The Role of Energy Efficiency in the Northwest

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Northwest Power and Conservation Council

Presented October 20, 2005

to

Maine Public Utilities Commission

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To Understand the Present, You Need to Know Our Past

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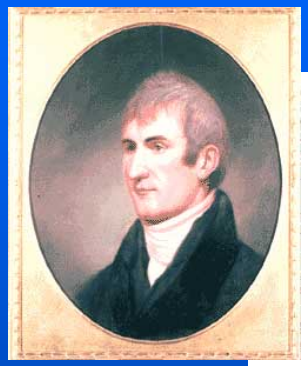
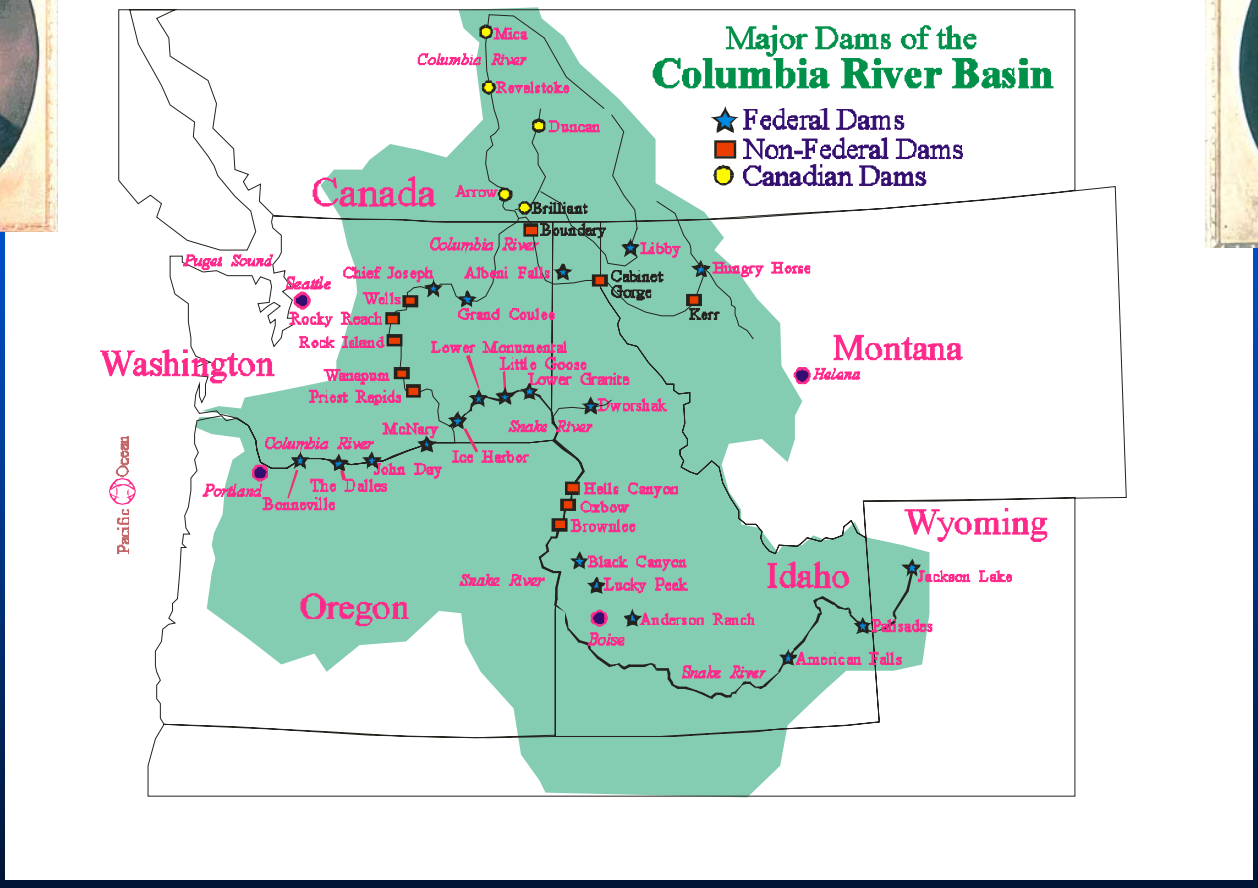
What Happened After Lewis and Clark Left?





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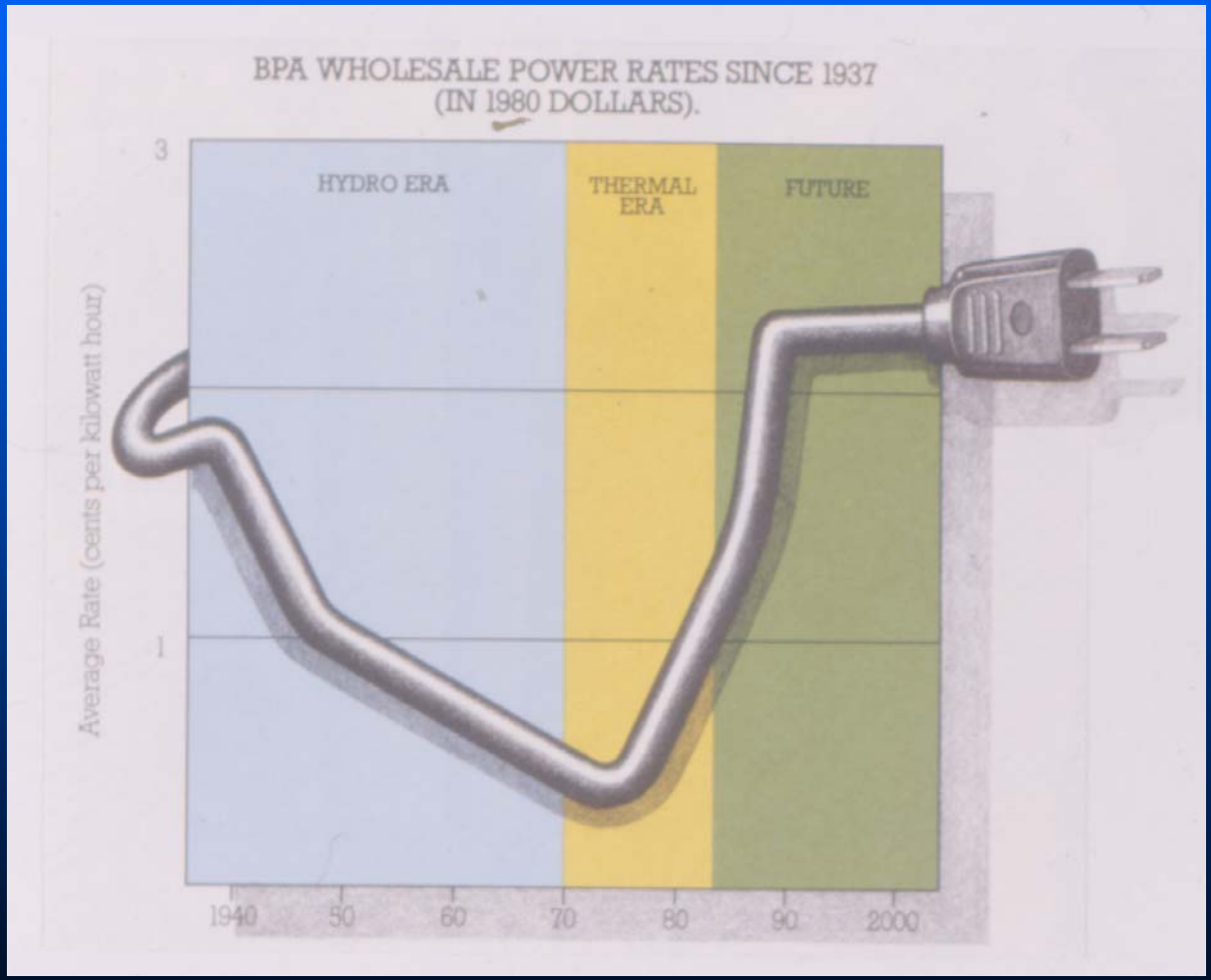
The First Three "Eras" of Power Planning in the PNW

- "New Deal" Mysticism (1930-1950)
  - Politicians plan using "chicken entrails and crystal balls" legislate what's needed and when
- Engineering Determinism (1950- 1970)
  - Engineers, using graph paper and rulers schedule the next power plants
- Economic Determinism (1970 to April 27, 1983)
  - Economist, using price elasticity's slow the engineer's construction schedules

Actions Taken in Response to "Engineering and Economic Determinist's" Forecasts

- Utilities planned and/or started construction on 28 coal and nuclear power plants to be completed over a 20-year period.
- Native American tribes sued the state and federal government over loss of salmon
- Environmental groups sued Bonneville Power Administration over plans to turn the Columbia River into "Wave World"

Impact of Actions Taken in Response to "Engineering and Economic Determinist's Forecasts and Plans



