# Regulatory Barriers and Opportunities

## Eliminating Disincentives, Creating the Right Incentives

Jim Lazar
Cheryl Harrington
April 13, 2006

*The Regulatory Assistance Project*

*50 State Street, Suite 3*
*Montpelier, Vermont USA 05602*
*Tel: 802.223.8199*
*Fax: 802.223.8172*

*177 Water St.*
*Gardiner, Maine USA 04345*
*Tel: 207.582.1135*
*Fax: 207.582.1176*

Website:
*http://www.raponline.org*

# The Regulatory Assistance Project

RAP is a non-profit organization, formed in 1992, that provides workshops and education assistance to state government officials on electric utility regulation. RAP is funded by the Energy Foundation and the US DOE.

RAP Mission: ***RAP is committed to fostering regulatory policies for the electric industry that encourage economic efficiency, protect environmental quality, assure system reliability, and allocate system benefits fairly to all customers.***

# Who We Are

- **Cheryl Harrington** is an attorney and cofounder of RAP. She was Commissioner of the Maine Public Utility Commission 1982-1991, Vice Chair of NARUC's Energy Conservation Committee. She has taught utility resource planning in just about every state except Nebraska.
- **Jim Lazar** is a regulatory economist based in Olympia, Washington consulting in electric and natural gas utility ratemaking and resource planning since 1982. His clients have included municipal and cooperative electric utilities, natural gas utilities, regulatory commissions, state consumer advocates, and public interest organizations in the United States, Canada, Ireland, New Zealand, and Australia.

# The Business Case

- Energy Efficiency is a Energy Resource not a Social Program.
- Strategic Deployment of Energy Efficiency will reduce the current and future costs of Electricity and Natural Gas in Indiana.
- Efficiency can be the power-grid's most fine-tuned power plant.

# Energy Efficiency is Not a Social Program – It is a Resource

• Generation Benefits:

– Both capacity and energy savings

– Lowers fuel supply and fuel costs

– Benefits in real-time and through deferred investment

– Reduces required reserves

• Transmission and distribution benefits:

– Deferral of new investment

– Line loss reductions

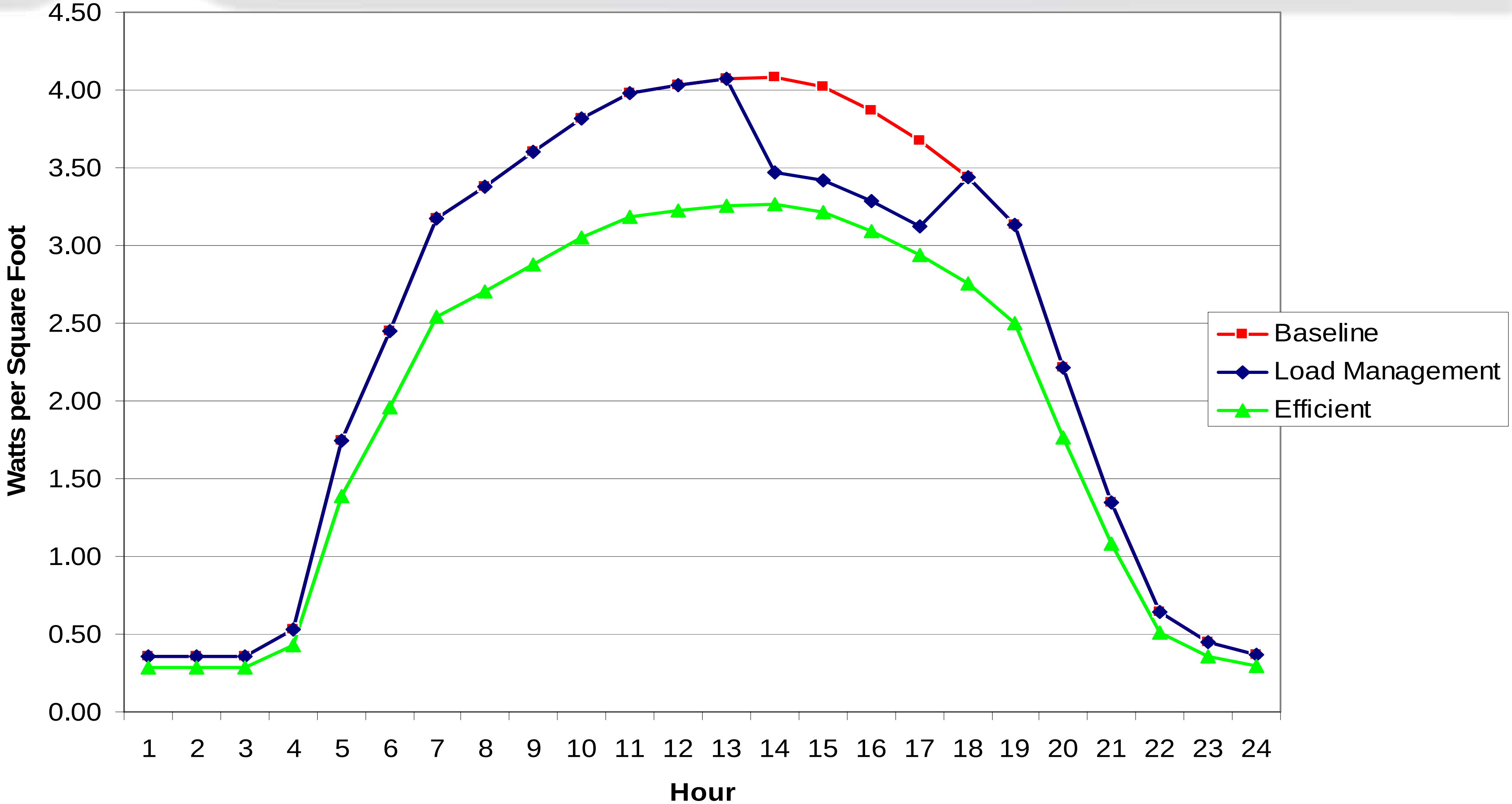
– Improved reliability

• Many states are investing in efficiency, *but* miss out on full potential of ***Fully*** Integrated Resource Planning

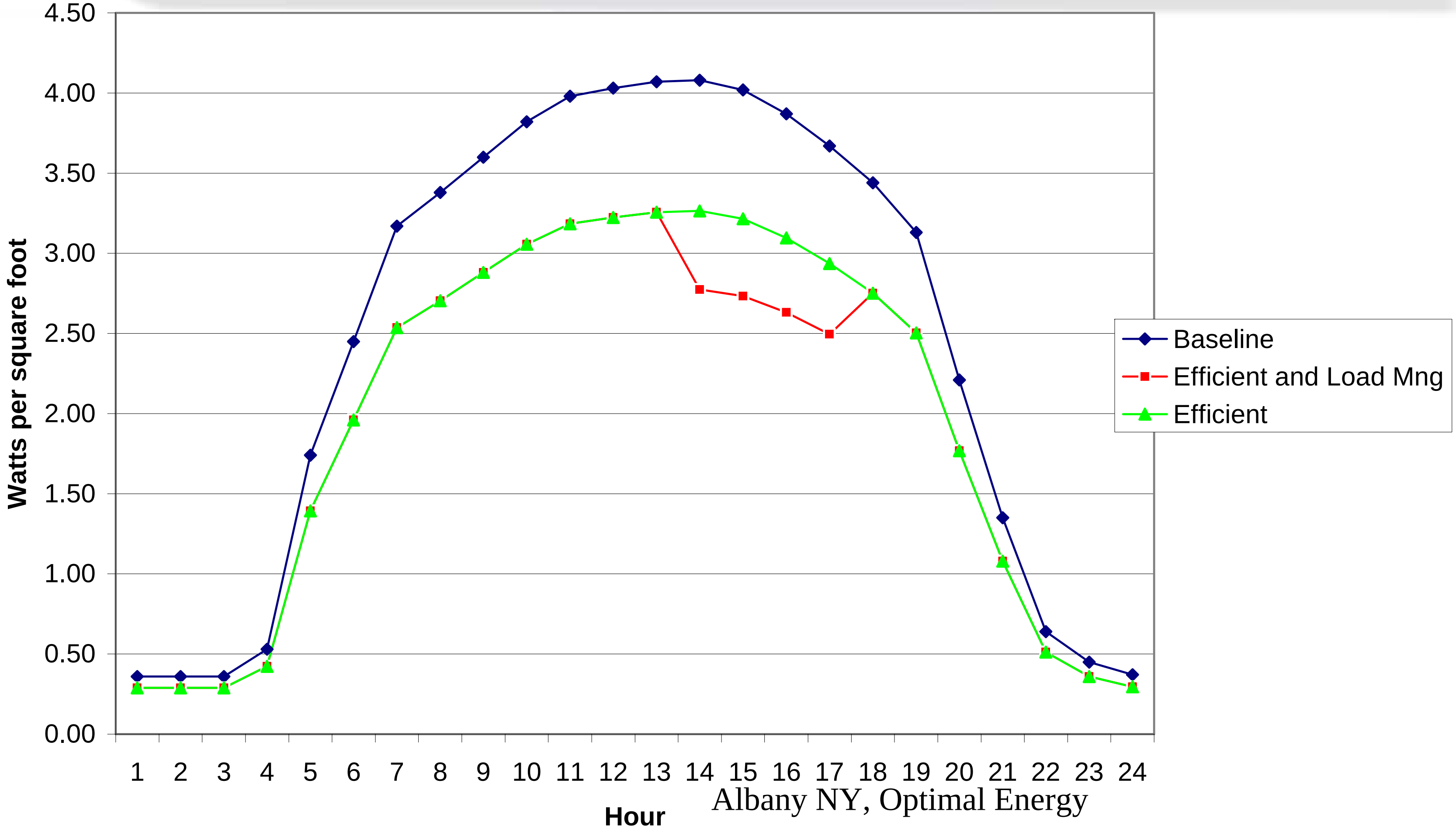
# Why Energy Efficiency

- Cost-effective (cheap) compared with other resources.
- An abundant resource native to Indiana.
- Is highly precise in meeting system needs.
- Inherent barriers exist for electric and gas consumers to do efficiency on their own
- It creates jobs and save money.

