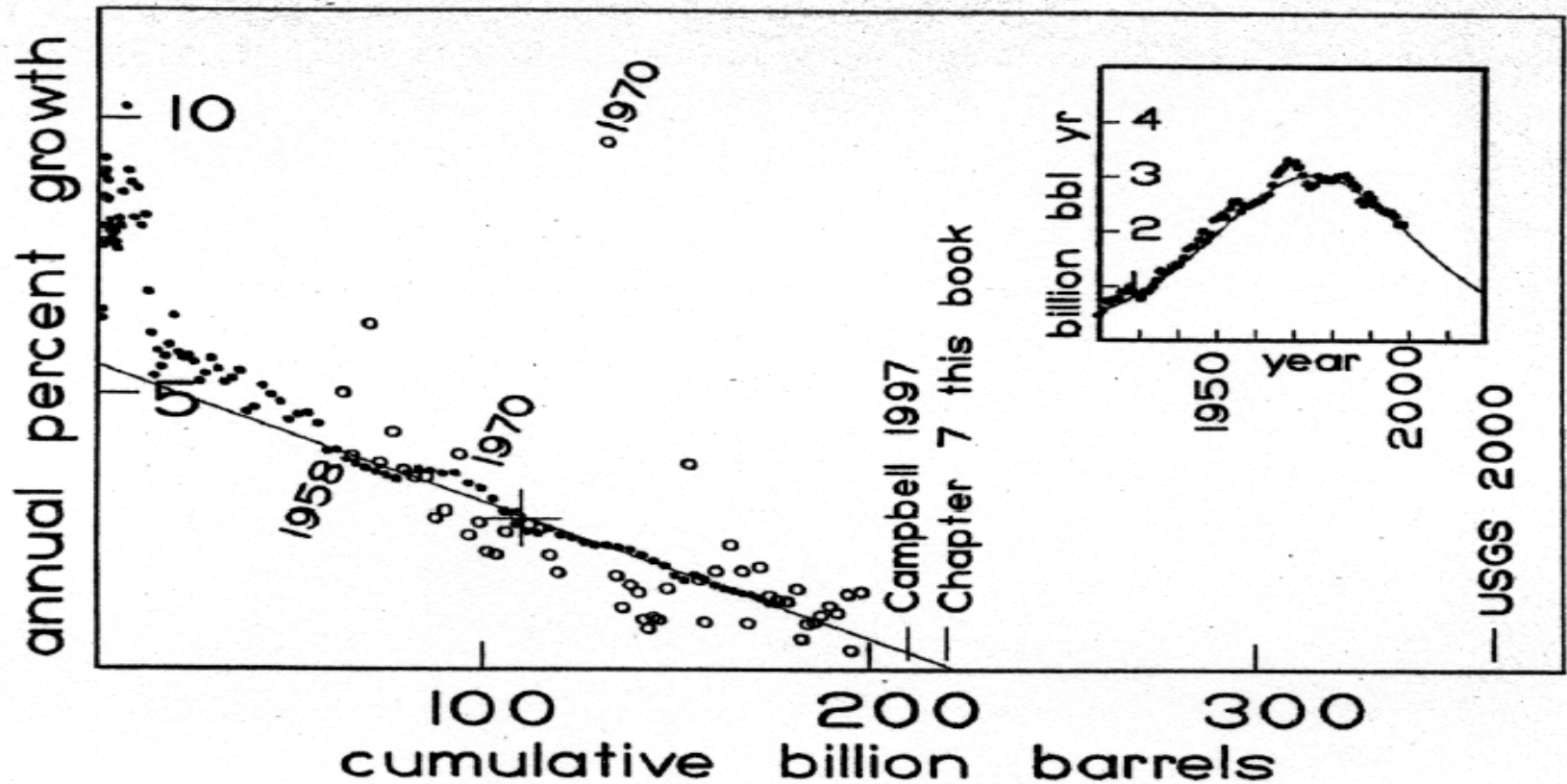
Source: York & Kushler, ACEEE, 2003



Cost of Efficiency Measures – DOE