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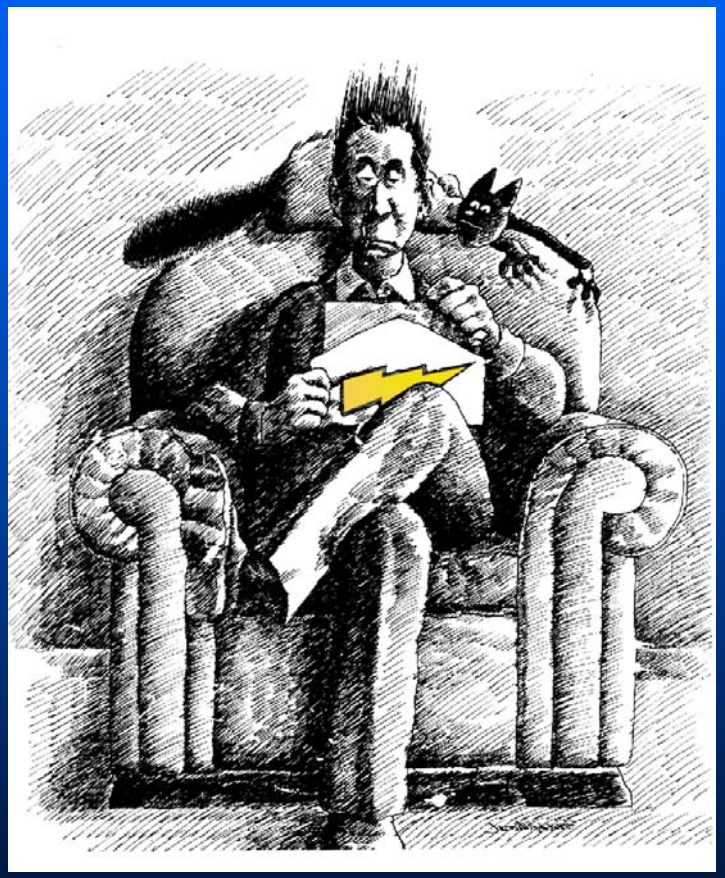
Reaction to Impact of Actions Taken in Response to "Engineering and Economic Determinist's Forecasts and Plans



Terminate or mothball 9 nuclear and 5 coal plants at a cost to the region's consumers of more than $7 billion.

Motivate the region's politicians, utilities, larger industries and public interest groups to accept the "deals" embodied in the *Northwest Power and Conservation Planning Act of 1980*

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The Fourth Era - *Northwest Power and Conservation Planning Act of 1980 (PL96-501)*

- Authorized States of ID, OR, MT and WA to form an "interstate compact" (aka, the "Council")
- Directed the Council to develop 20-year load forecast and resource plan ("The Plan") and update it every 5 - years
  - To assure the region of an *adequate, efficient and reliable power system*
  - To provide for the development of the *least cost* mix of resources*
  - *Conservation (energy efficiency) deemed highest priority resource* equivalent to generation with a 10% cost advantage over power generating resources
- Mandated *public involvement* in Council's planning process.

Federally mandated "least cost integrated resource planning" on regional basis

Council Planning Process and Plans

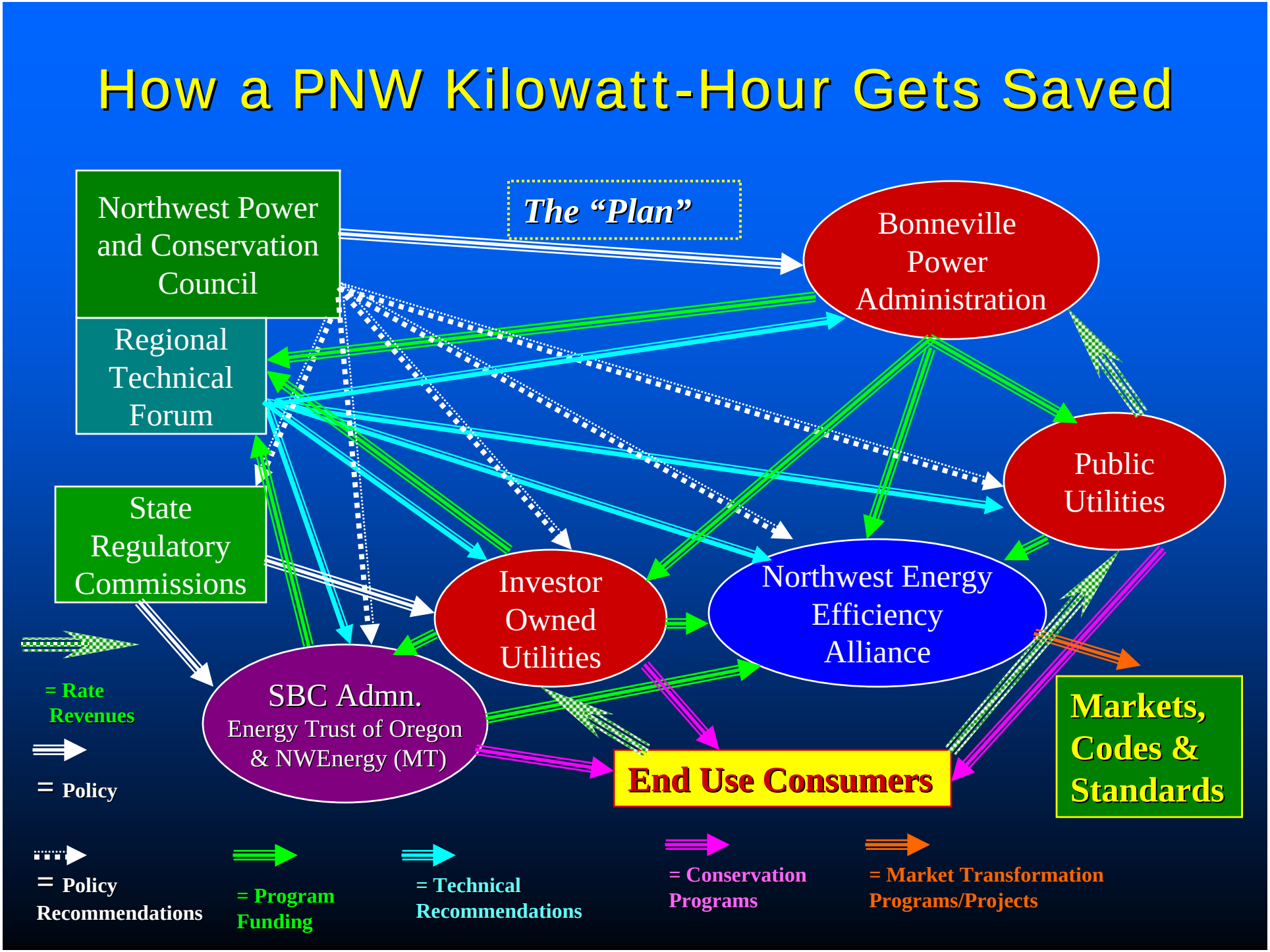
- Longest Running "Integrated Resource Planning Process" in the Country
- Serves as "Regional Lens" through which state Commissions view utility IRPs (and other resource development)
  - Regional resource adequacy
  - Resource cost-effectiveness
  - Conservation/Efficiency goals

How Has It Worked?