# Combined Commercial Cooling and Lighting Loadshape
# Baseline, Load Management (STDR), and Energy Efficiency



# Combined Commercial Cooling and Lighting Loadshape with Efficiency and Load Management (Four-Hour Curtailment by 15%)




Albany NY, Optimal Energy

# What Costs are Displaced?

- Peak energy at 12 cents a kWh
- Off peak energy at 5 cents a kWh
- New capacity (peak or maybe even baseload) at 7 cents kWh
- Probably some transmission at 2 cents kWh
- Maybe a distribution upgrade at 1 cent kWh
- Somewhere between 8-22 cents kWh

# Cost of Energy Efficiency

- Mature energy efficiency programs are being delivered at a cost to consumers of 3 cents per kWh
- Supply sources (don’t forget transmission, distribution & lines losses) cost more
- Risk of increased future costs for environmental compliance from fossil fuel supply has to be counted in as well.

# Energy Efficiency is the *Most* Adaptable Resource

- Can be targeted and shaped to particular system need.
- Works through all economic cycles.
- Works in an energy deficit or surplus.
- Makes your customers happy.

# Delivering Energy Efficiency through Utility Rates

- Consumers pay because there are system benefits to all from energy efficiency
- Utilities or other administrator delivers
- Network of contractors to the program
- Supply chain of services and products (trade allies)
- Leadership reinforces success
- Regulators oversee progress and direction

# Energy Efficiency Program Spending and Savings

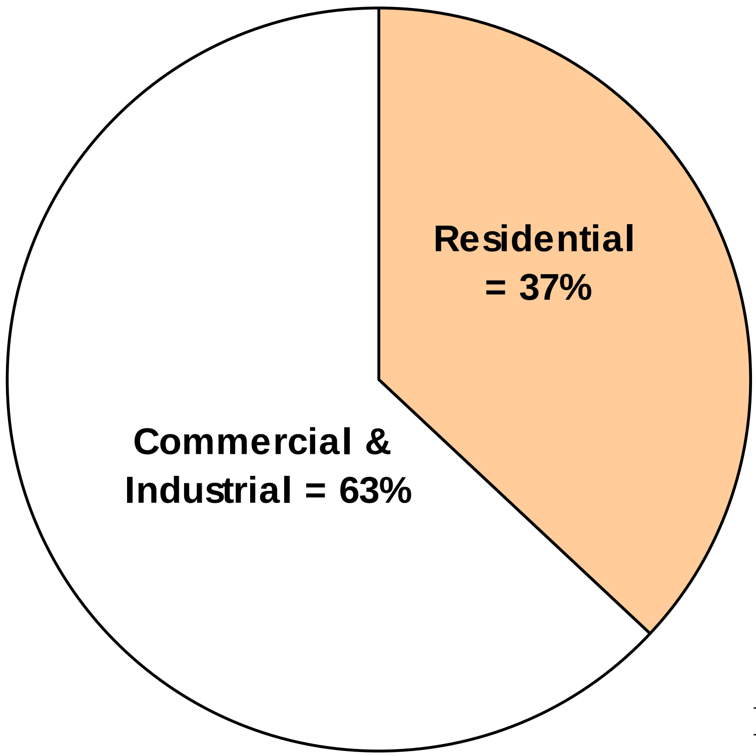
- For highest spending states:
  - Spending ranges are 3% of utility revenues (CA higher)
  - Savings are approaching 1% of sales and 1% of peak
  - MN, WI, IA, CA, MA, VT, OR, NY, NJ are all good states to take a look at for programs, policies and results.

# Integration of EE into Resource Planning and Investment

- Using the energy efficiency resources planners to ask the right questions:
  - How much energy efficiency (reduced load growth) would alleviate the need for this new transmission line?
  - How much energy efficiency would it take to moderate load growth while allowing my state's economy to grow and have all the electricity and gas it needs at affordable prices?

# What are the Major "Reservoirs" of Achievable EE Potential in 2013? #1: By Sector

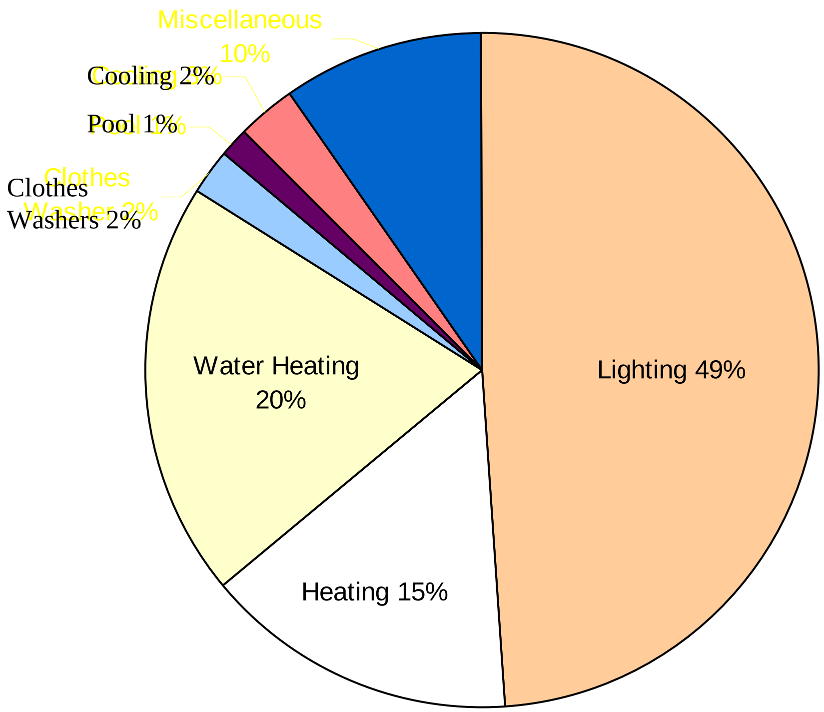
**Residential Savings = 12,745 GWH** **C&I Savings = 21,630 GWH**



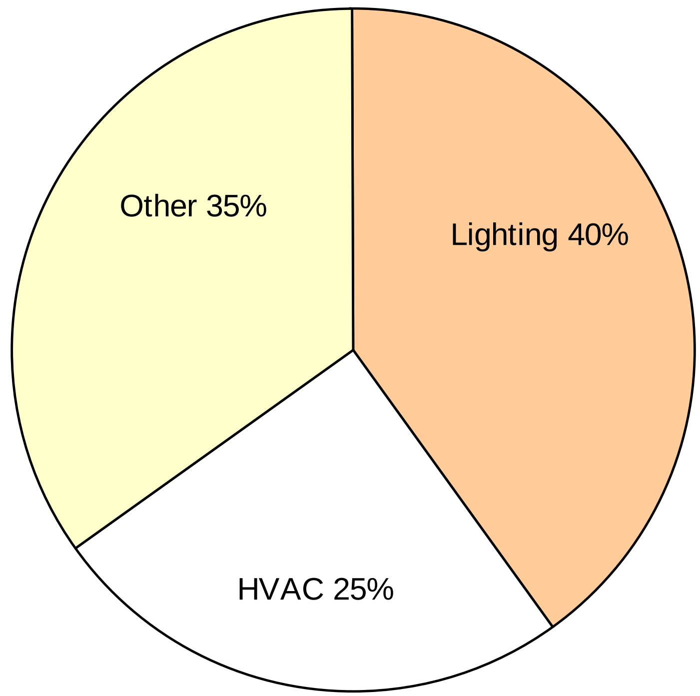

NEEP assessment of
New England, 2004

# What are the Major "Reservoirs" of Achievable EE Potential in 2013?
# #2: By End Use

**Residential Savings**




**C&I Savings**




NEEP assessment of New England, 2004

# IUB – 2004 DSM Results - IOUs

- Cumulative effects of 14 years of DSM
- 1,400 GWh – about 3.5% of MWh sold
- 970 peak MW – about 12% of peak MW
- 6,000,000 MCF – about 2.5% of total "throughput" or 4% of retail sales
- B/C ratios about 2.0 and NEW net benefits about $100 million per year, 1999-2004

# Minnesota Legislative Audit Report

***Based on the benefit-cost information reported by Minnesota's investor-owned utilities, the Conservation Improvement Program (CIP) has been cost effective. In 2003, CIP's societal benefits were two or three times greater than its societal costs. While we did find problems with the accuracy of these estimates, the problems do not undermine the overall conclusion that CIP has been cost effective. In fact, the utility estimates tended to understate the cost effectiveness of the program, especially for natural gas projects.***

**http://www.auditor.leg.state.mn.us/ped/2005/pe0504.htm**

# Minnesota Legislative Audit (2)

***CIP does not appear to be becoming less effective over time. The cost effectiveness of CIP has remained relatively constant over the last several years. In addition, utilities that have tried to estimate the potential for cost-effective conservation in Minnesota have found that the state should not run out of conservation opportunities in the near future.***

***Chapter Two Cost Effectiveness***
**http://www.auditor.leg.state.mn.us/ped/2005/pe0504.htm**

# Barriers to Customer Implementation of Energy Efficiency

- Information and Knowledge
  - Customers, stores, contractors, suppliers, etc.
- Time to make different decisions
- Upfront cash
- Long run cash, Financing
- Split Responsibility (the renter's dilemma)