Projections vs. Census CIR



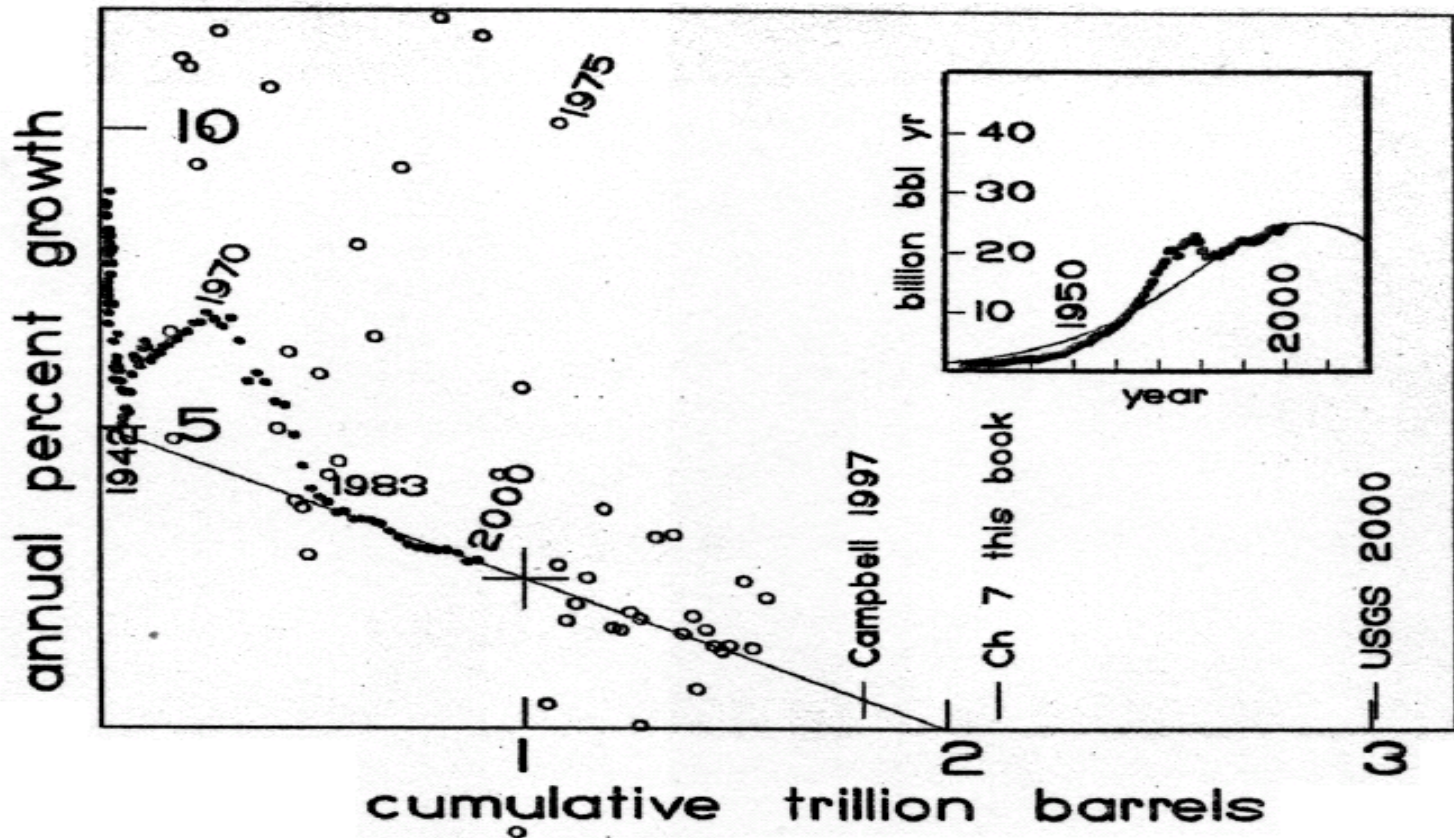
U.S. Oil Supplies



Source: Deffeyes, *Hubbert's Peak*