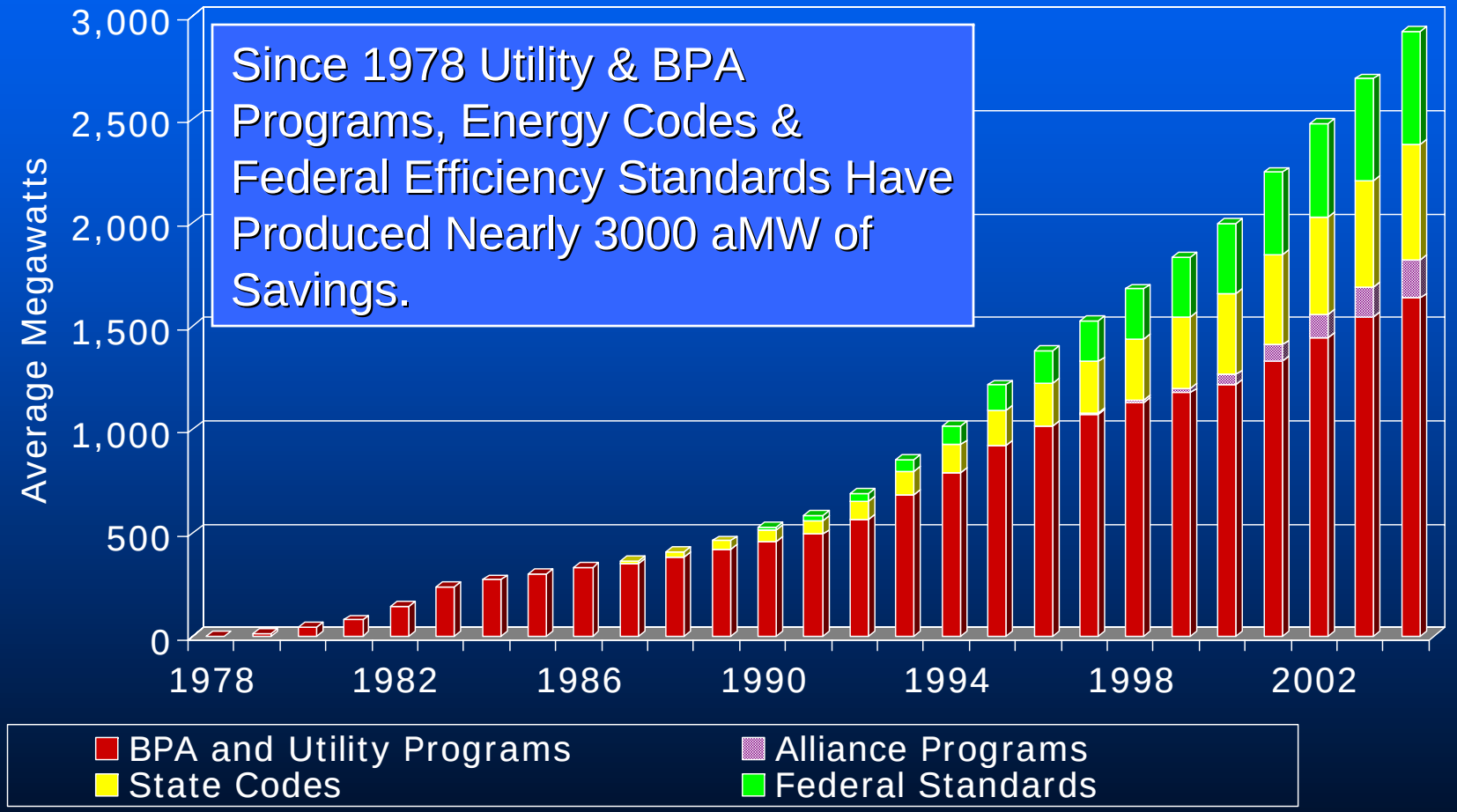
- Fundamentally changed utility resource planning
  - Council's independent view of resource adequacy in first Plan led Bonneville and the region's utilities terminate WNP 4&5, Skagit 1&2 and defer and ultimately cancel WNP 1&3, Creston 1&2, etc.
  - Oregon and Washington Commissions adopted "least-cost" planning requirements for investor-owned utilities, Idaho and Montana have since followed
  - First Council "Action Plan" Called on Bonneville and the Region's Utilities to Develop Conservation to Reduce Year 2002 Loads by Between 5 – 17%

    » ***Let's See How This Worked***

How a PNW Kilowatt-Hour Gets Saved



PNW Energy Efficiency Achievements 1978 - 2004



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So What's 3000 aMW?

- It was enough electricity to serve the ***entire*** states of Maine and New Hampshire ***plus*** 50% of Vermont in 2004

- It Saved the PNW Region's Consumers Nearly ***$1.25 billion*** in 2004

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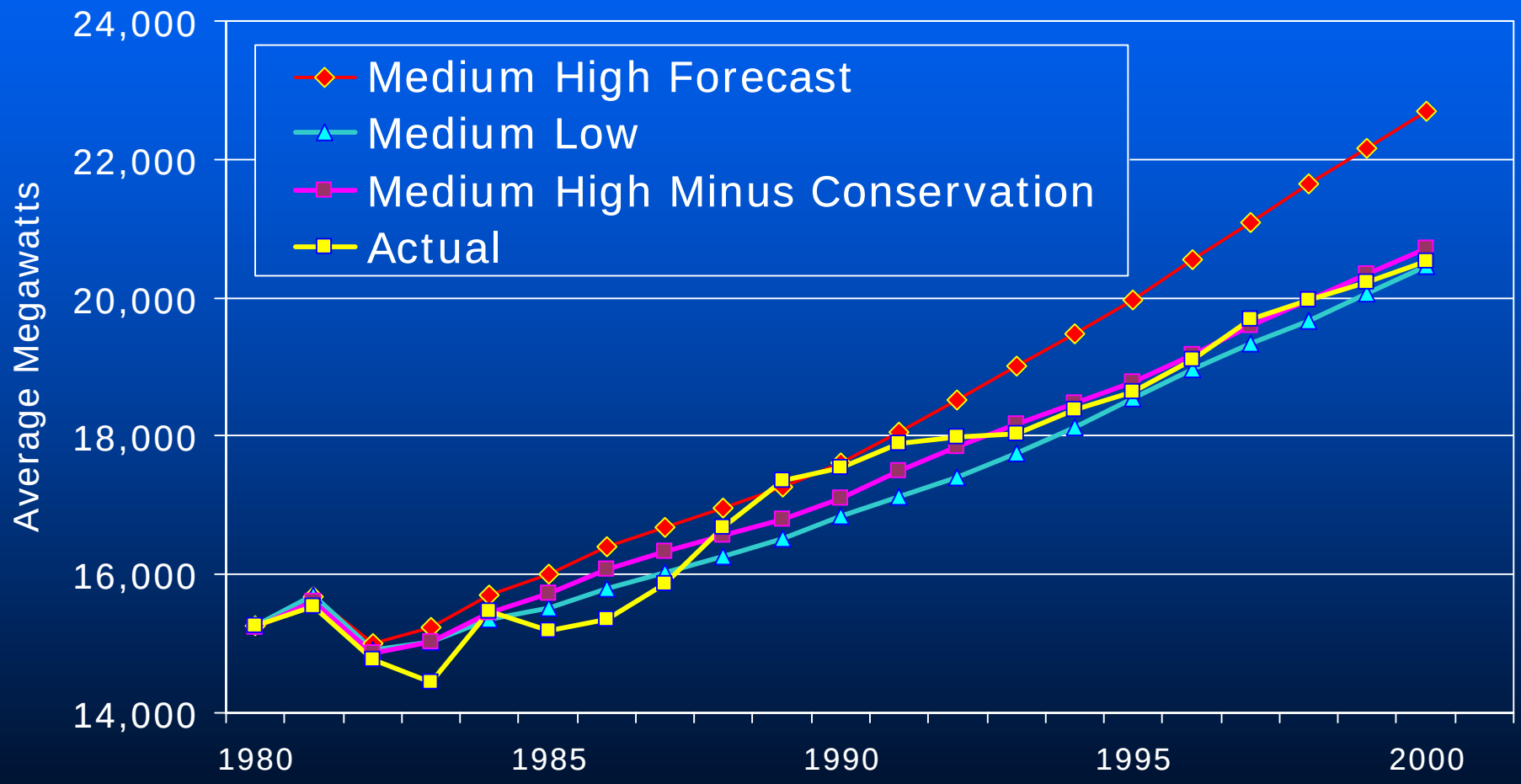
Energy Efficiency Resources Significantly Reduced Projected PNW Electricity Sales



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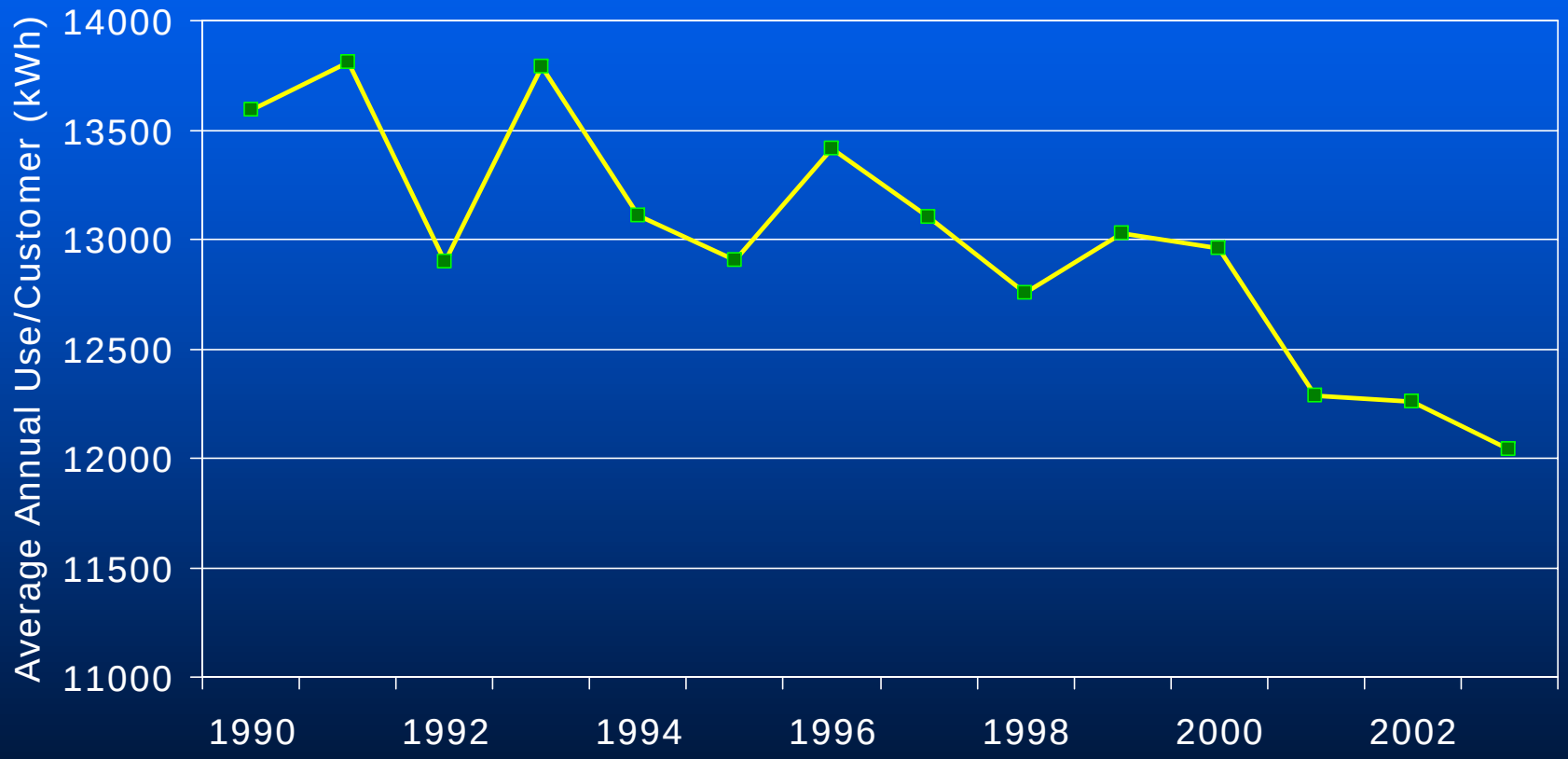
PNW Average Residential Electricity Use/Customer