# Connection to Codes and Standards

- If standard practice for energy consumption is more efficient, consumer funded energy efficiency programs can focus on more valuable objectives.
  - This is the way building energy codes and appliance and equipment efficiency standards work with consumer funded energy efficiency programs

# Resources

- Energy Efficiency Tool Box
  - www.raponline.org/Pubs/General/EfficiencyPolicyToolkit106.pdf
- www.Neep.org
- www.aceee.org
- www.mwnaturalgas.org

# Building a Utility Portfolio Considering Reliability, Cost, Risk and Local Economic Content

Jim Lazar
Consulting Economist
April 13, 2006

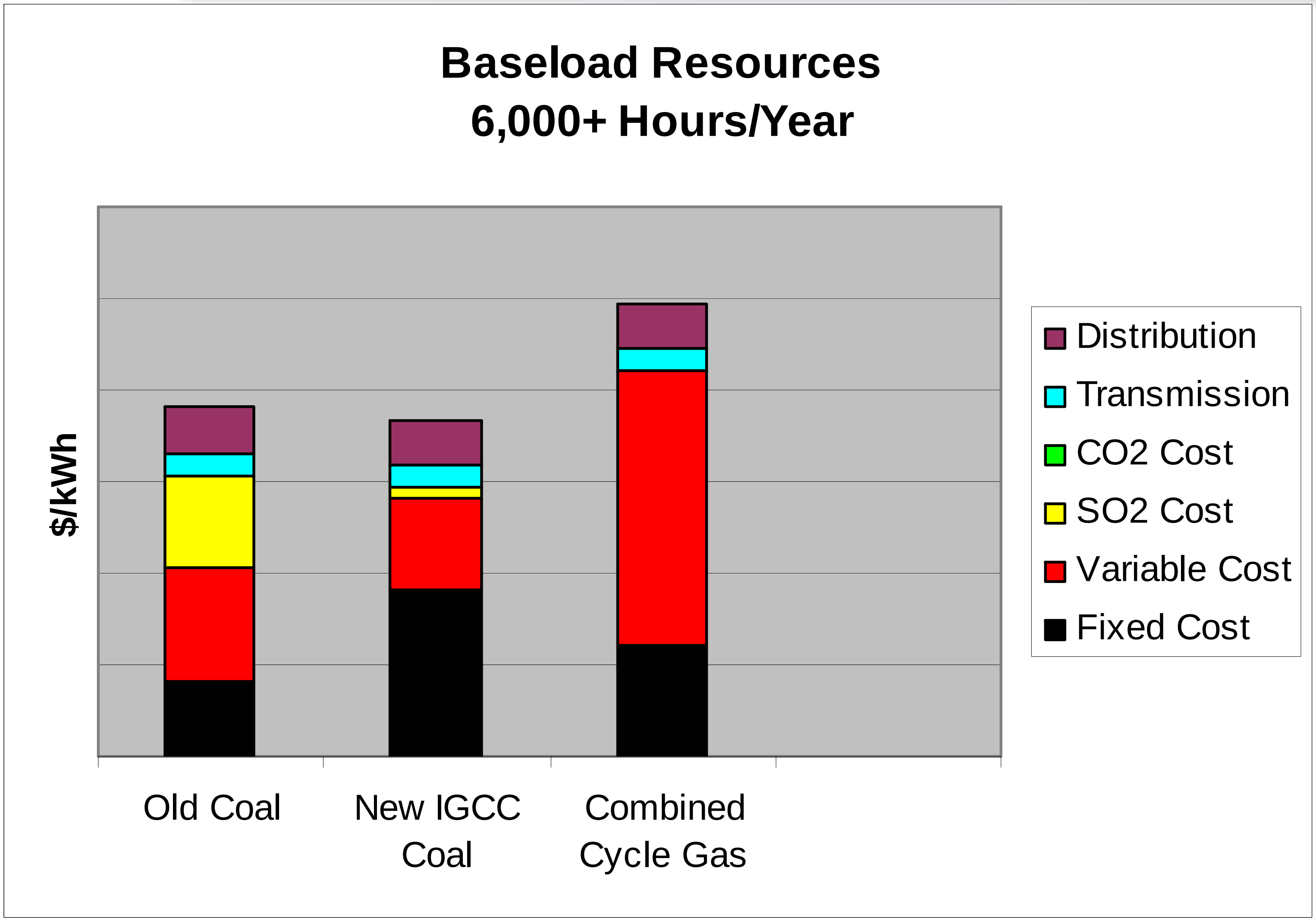
*The Regulatory Assistance Project*

*50 State Street, Suite 3*
*Montpelier, Vermont USA 05602*
*Tel: 802.223.8199*
*Fax: 802.223.8172*

*177 Water St.*
*Gardiner, Maine USA 04345*
*Tel: 207.582.1135*
*Fax: 207.582.1176*

Website:
*http://www.raponline.org*

# Coal Is Most Economical As a Baseload Resource



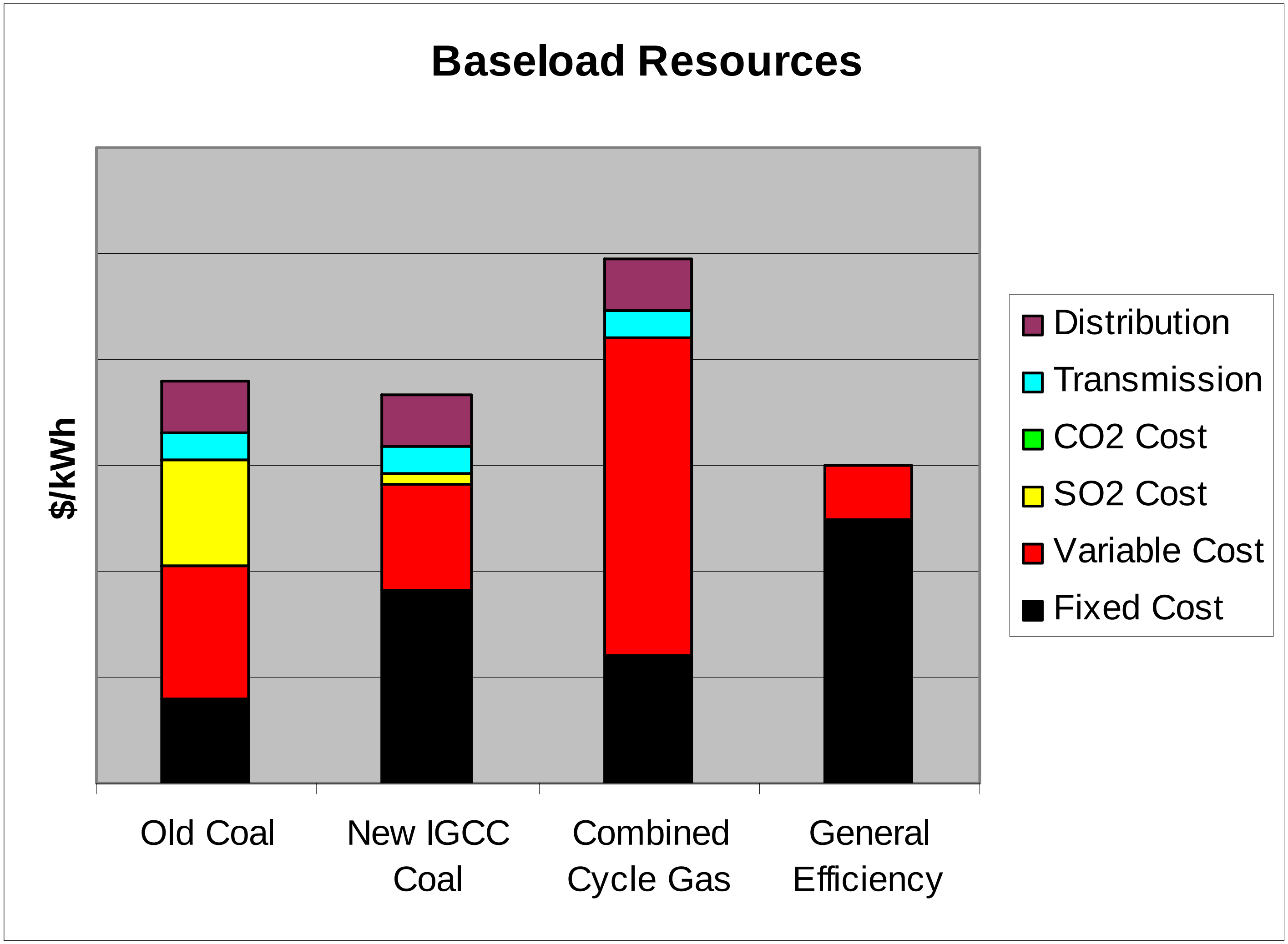
# Conservation Assessments Show Low Costs for Savings