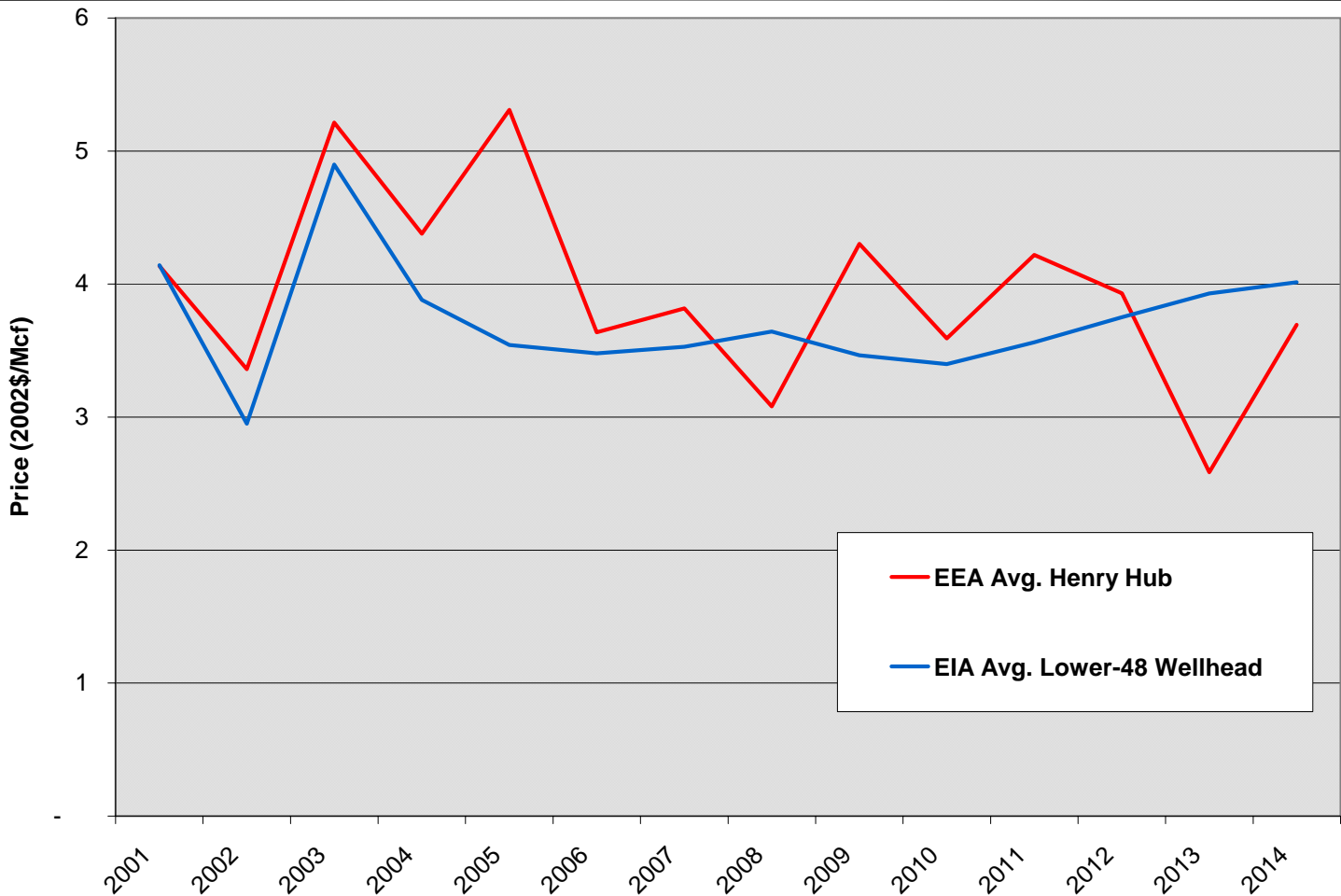


Worldwide Oil Supply and Impact on Prices



Source: Deffeyes, *Hubbert's Peak*