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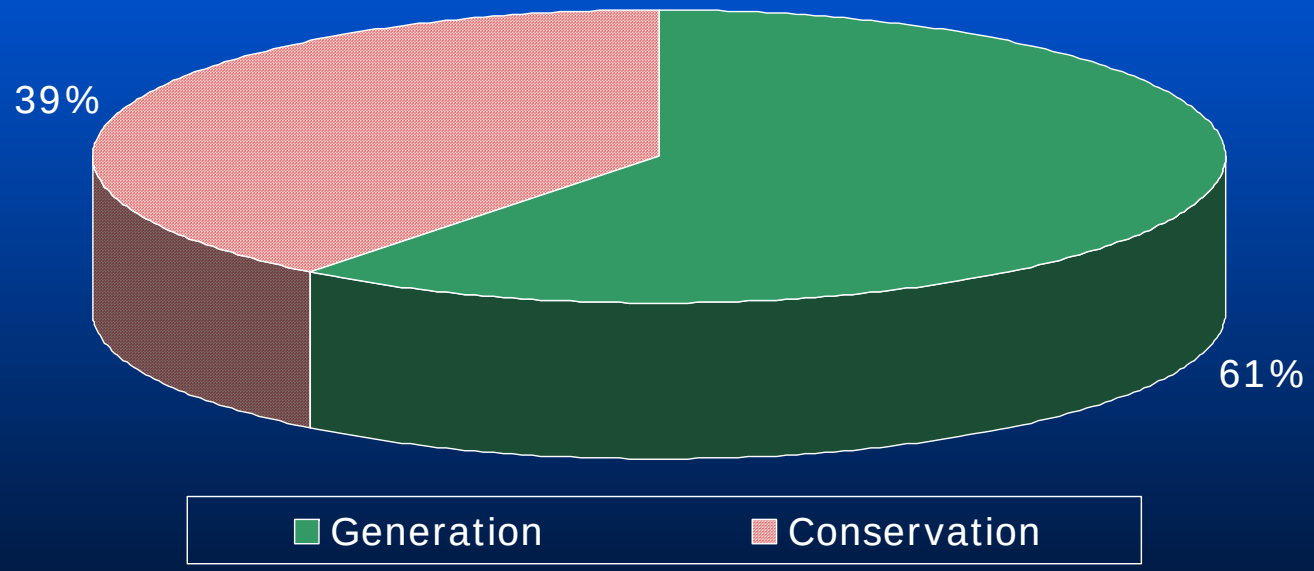
Energy Efficiency Met Nearly 40% of PNW Regional Firm Sales Growth Between 1980 - 2003



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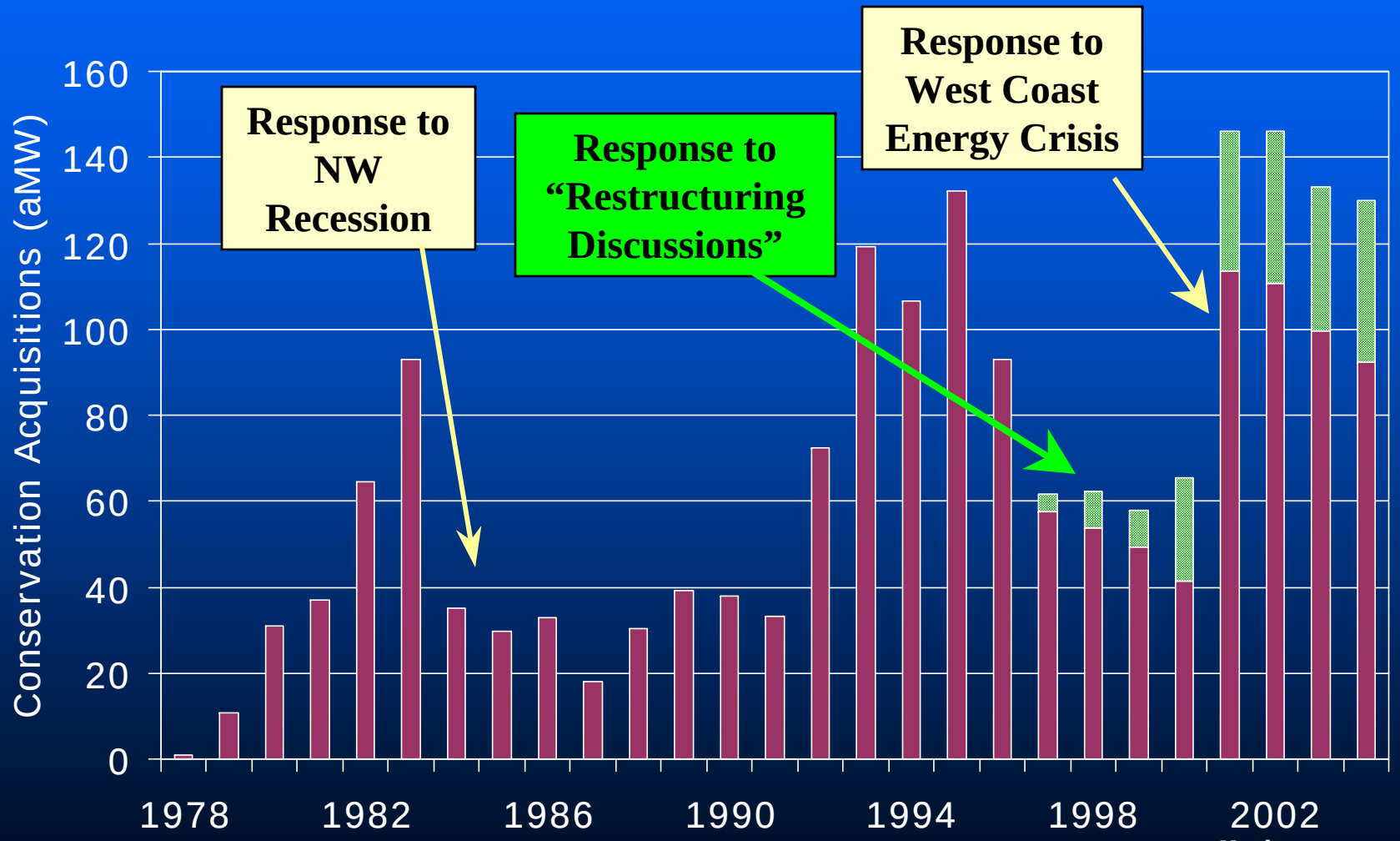
Regional Utility Energy Efficiency Acquisitions Have Helped Balance Loads & Resources