**Table 3-1: Achievable and Cost-Effective Conservation Potential**

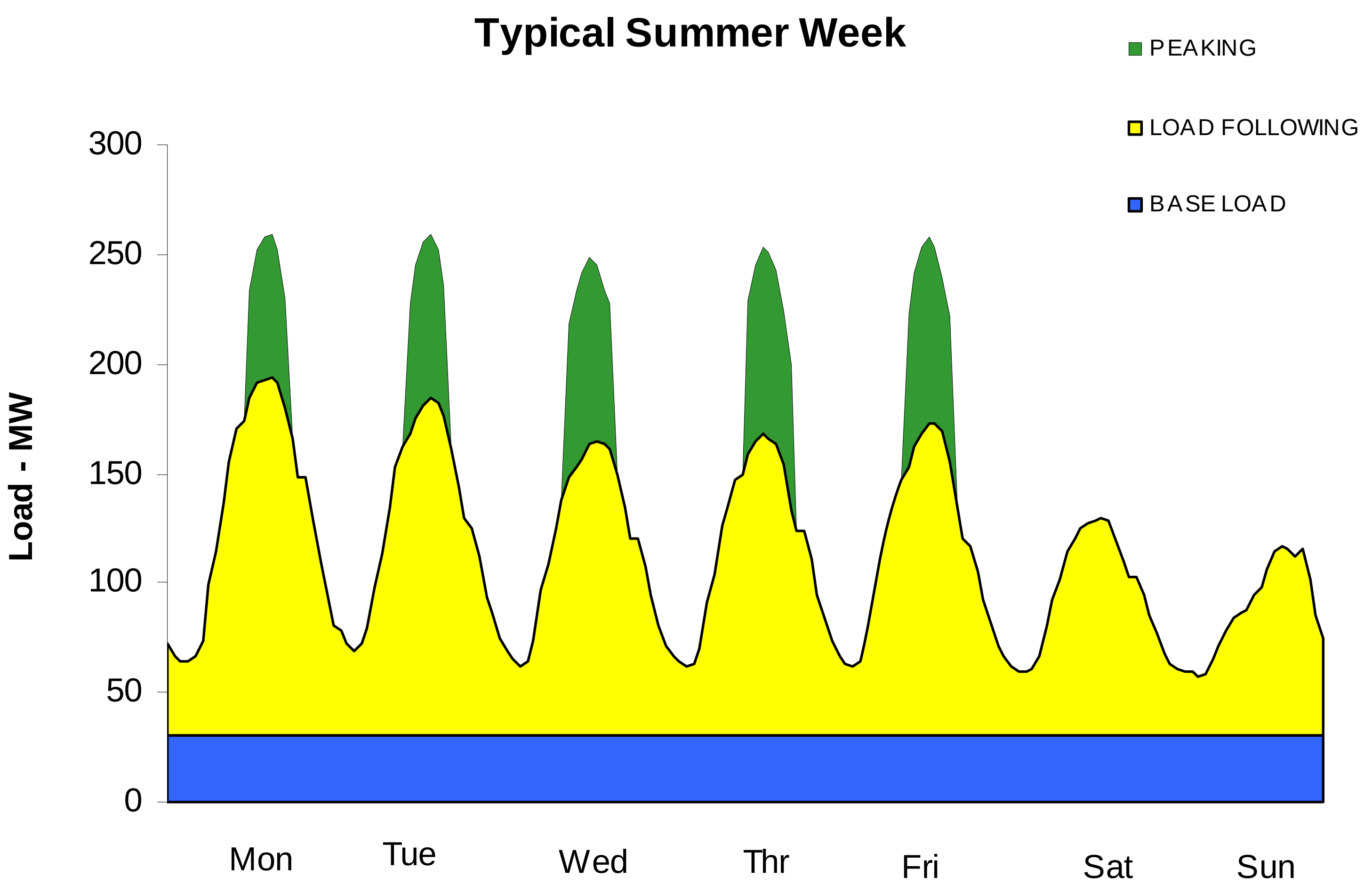
| Sector and End-Use | Cost-Effective Savings Potential (MWa in 2025)[4] | Average Levelized Cost (Cents/kWh)[5] | Benefit/Cost Ratio[6] |
|---|---|---|---|
| Commercial New & Replacement Lighting | 245 | 1.2 | 9.1 |
| Agriculture - Irrigation | 80 | 1.6 | 3.2 |
| New & Replacement AC/DC Power Converters[7] | 156 | 1.5 | 2.7 |
| Residential Clothes Washers | 135 | 5.2 | 2.6 |
| Residential Dishwashers | 10 | 1.6 | 2.6 |
| Commercial New & Replacement Infrastructure[8] | 11 | 1.4 | 2.4 |
| Residential Compact Fluorescent Lights | 535 | 1.7 | 2.3 |
| Residential Water Heaters | 80 | 2.2 | 2.3 |
| Commercial Retrofit Lighting | 114 | 1.8 | 2.2 |
| Residential Refrigerators | 5 | 2.1 | 2.2 |
| Commercial Retrofit Equipment[9] | 109 | 3.4 | 2.1 |
| Residential HVAC System Conversions | 70 | 4.3 | 2.1 |
| Commercial New & Replacement Shell | 13 | 1.6 | 2.0 |
| Industrial Non-Aluminum | 350 | 1.7 | 2.0 |
| Residential New Space Conditioning - Shell | 40 | 2.5 | 2.0 |
| Residential Existing Space Conditioning - Shell | 95 | 2.6 | 1.9 |
| Residential HVAC System Commissioning | 20 | 3.1 | 1.9 |
| Commercial Retrofit Infrastructure[8] | 105 | 2.2 | 1.8 |
| Commercial New & Replacement Equipment[9] | 84 | 2.2 | 1.8 |
| Commercial New & Replacement HVAC | 148 | 3.0 | 1.5 |
| Commercial Retrofit HVAC | 117 | 3.4 | 1.3 |
| Commercial Retrofit Shell | 9 | 2.9 | 1.3 |
| Residential HVAC System Efficiency Upgrades | 65 | 2.9 | 1.2 |
| Residential Heat Pump Water Heaters | 195 | 4.3 | 1.1 |
| Residential Hot Water Heat Recovery | 25 | 4.4 | 1.1 |
| **Total** | **2,814** | **2.4** | **2.7** |

Northwest Power and Conservation Council, 2005

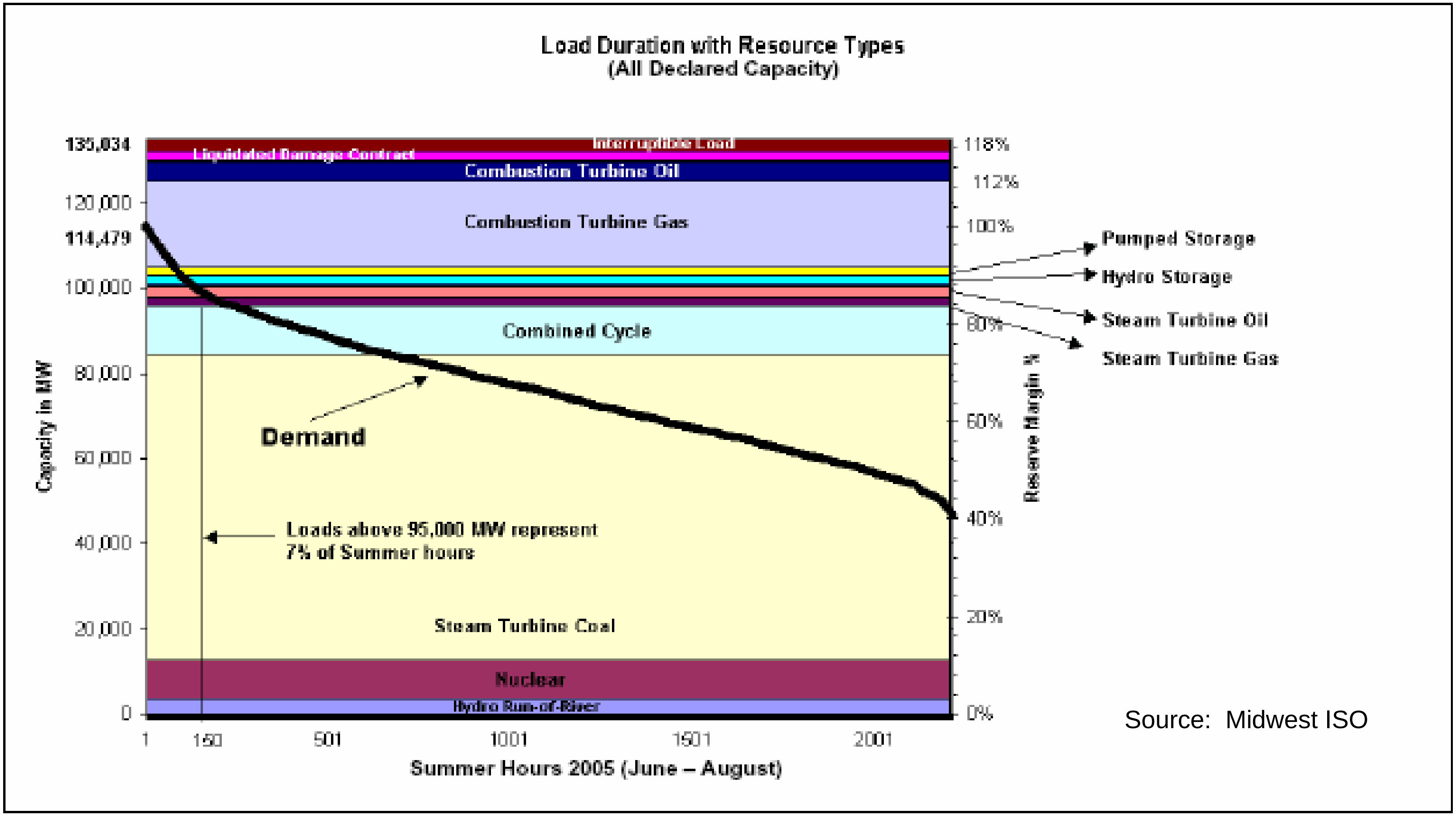
# Energy Efficiency Can Be Cheapest – In Large Part Due to T&D Savings