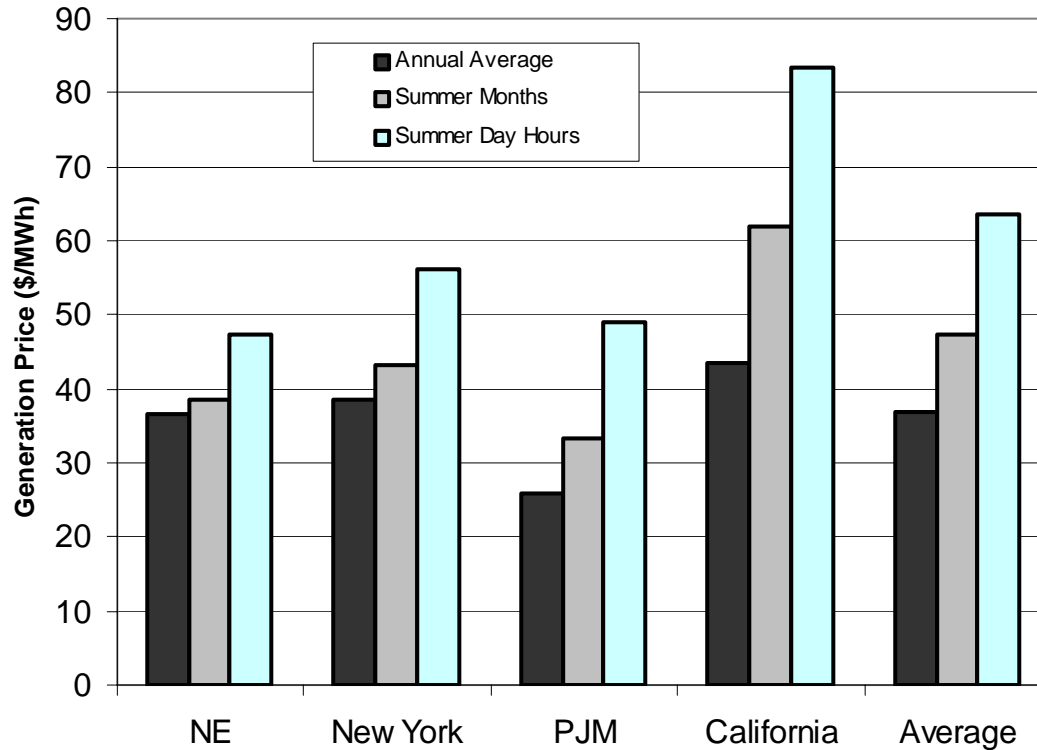
Natural Gas Prices



Wholesale Generation Price Differentials:

Existing Competitive Wholesale Markets -- Average of Hourly Prices

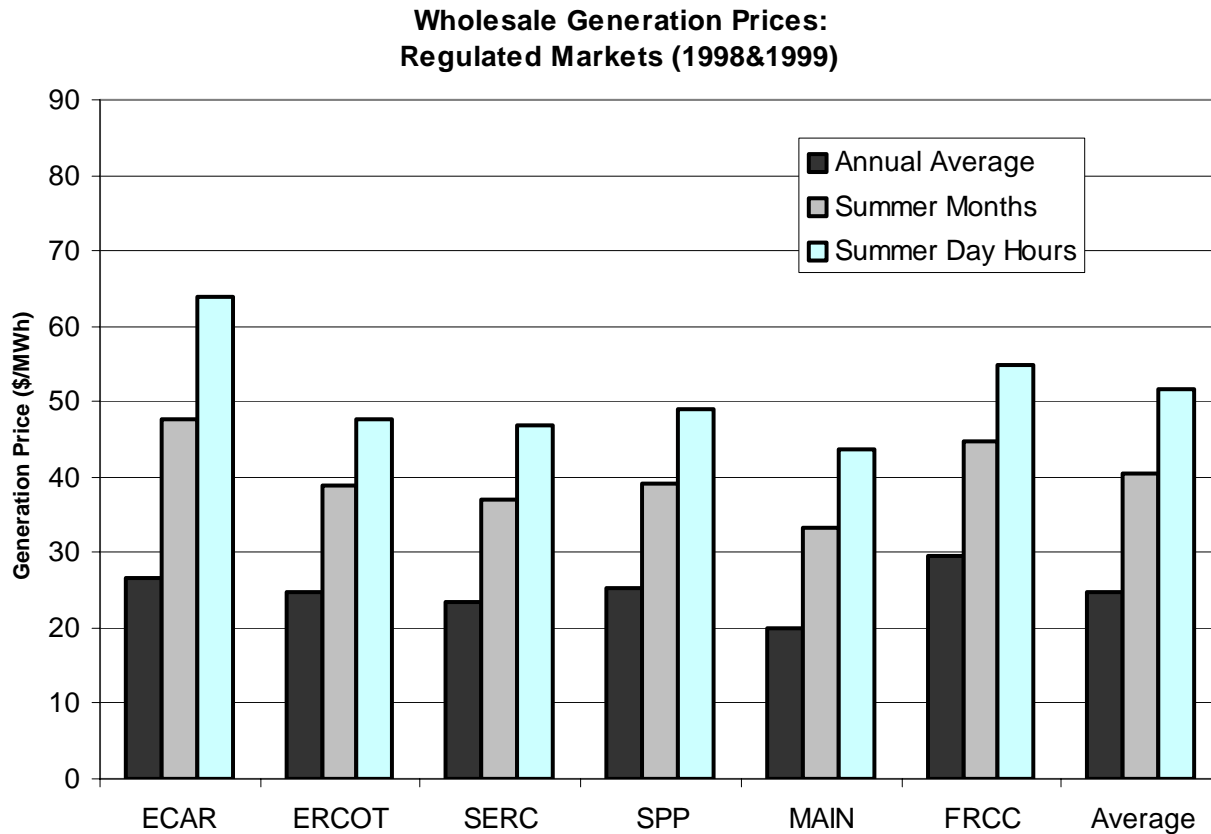
Wholesale Generation Prices:
Competitive Markets (start of competition through 10/2000)



Source: Synapse Resource Economics



Wholesale Generation Price Differentials: Currently Regulated Markets -- Average of Hourly Prices