Creating Mr. Toad's Wild Ride for the PNW's Energy Efficiency Industry



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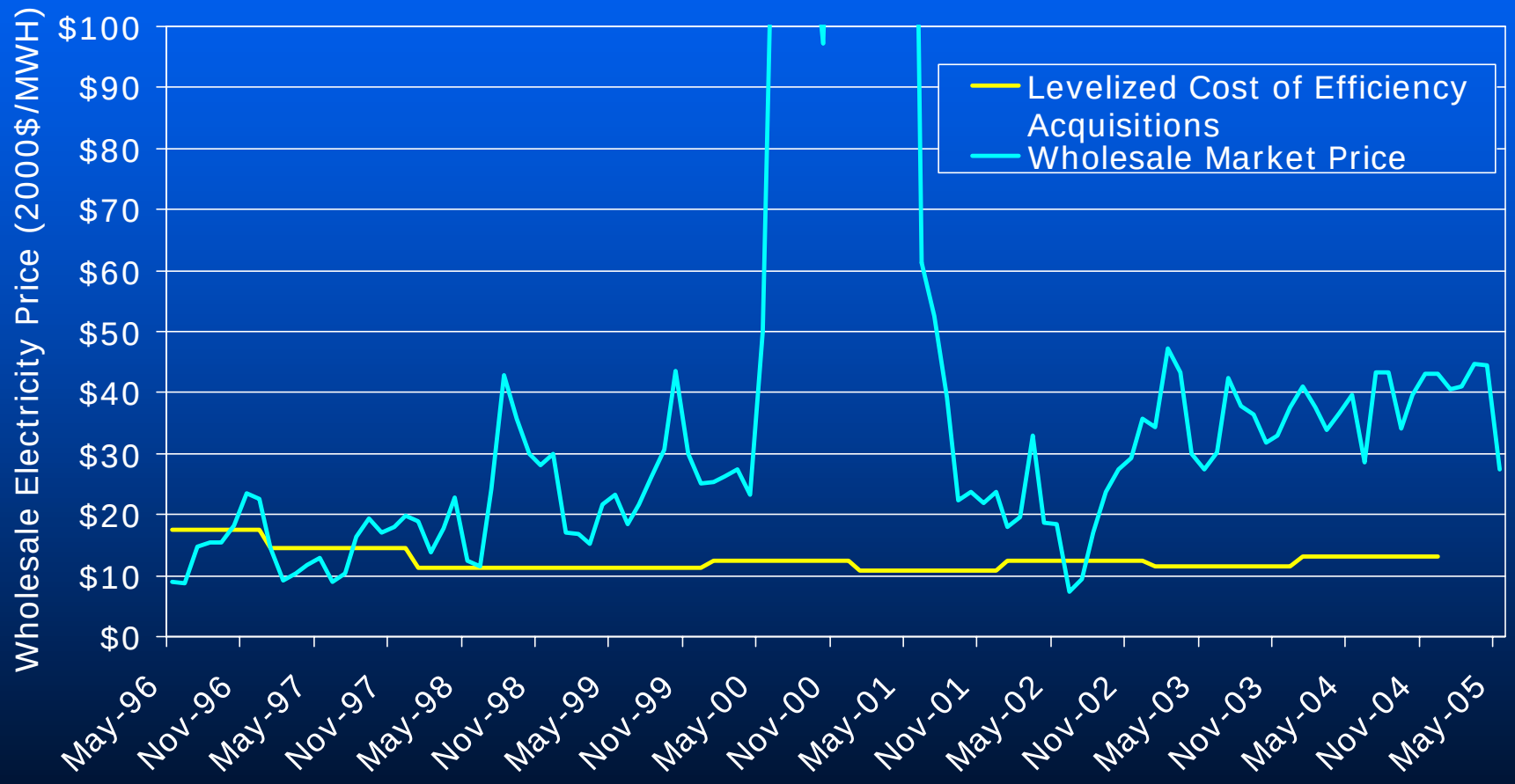
Utility Acquired Energy Efficiency Has Been ***A BARGAIN!***



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So Much for the Past, What's Ahead

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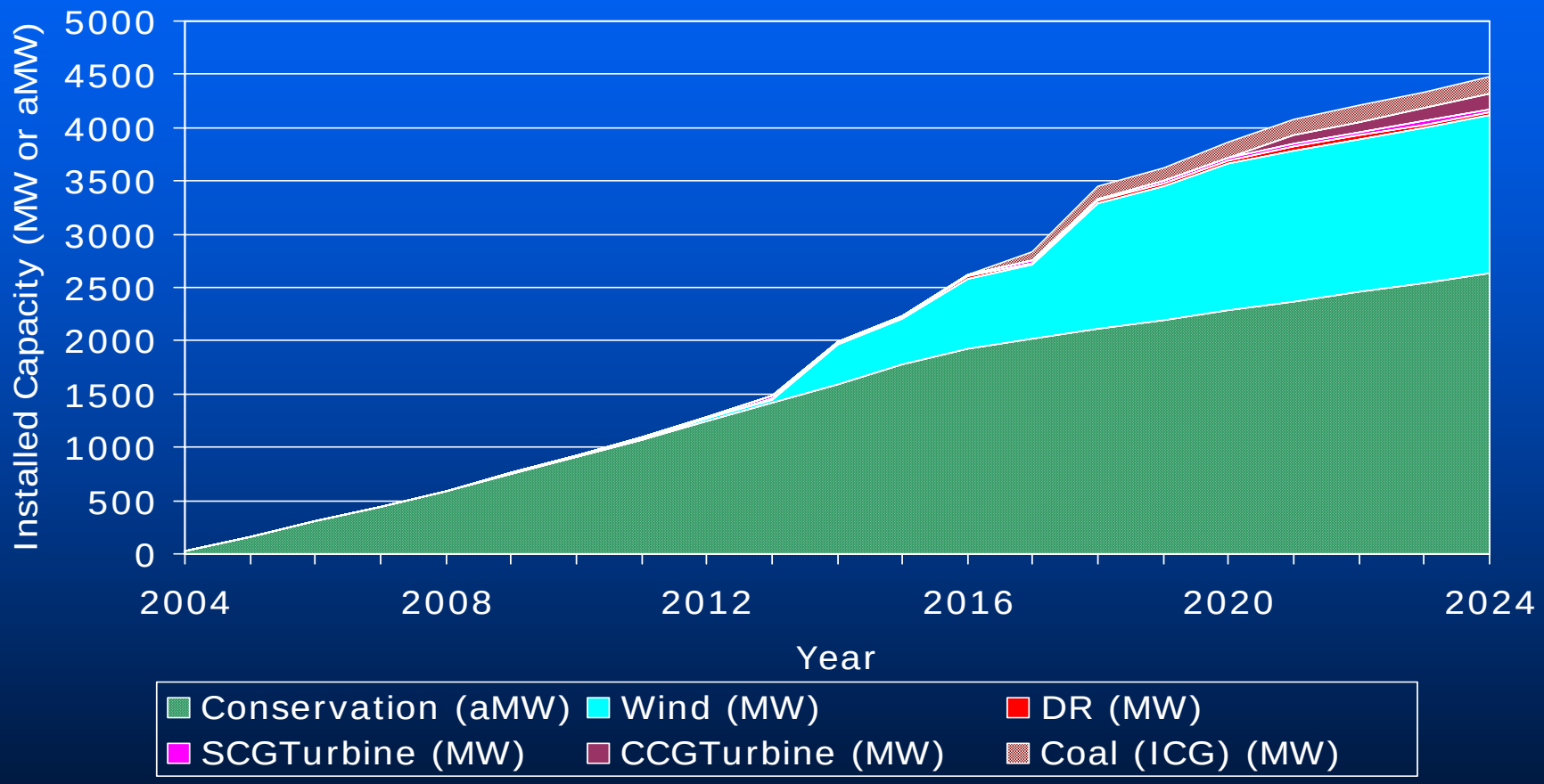
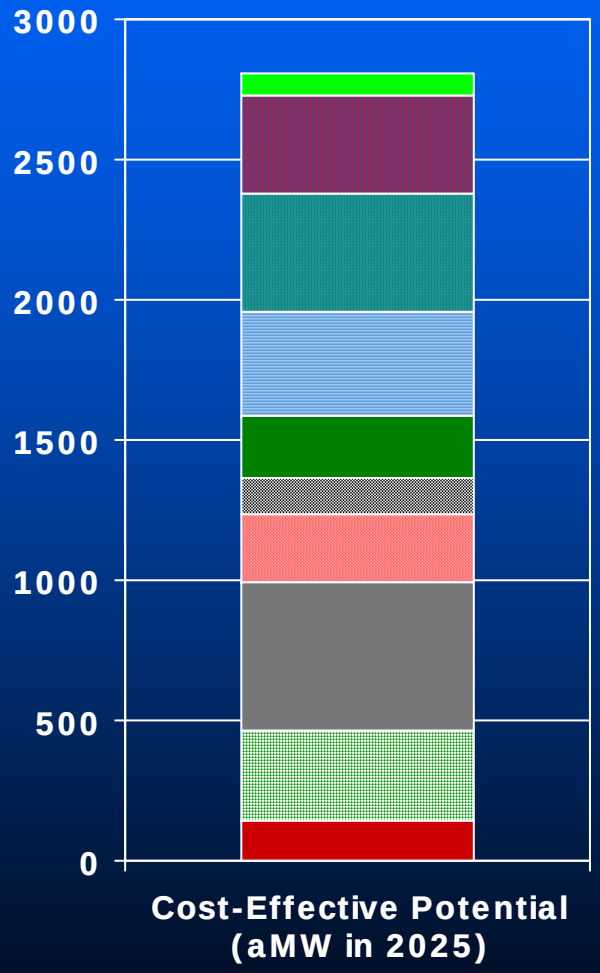
5th Plan Relies on Conservation and Renewable Resources to of Meet Load Growth*



*Actual future conditions (gas prices, CO2 control, conservation accomplishments) will change resource development schedule

Cost-Effective and Achievable Conservation Should Meet Over 45% of PNW Load Growth from 2005-2025*