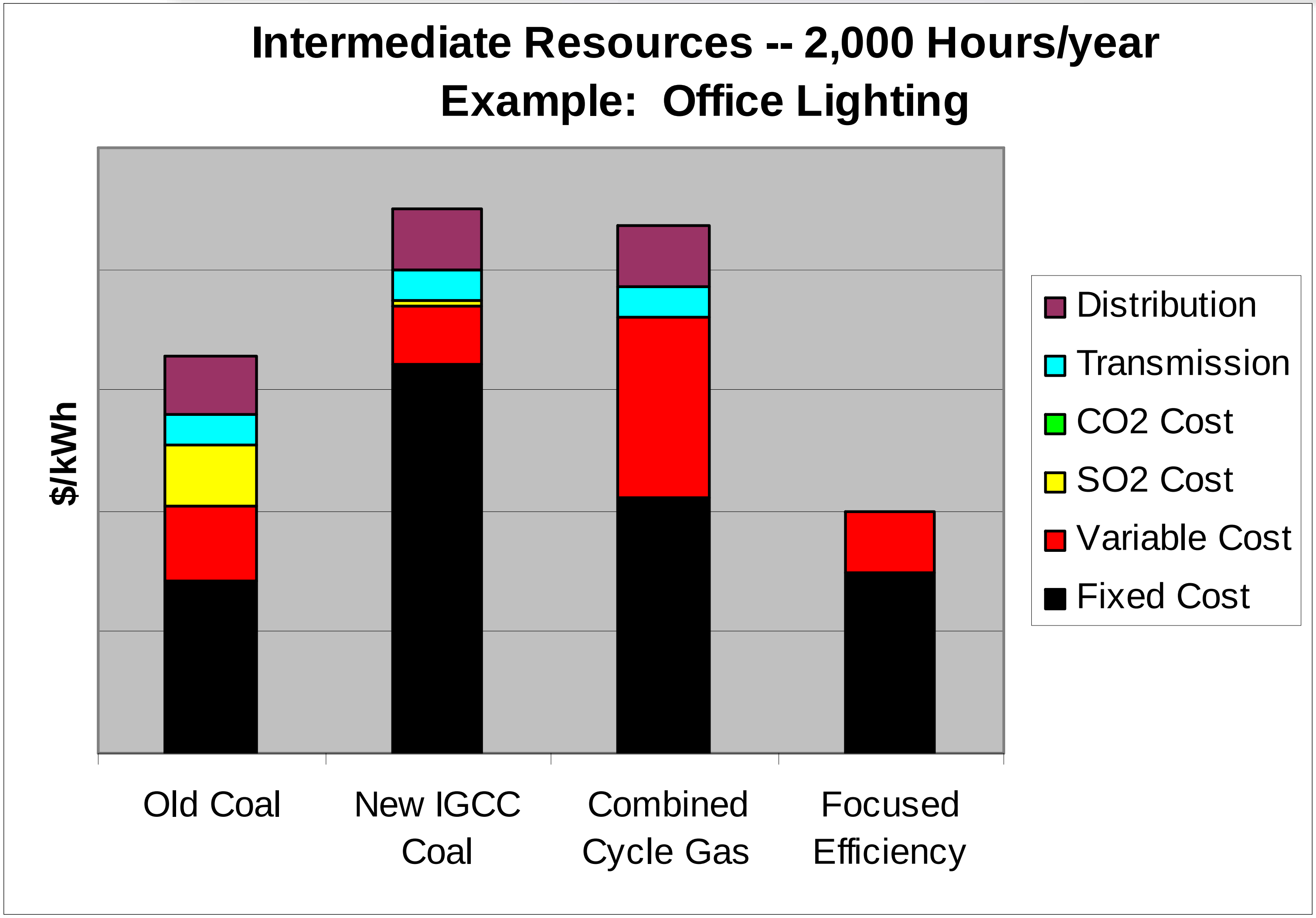
# Variation in Load During a Typical Week Creates Planning Challenges



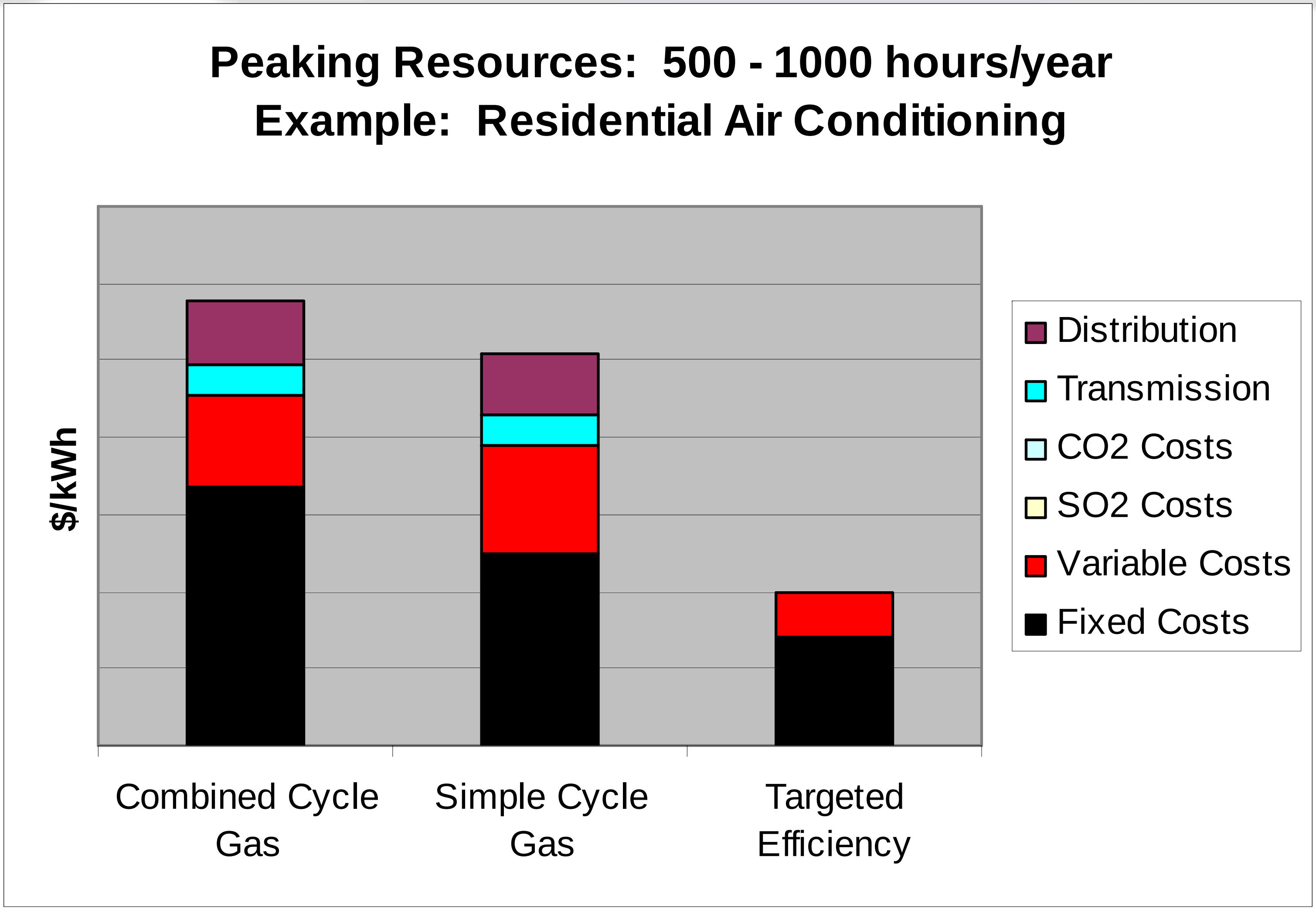
# The Midwest is Primarily Coal and Gas Dependent



# In an Intermediate Application Efficiency Looks Even Better



# During Peak Hours, Generation Costs Are Very High



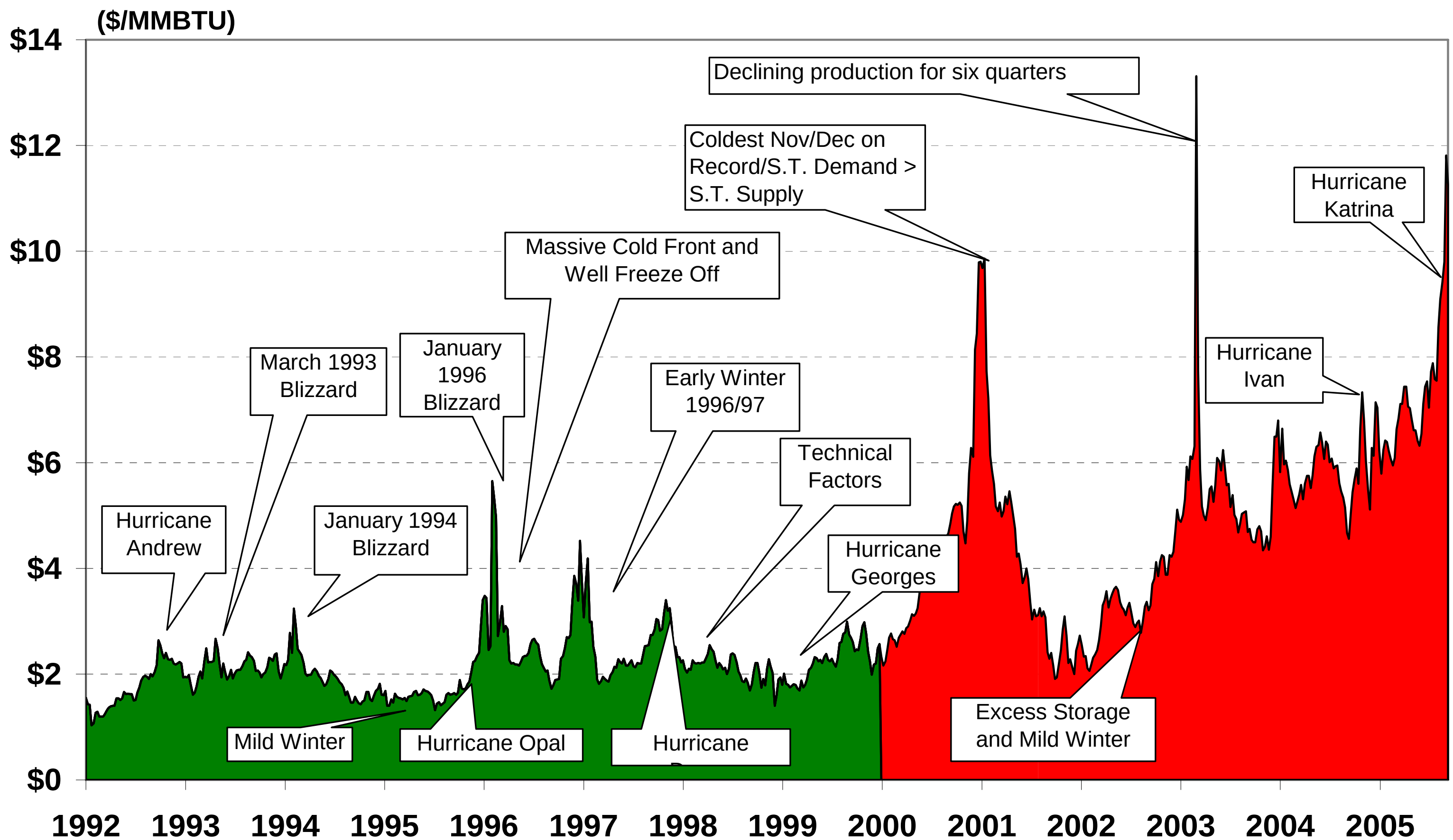
# Efficiency Can Be Targeted To Peak Periods