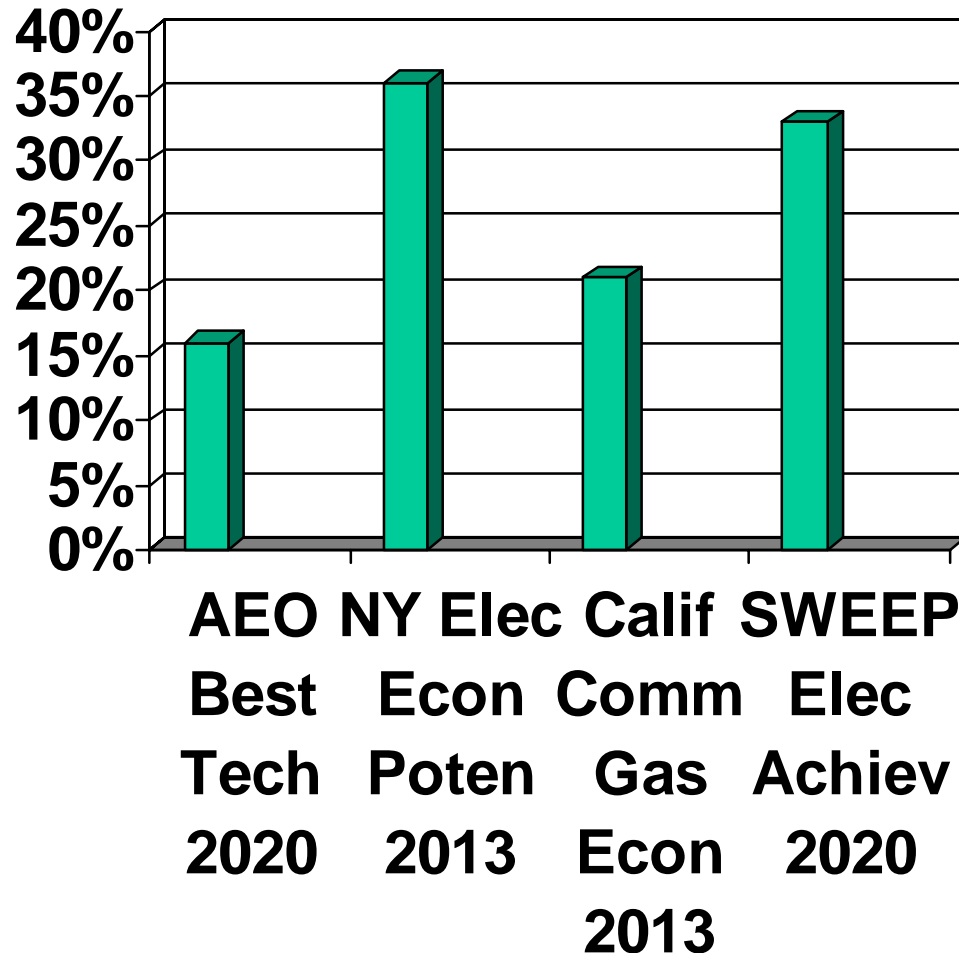


Source: Synapse Resource Economics



AEO Best Technology Case

Comparison to Res+Comm Savings Potential Studies



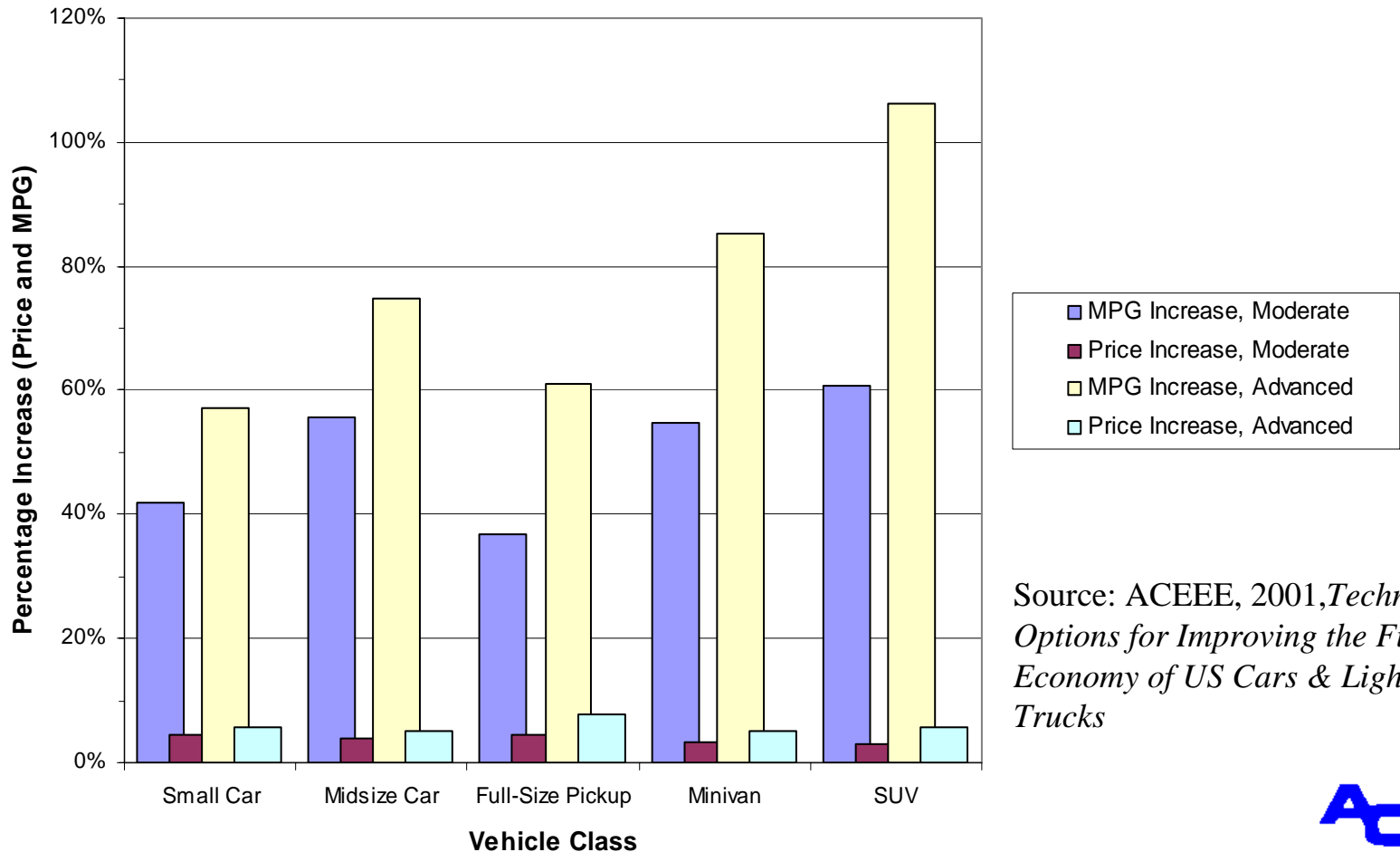
Modeling the Industrial Sector

- Major progress made in recent years (e.g., CHP and motors)
- Hybrid top-down/bottom-up approach misses changing trends in non-energy intensive industries
- Limited technology representation
- Undervalue non-energy benefits of efficiency technologies

Modeling Transportation