- Agricultural Sector - 80 aMW
- Non-DSI Industrial Sector - 350 aMW
- Commercial Sector Non-Building Measures - 420 aMW
- HVAC, Envelope & Refrigeration - 375 aMW
- New Commercial Building Lighting - 220 aMW
- Existing Commercial Buildings Lighting - 130 aMW
- Residential Space Conditioning - 240 aMW
- Residential Lighting - 530 aMW
- Residential Water Heating - 325 aMW
- Residential Appliances - 140 aMW

*Medium Load Forecast
Loads & Market Prices

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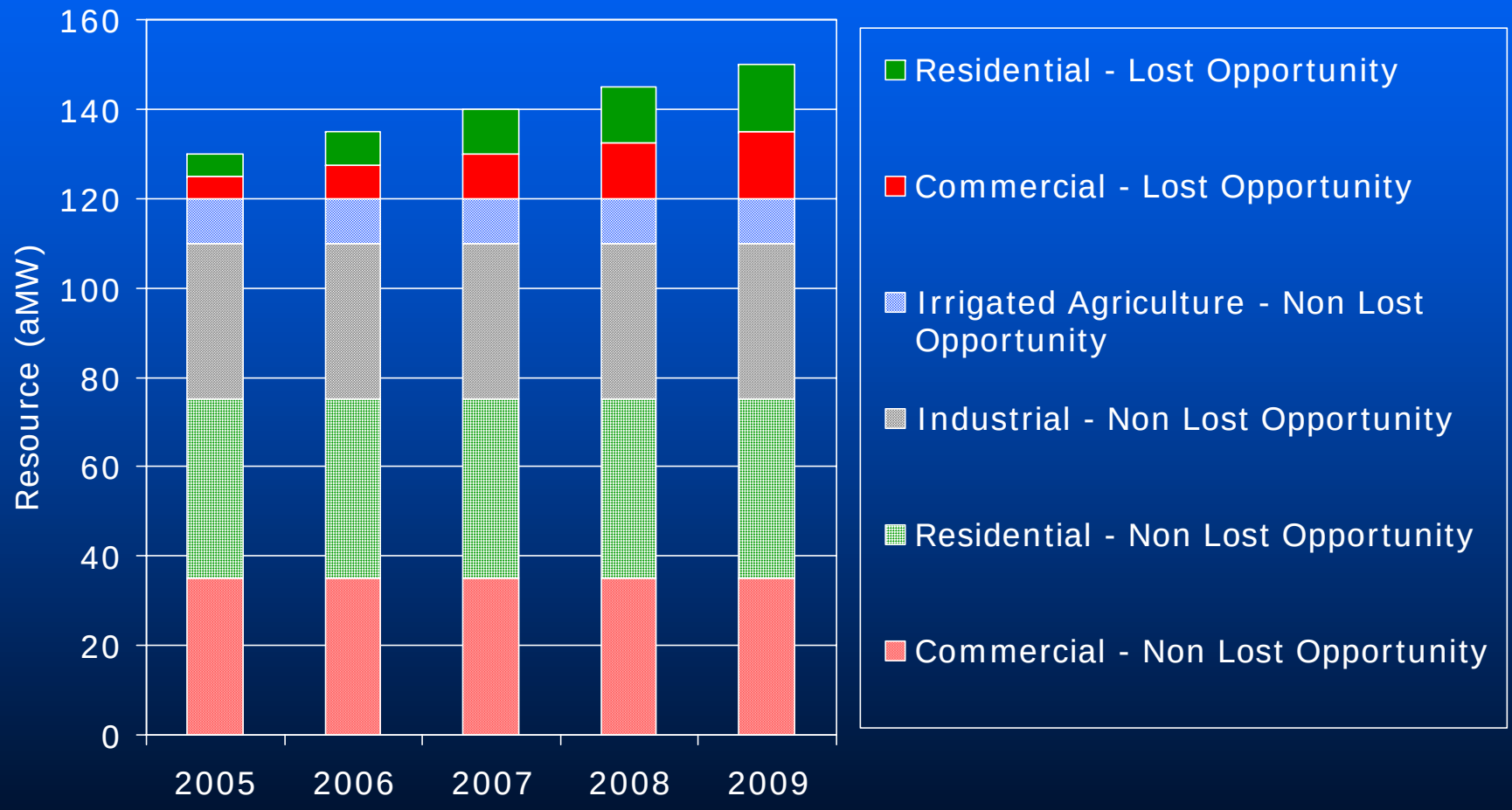
Regional Near-Term Conservation Targets (2005-2009) = 700 aMW



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Why Should We?

What's Behind the 5th Plan's Conservation Targets?

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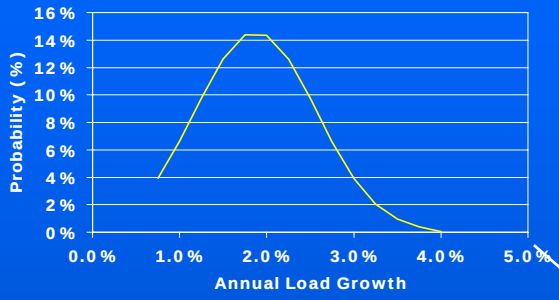
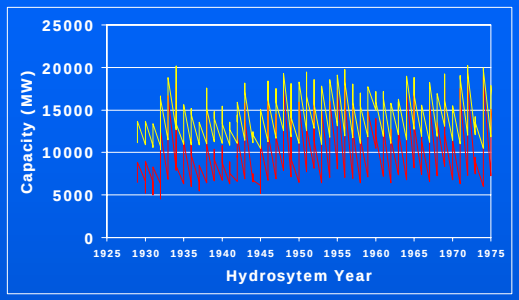
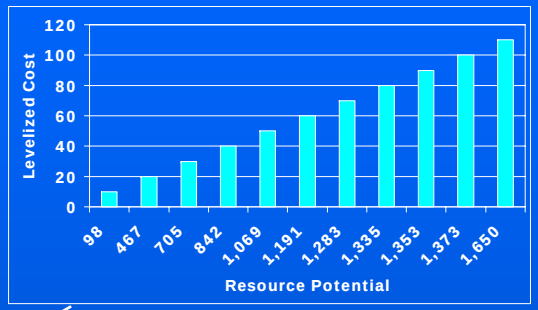
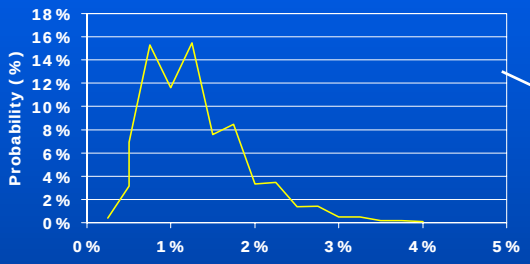
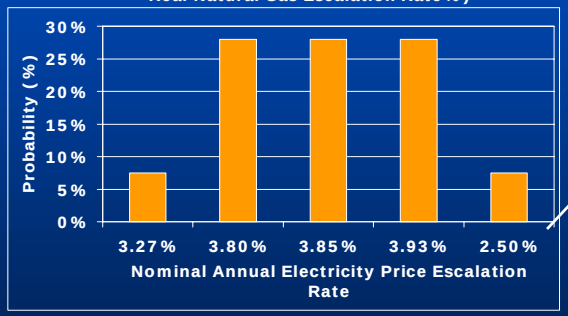
PNW Portfolio Planning – Scenario Analysis on Steroids