- Energy Efficiency measures address specific end-uses.
- Each end-use has a different load shape
- Residential cooling, office lighting, and office cooling are particularly peak-oriented.

- Northwest Power and Conservation Council Estimated Costs:
- Commercial Lighting: $.012/kWh
- Commercial HVAC: $.03/kWh
- Residential HVAC: $.03/kWh

# During On-Peak Hours, The Marginal Resource is Gas

HENRY HUB NATURAL GAS PRICE WEEKLY DATA




Source: NGW and EVA, Inc.

# Efficiency Can Be Targeted To Geographic Areas

- First utility conservation programs were designed to avoid distribution outages.
- Some utilities target strategic fuel switching to alleviate constraints on specific distribution circuits
- Areas with transmission deficiency
- Areas with distribution capacity needs
- Areas with air quality issues

# Efficiency Avoids Generation Capacity, Losses, and Reserves

| | |
|---|---|
| Savings at Customer | 10 mW |
| Line Losses | Off-Peak: 5%<br>On-Peak: >10% |
| Reserves | 7% of generation requirement |
| Savings at Generation | 10 / .9 / .93 = 12 mW |

# Steps to Assembling An Energy Efficiency Portfolio To Match Other Resources

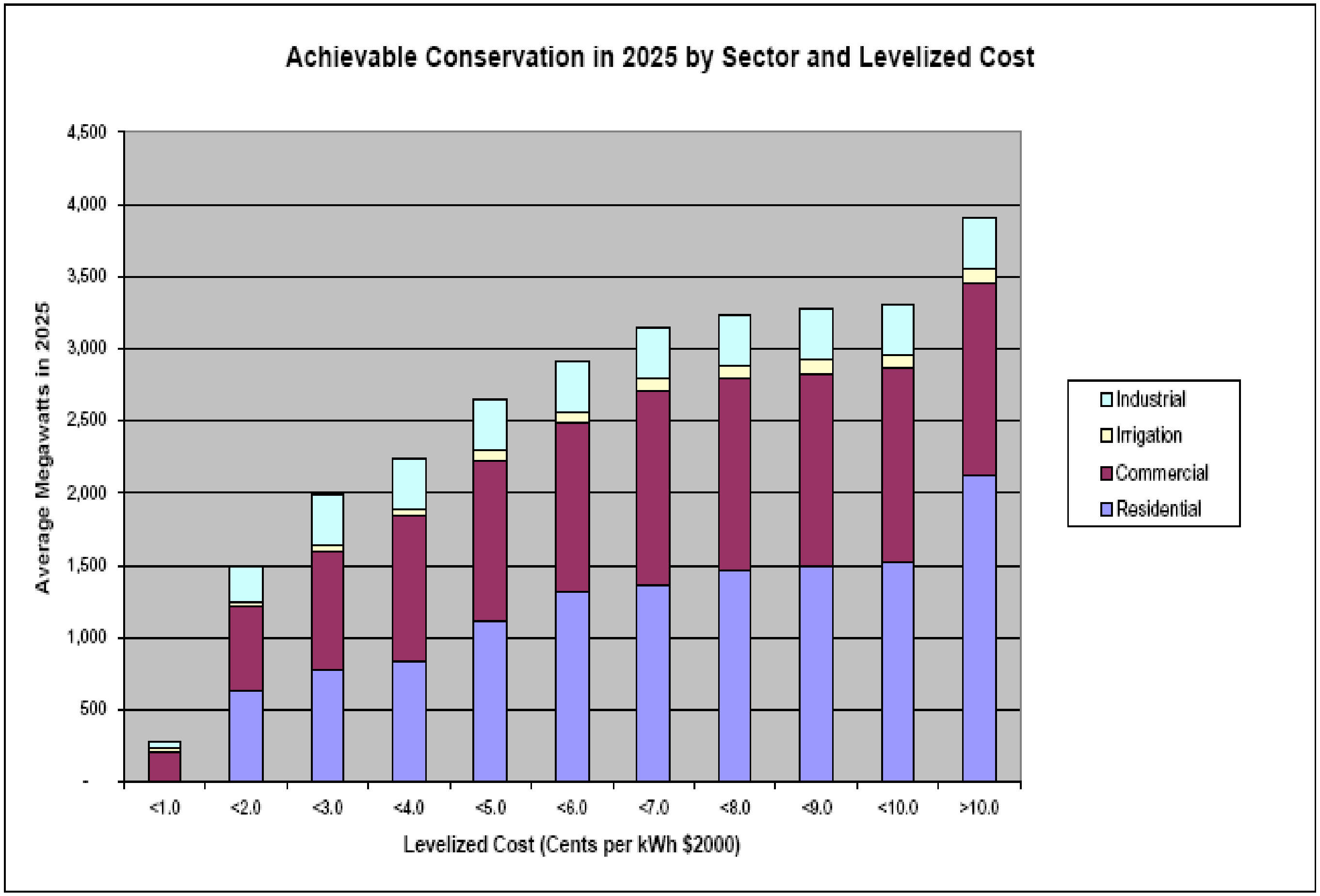
**Supply and Load Analysis**

- Determine load shape of utility system
- Determine costs of meeting each area of the load duration curve with supply
- Identify high-cost distribution locations
- Identify technology risks

**Efficiency Analysis**

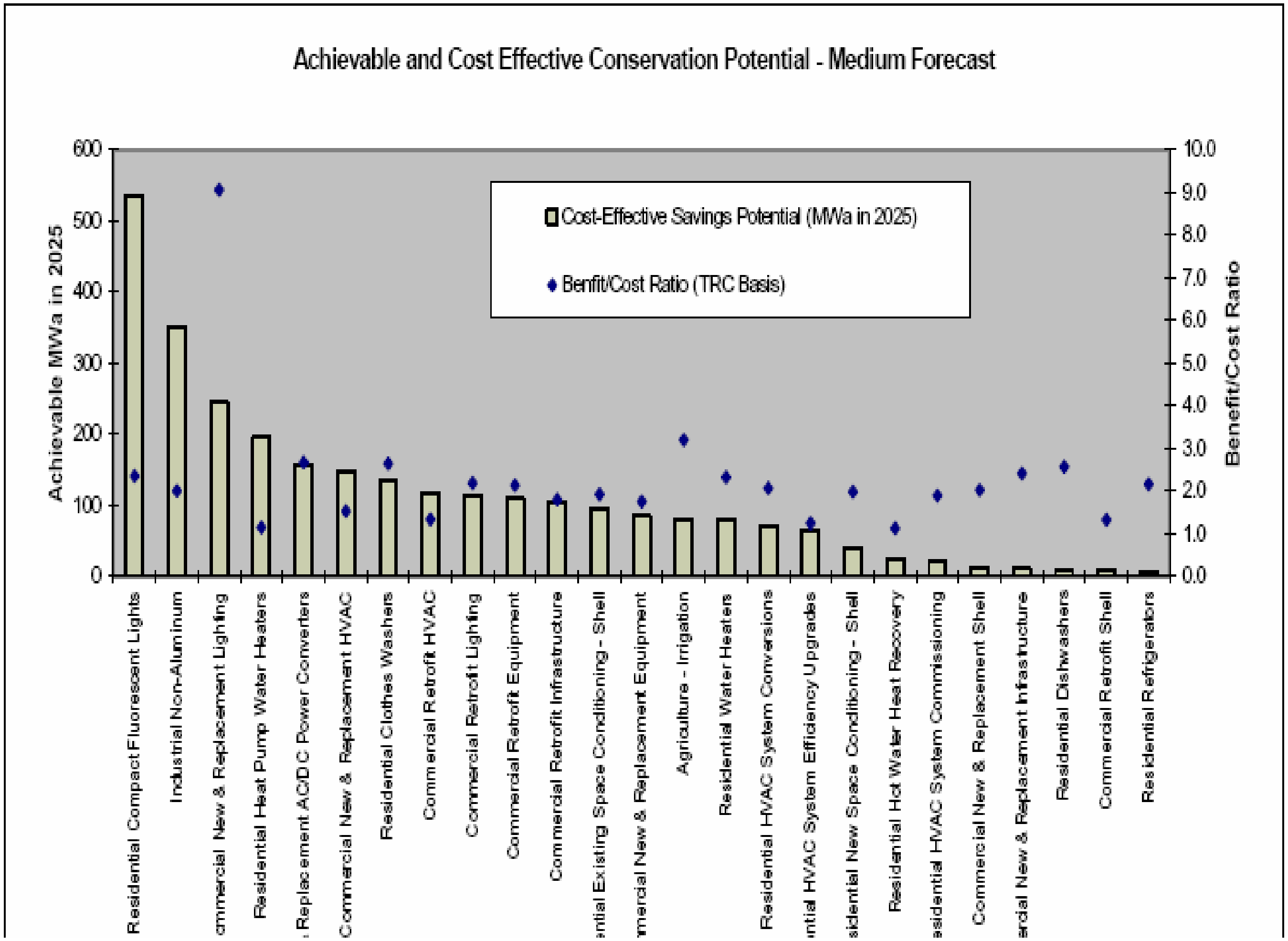
- Identify available resources.
- Determine costs
- Identify implementation mechanisms
- Identify funding and cost-recovery mechanisms