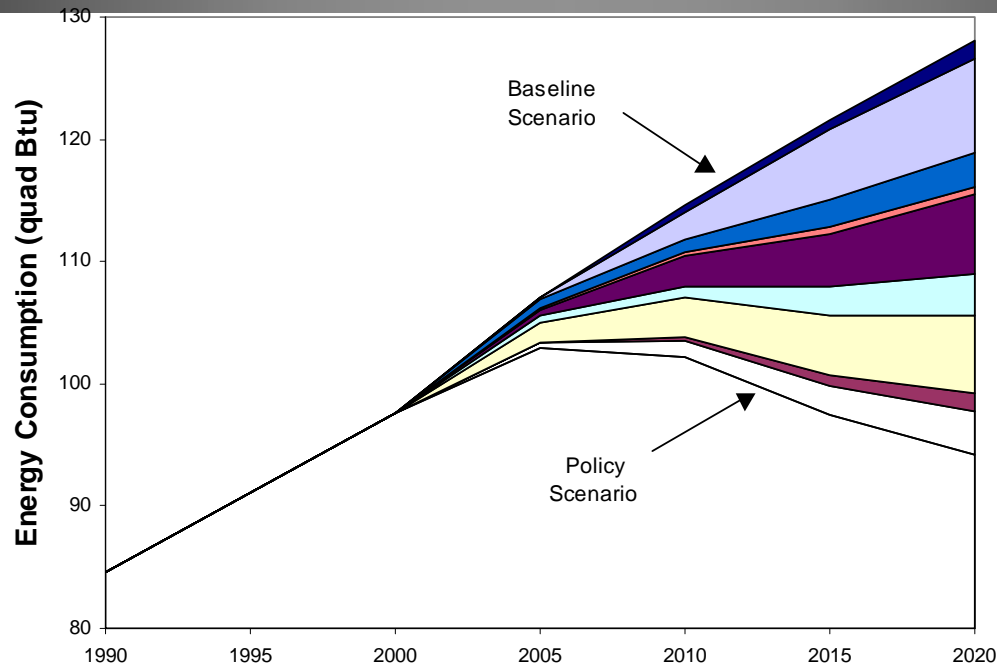
- No significant advanced technology case included
 - High Tech case only a small variant (6% higher MPG in 2025) than Reference Case
 - Other studies have found opportunities for 33-66% improvements by 2015
- Unclear why diesel sales assumed almost equal to hybrids given ZEV mandate

Fuel Economy & Price Increase for Light Vehicle Technology Packages



Source: ACEEE, 2001, *Technical Options for Improving the Fuel Economy of US Cars & Light Trucks*