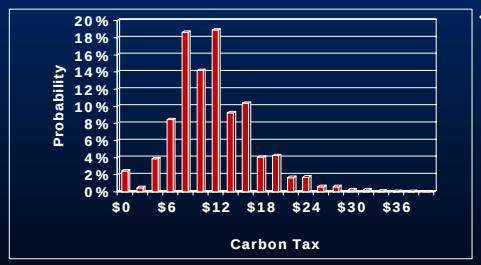


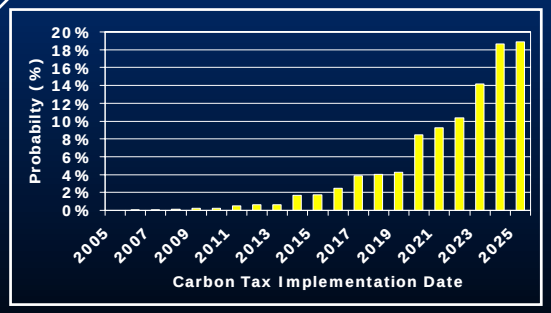




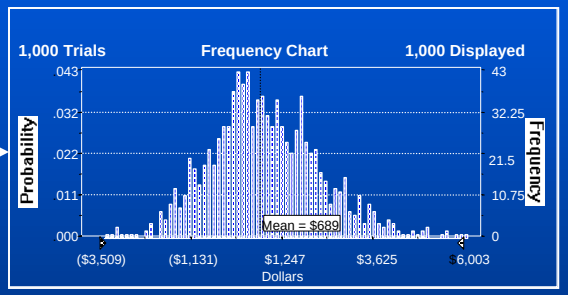




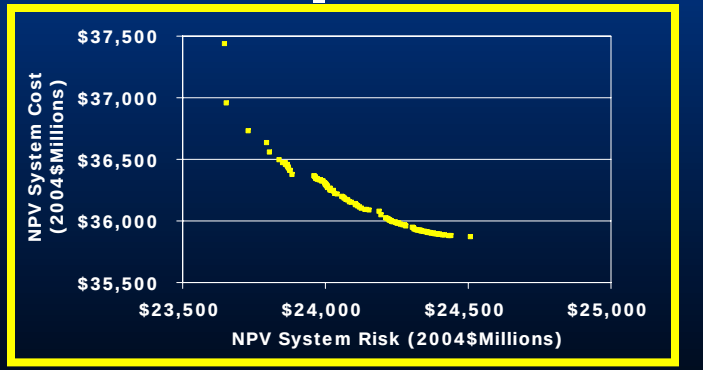




Portfolio Analysis Model

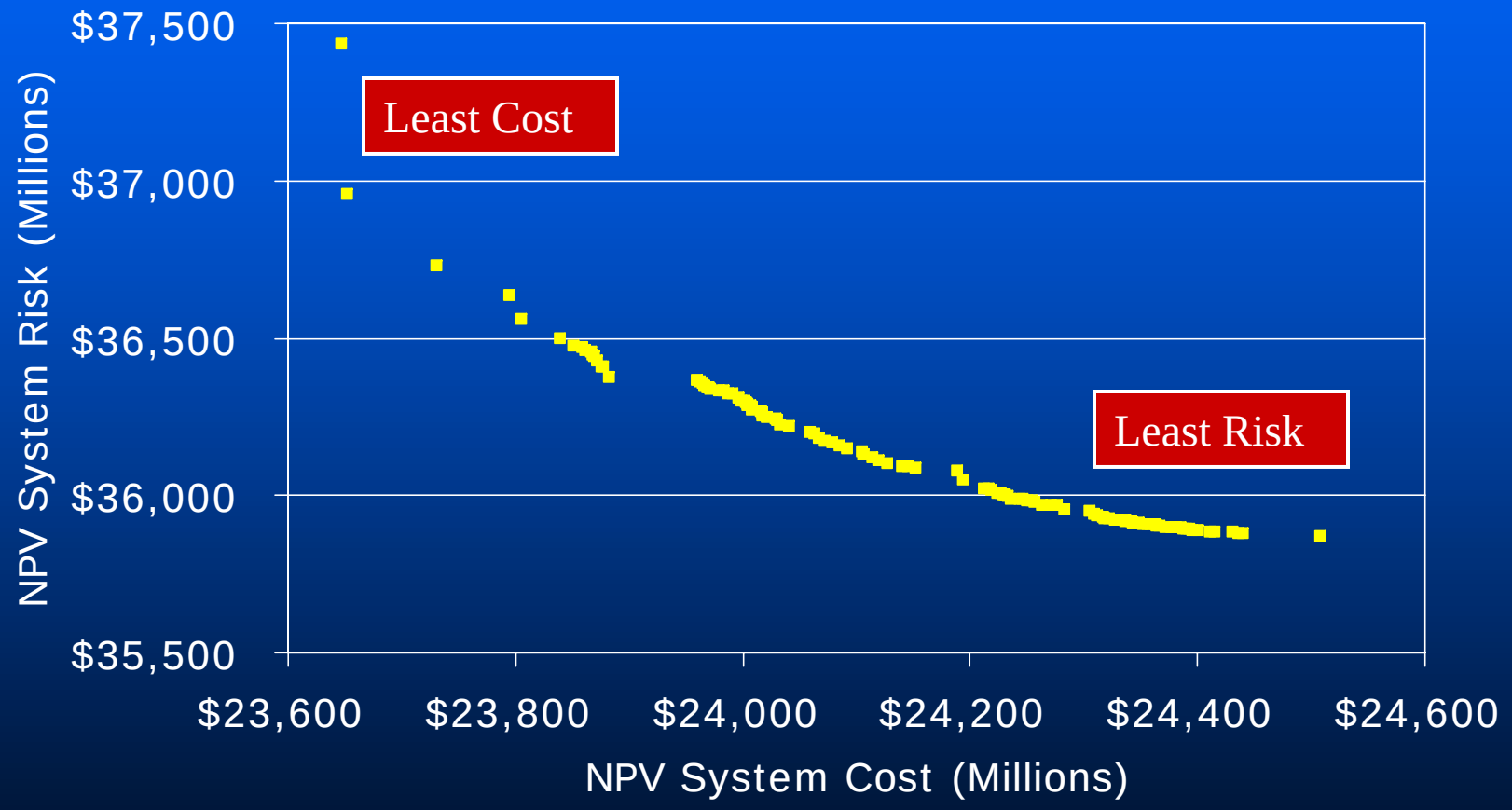


NPV System Cost



Efficient Frontier

Plans Along the Efficient Frontier Permit Trade-Offs of Costs Against Risk



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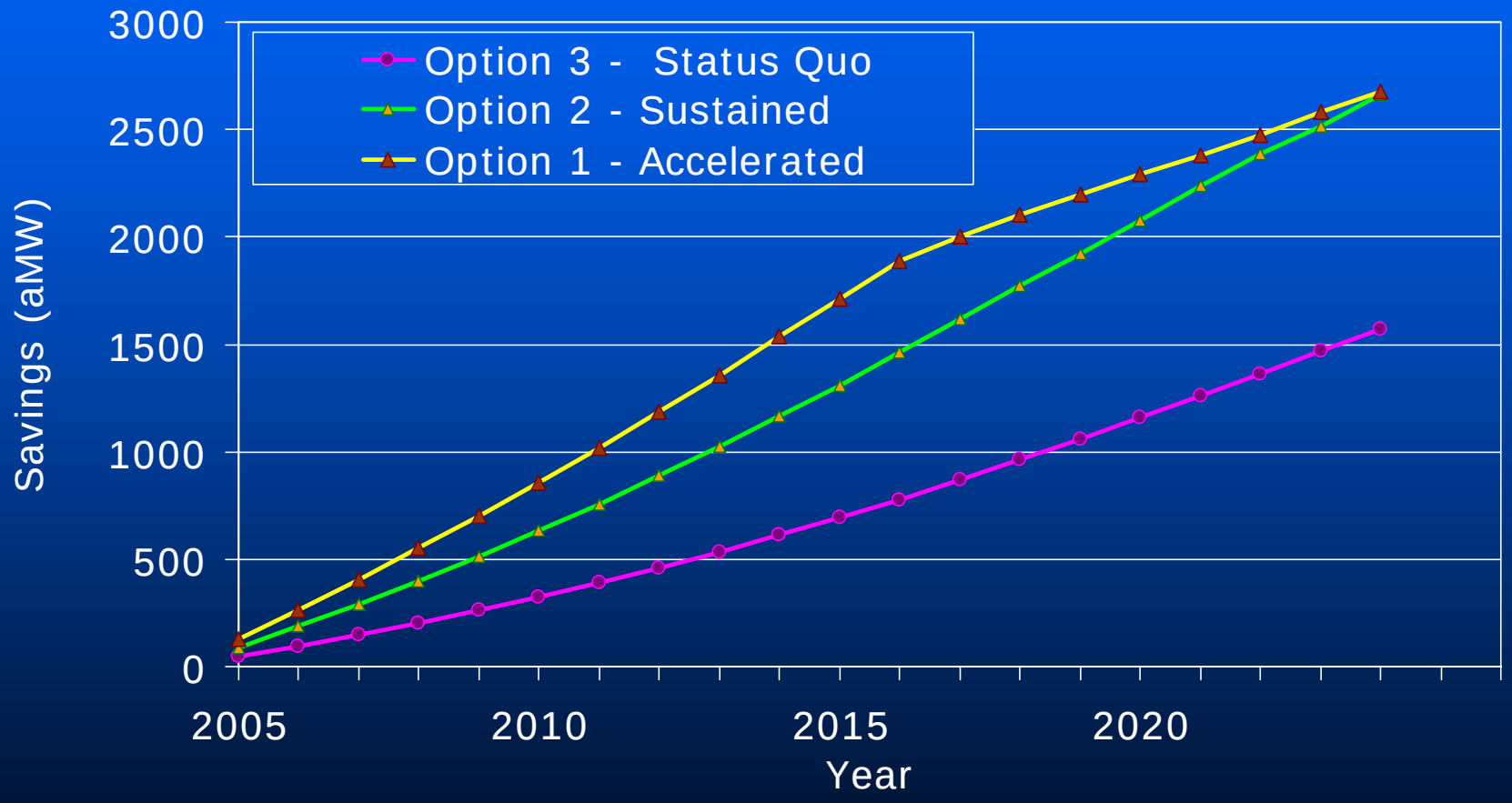
Three Conservation Options Tested