# Efficiency Portfolio by Cost Level




Northwest Power and Conservation Council, 2005

# Efficiency Portfolio by Program and Cost-Effectiveness




Northwest Power and Conservation Council, 2005

# Implementation Strategies

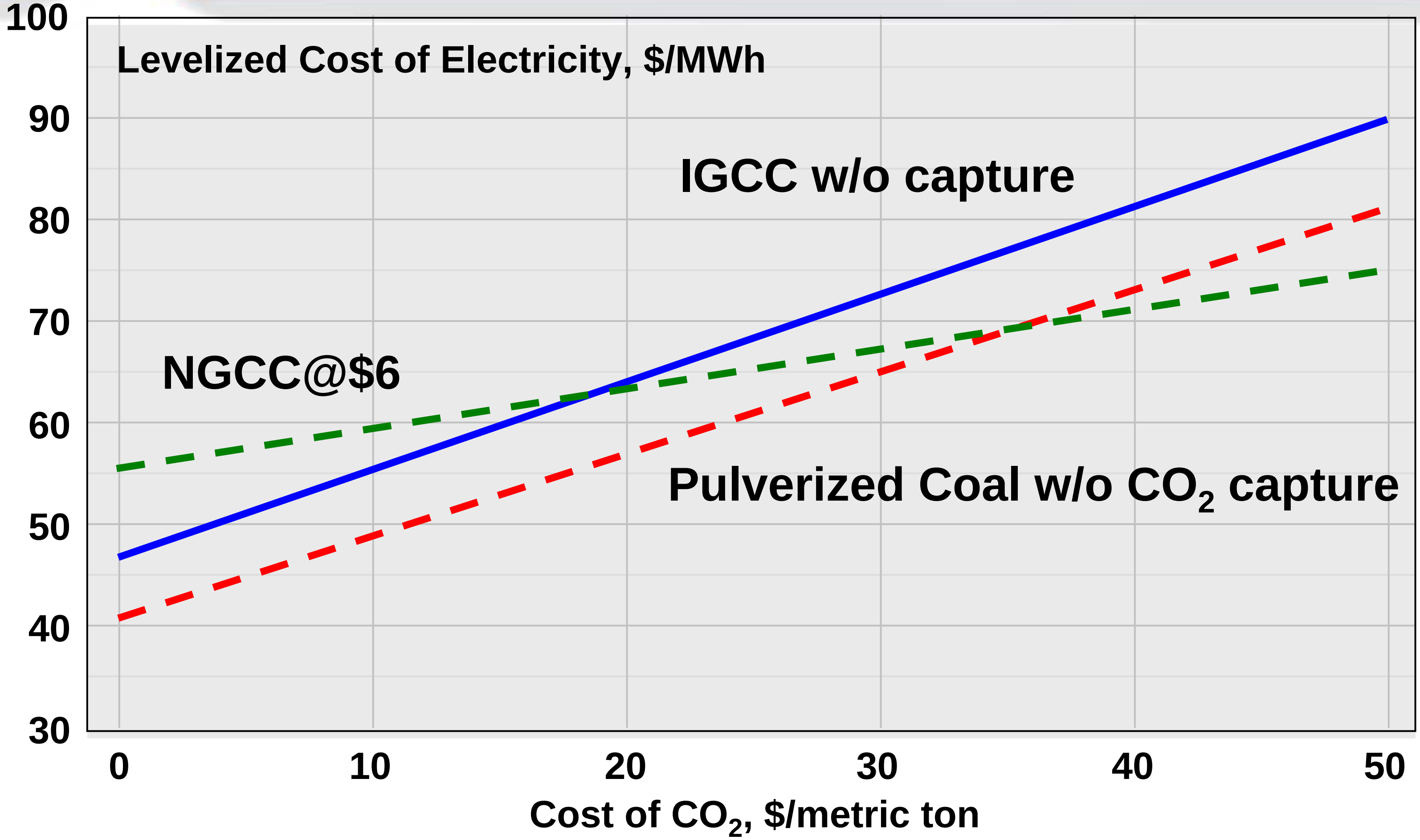
- Utility Direct Investment - California
- Energy Efficiency Utility
  - Efficiency Vermont, Energy Trust of Oregon
- Codes and Standards
  - California Title 24 Energy Code

# CO2 Risk Should Be Considered In Developing a Portfolio

- Estimated CO2 costs range from $0/ton to $40/ton
- Likely date for monetization is 2009+
- If imposed, probably will be phased in slowly.
- Much more of an issue for baseload coal than for gas-fired generation.

- Coal
  - $10/ton = $.01/kWh
  - $20/ton = $.02/kWh
- Gas CCCT
  - $10/ton = $.004/kWh
  - $20/ton = $.008/kWh
- Gas Peaker
  - $10/ton = $.006/kWh
  - $20/ton = $.012/kWh

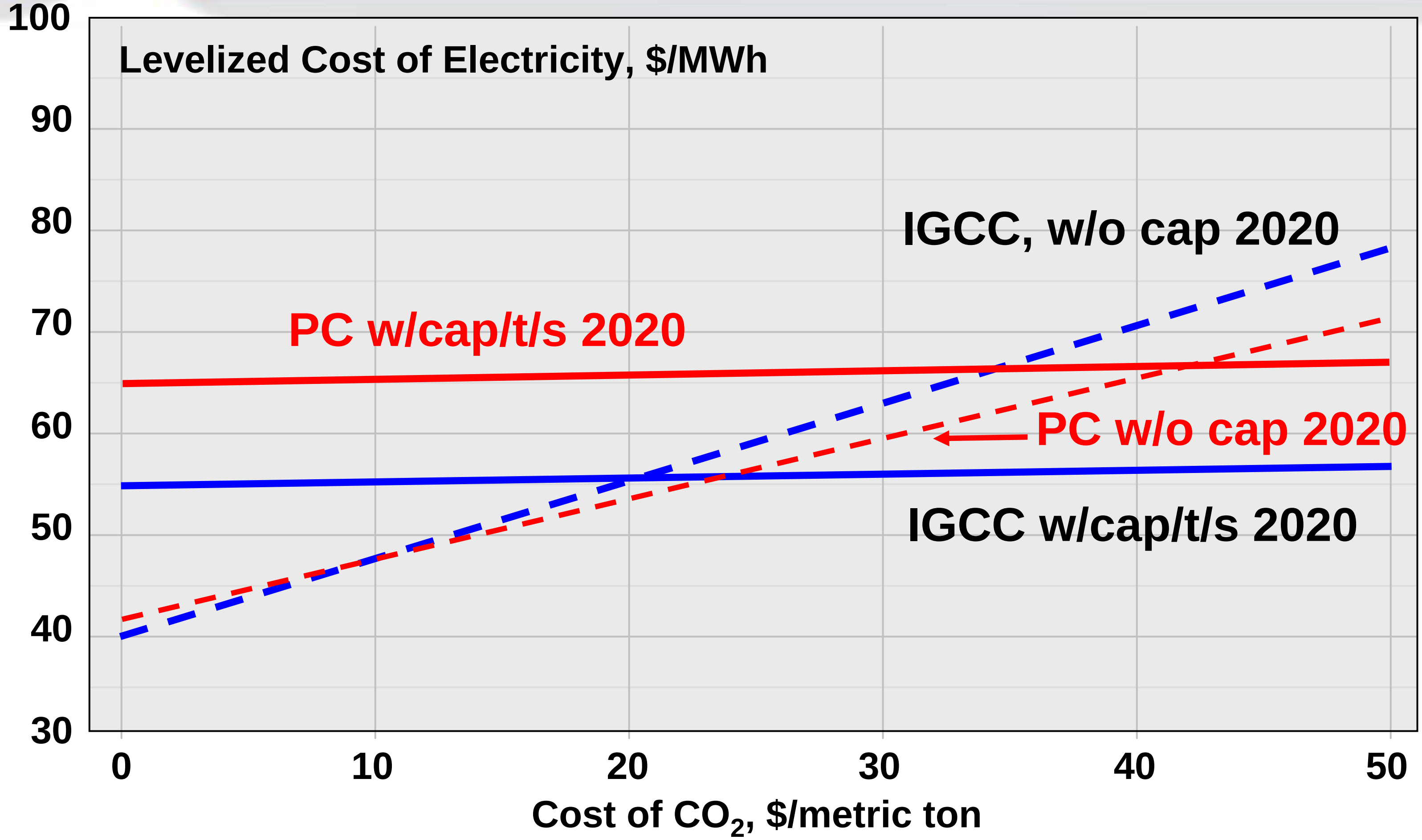
# Baseload Generation Costs vs. Potential Cost of $CO_2$ Penalties