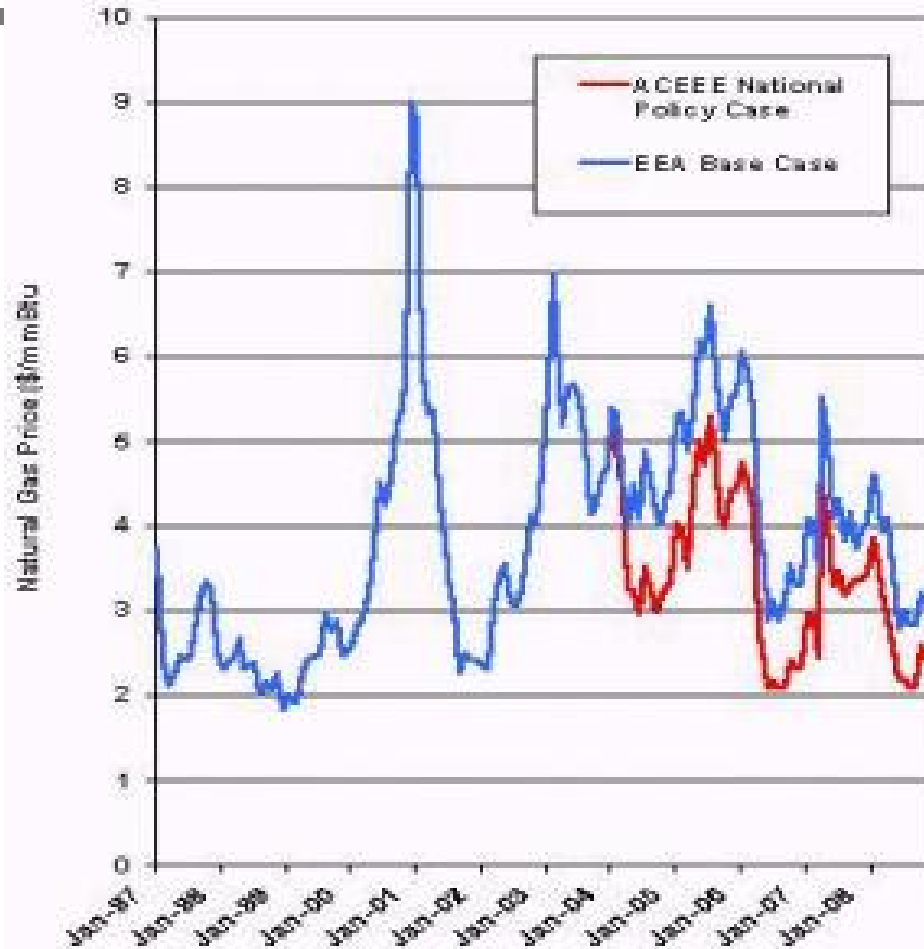
Policies to Increase Efficiency: ACEEE Smart Energy Policies



- Reduction from power plant retirement policy
- Reduction from passenger vehicle effic. policy
- Reduction from CHP
- Reduction from tax credits
- Reduction from public benefits fund
- Reduction from R&D and deployment programs
- Reduction from industrial voluntary program
- Reduction from building codes
- Reduction from appliance standards

Energy Efficiency and Natural Gas Prices

Impact of 5% gas & electric savings implemented over 5 years



Role of Policy in the AEO

- Currently AEO Reference Case ignores policies that are not adopted
- Side-cases often relate to policy issues, but tend to “nibble around the edges”
 - Technology Cases, not Policy Cases
 - AEO 2004 shows negligible role for fuel cells by 2025 but not explicitly stated
- Don’t know if policies will be implemented
- But unlikely to have no new policies – absence of substantial market effects show that policies are needed
- Need more analysis of realistic policies – to aid policy makers

Recommendations for the AEO

- Seek more complete treatment of technologies
- Allow for new technologies and price reductions for existing technologies – dynamic modeling
- Factor in non-energy benefits
- Review price forecasts
 - Oil prices may be too narrow a range (\$35/bbl max.)
- More policy cases