Source: EPRI, October 20, 2005

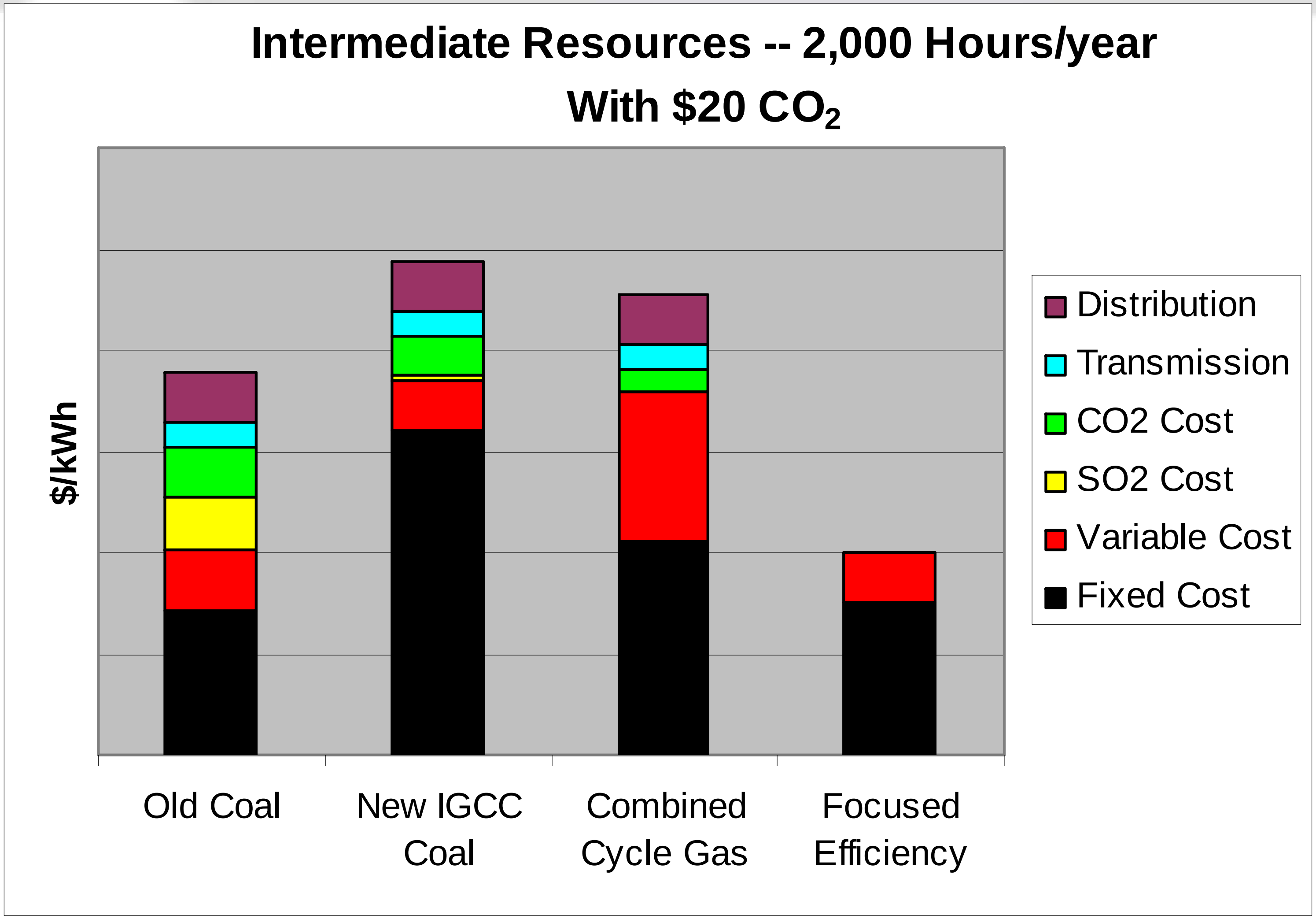
# IGCC With Capture Is a Realistic Option

## But it Does Not Come Cheap




Source: EPRI, October 20, 2005

# With CO2 Costs Included, the Efficiency Cost Advantage Widens



# Efficiency Advantages

- Cost-Effectiveness
- Reliability – many small units
- Scalability – build as needed
- Peak-Oriented
- No Carbon Risk
- Can be targeted geographically
- Transmission and Distribution Savings
- High Labor and other Local Economic Content

# Regulatory Barriers and Opportunities

## Eliminating Disincentives, Creating the Right Incentives

Jim Lazar
Cheryl Harrington
April 13, 2006

*The Regulatory Assistance Project*

*50 State Street, Suite 3*
*Montpelier, Vermont USA 05602*
*Tel: 802.223.8199*
*Fax: 802.223.8172*

*177 Water St.*
*Gardiner, Maine USA 04345*
*Tel: 207.582.1135*
*Fax: 207.582.1176*

Website:
*http://www.raponline.org*

# The Effect of Energy Efficiency on Utility Profits

- With a fully-reconciled fuel clause, every lost sale means lost profits.
- Even without a fully-reconciled fuel clause, if retail rates are above short-run market prices, every lost sale means lost profits.
- The numbers can be very large – a 1% reduction in sales can mean a 5% reduction in profits.

# Cost-Effectiveness of Efficiency is Not the Issue

- EE has the same energy and capacity values as generation facilities, transmission lines and distribution facilities.
- EE is considerably cheaper than  most supply-side alternatives, lowering total revenue requirements

# Regulatory Barriers

- Regulatory practice does not really support EE investment.
- Unless it is modified, utilities will carefully contain their EE investments.
- It usually takes broad stakeholder consensus to modify current regulatory practice.

# Two Ways a Utility can Increase Profits

- **Increase Sales**
- **Reduce Costs**

- Guess which is more fun?

# Alternatives to Address Utility Reluctance

- Lost Margin Recovery Mechanisms
- Rate of Return Incentives
- Fixed / Variable Rate Design
- Real-Time Pricing
- Moving Efficiency Outside the Utility
- Revenue Normalization Measures

# Lost Margin Recovery Mechanisms

- Does not remove sales incentive.
- Best financial outcome is when EE fails early.
- Measurement intense – lots of room for squabbles.
- Does not address rate design issues
- Experience in Hawaii particularly frustrating – 13 years and counting.

# Rate of Return Incentives

- Washington (1980 – 1990):  2% bonus for return on equity for efficiency investment.
- Encouraged maximum spending on measures with minimum savings.
- Did not reduce sales incentive.
- Utility invested heavily in heat pump retrofits in mobile home parks – to prevent migration to natural gas.

# Fixed / Variable Rate Design

- $30/month + variable energy cost
- Eliminates sales incentive
- Destroys consumer incentives for self-initiated efficiency.
- May attract uneconomic load – space heating and water heating.
- Without TOU prices, invites surging growth in on-peak loads like air-conditioning.

# Real-Time Pricing

- Often advocated by market theorists.
- Hated by consumers due to volatility.
- Uneconomic metering for small consumers.
- Only addresses generation component of pricing – distribution capacity costs can be significant at the margin.

# Moving Efficiency Outside the Utility

- Efficiency Vermont (Efficiency Maine?)
- Energy Trust of Oregon
- Utility collects and remits revenue
- Efficiency company has no exposure to lost utility margins.
- Willingness of utilities to cooperate requires legislation.
- May not optimize geographic focus of investment without utility involvement.

# Revenue Normalization Mechanisms

- Establish an approved revenue requirement, and adjust rates as needed over time to sustain it.
- Breaks the sales incentive.
- Reduces volatility of utility earnings
- Allows management to focus on reducing costs – which will benefit consumers after next general rate proceeding.

# Examples of Revenue Normalization Mechanisms

- CA - All gas & electric IOUs
- MD, OR -- gas only (MDPSC, Calvin Timmerman; contact in ORPUC, Lisa Schwartz)
- NC- Piedmont Gas
- DC- Washington Gas (Rick Morgan, DCPSC)
- NJ - gas filings pending for NJ Natural Gas (NJBPU, Mike Winka)
- OH - gas filings pending for Vectren (Ohio Consumers' Counsel, Janine Migden-Ostrander)
- WA – gas filings pending for PSE and Cascade

# Elements of a Revenue Normalization Mechanism

- Determine "revenue per customer" in general rate proceeding.
  - By class
  - System Overall
  - May exclude resource costs if there is a fuel / purchased power mechanism.
- Measure actual revenue variations (due to weather, conservation, economic changes and other causes.)
- Apply a true-up mechanism over future months or future year.

# Benefits of a Revenue Normalization Plan

- Stable earnings for the utility
- Eliminates concerns about conservation, fuel switching, or other sales reductions.
- Rating agencies like the stable earnings; utility can have a lower equity capitalization ratio for the same bond rating.
- Customers on budget billing have fewer adjustments / delinquencies.

# Five Point Plan for Achieving Consensus on Decoupling

- Significant Energy Efficiency Investment Commitment
- Good Rate Design
- Capital Structure Adjustment
- A Collar on Maximum Possible Adjustment
- Periodic Rate Cases

# Thanks for your attention

- rapmaine@aol.com
- www.raponline.org
- RAP Mission: ***RAP is committed to fostering regulatory policies for the electric industry that encourage economic efficiency, protect environmental quality, assure system reliability, and allocate system benefits fairly to all customers.***