- **Option 1**: ***Accelerated*** – Similar to the "best performance" over the last 20 years
  - Non-lost opportunity limited to 120 aMW/year
  - Ramp-up lost-opportunity to 85% by 2017
- **Option 2**: ***Sustained*** - Similar to typical rates over last 20 years
  - Non-lost opportunity limited to 80 aMW/year
  - Ramp-up lost-opportunity to 85% by 2017
- **Option 3**: ***Status Quo*** - Similar to lowest rates over last 20 years
  - Non-lost opportunity limited to 40 aMW/year
  - Ramp-up lost-opportunity to 85% penetration by 2025

Average Annual Conservation Development for Alternative Levels of Deployment Tested



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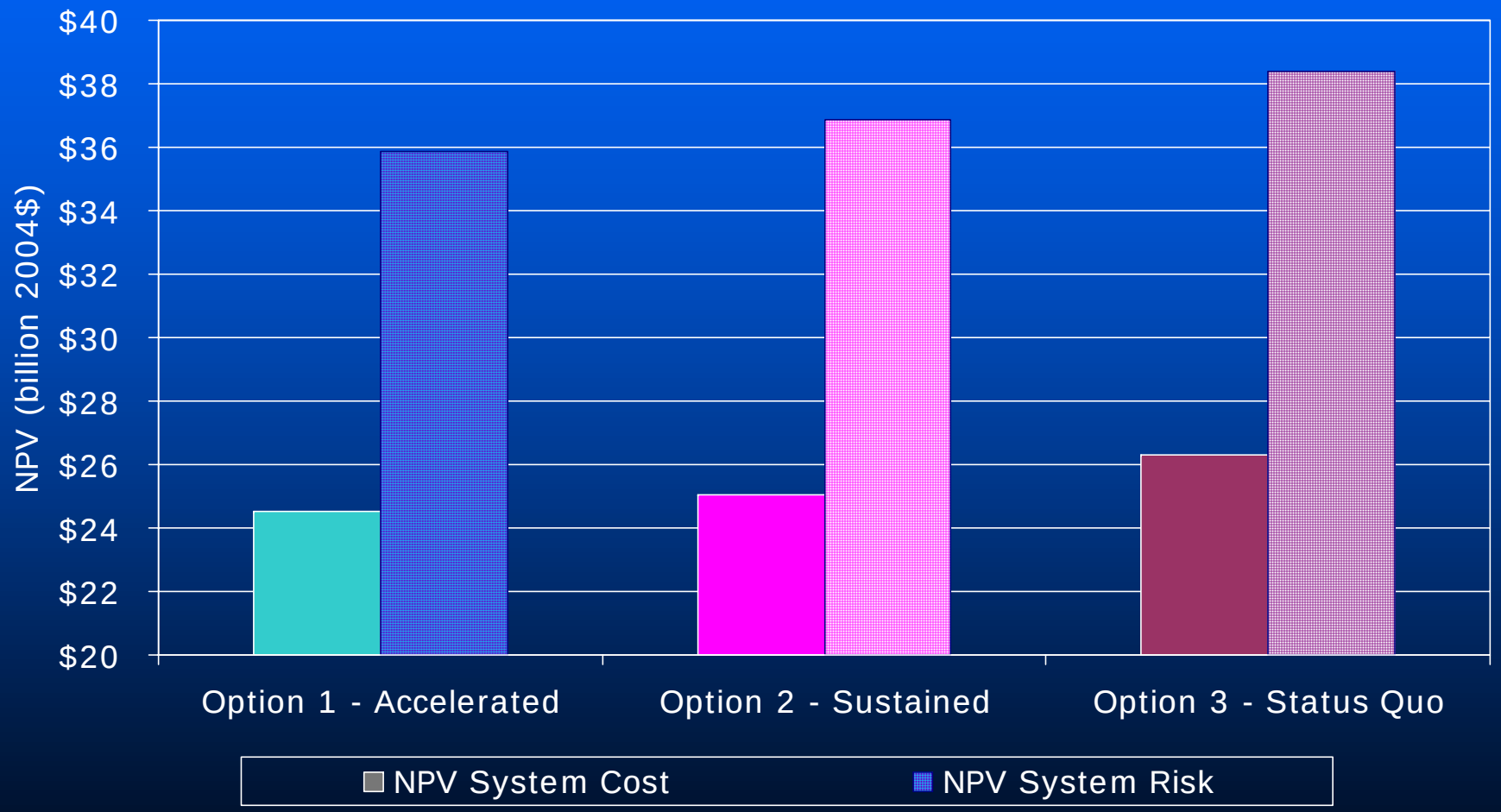
Accelerating Conservation Development Reduces Cost & Risk



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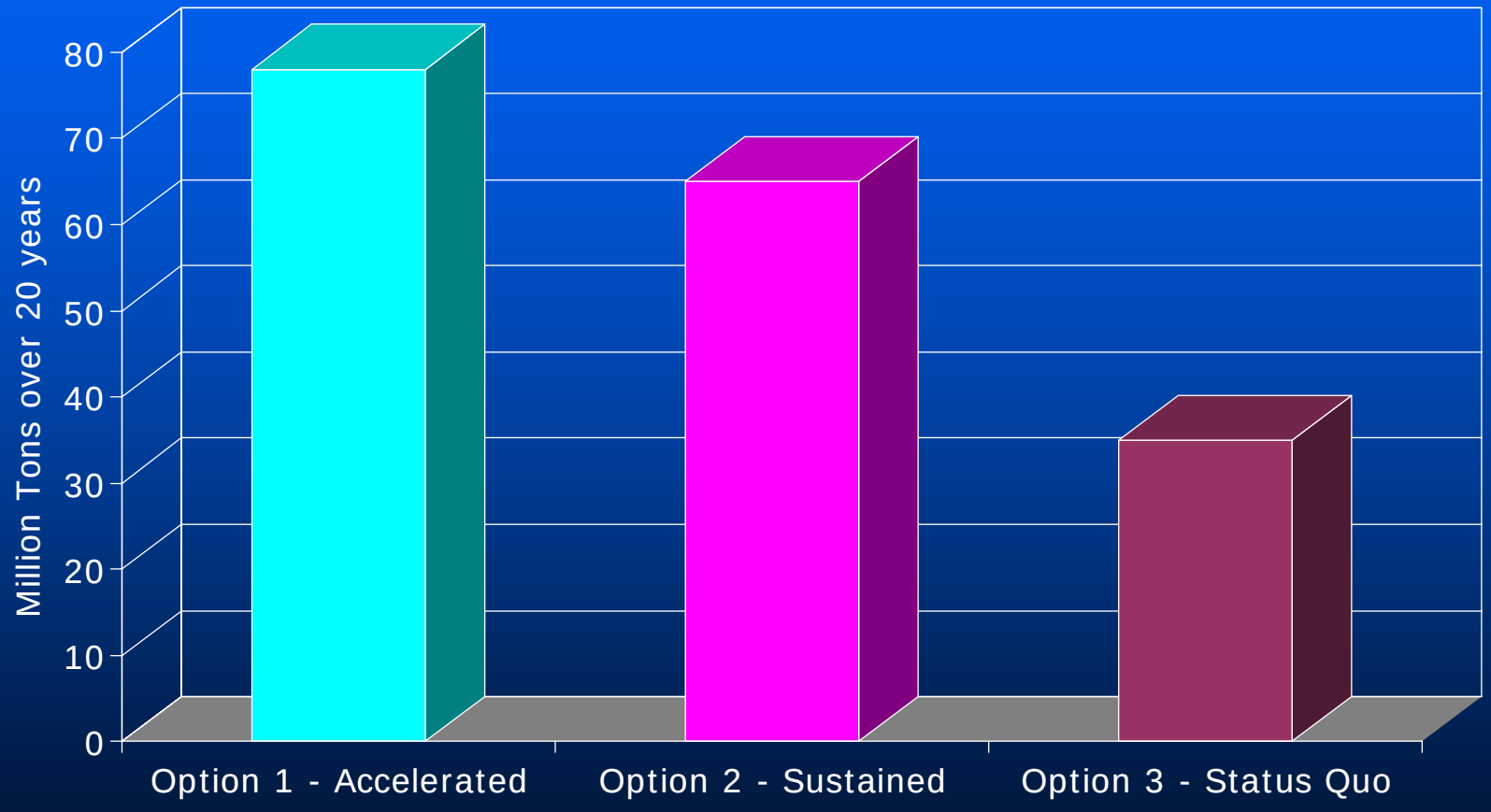
WECC Carbon Dioxide Emissions Reductions for Alternative Conservation Targets



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Why Energy Efficiency Reduces System Cost and Risk

- It's A Cheap (avg. 2.4 cents/kWh TOTAL RESOURCE COST) Hedge Against Market Price Spikes
- It has value even when market prices are low
- It's Not Subject to Fuel Price Risk
- It's Not Subject to Carbon Control Risk
- It's Significant Enough In Size to Delay "build decisions" on generation

The Plan's Targets Are A Floor, Not a Ceiling

When we took the "ramp rate" constraints off the portfolio model it developed

1500 aMW

of Energy Efficiency in 2005

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Where Are We Getting The Savings?

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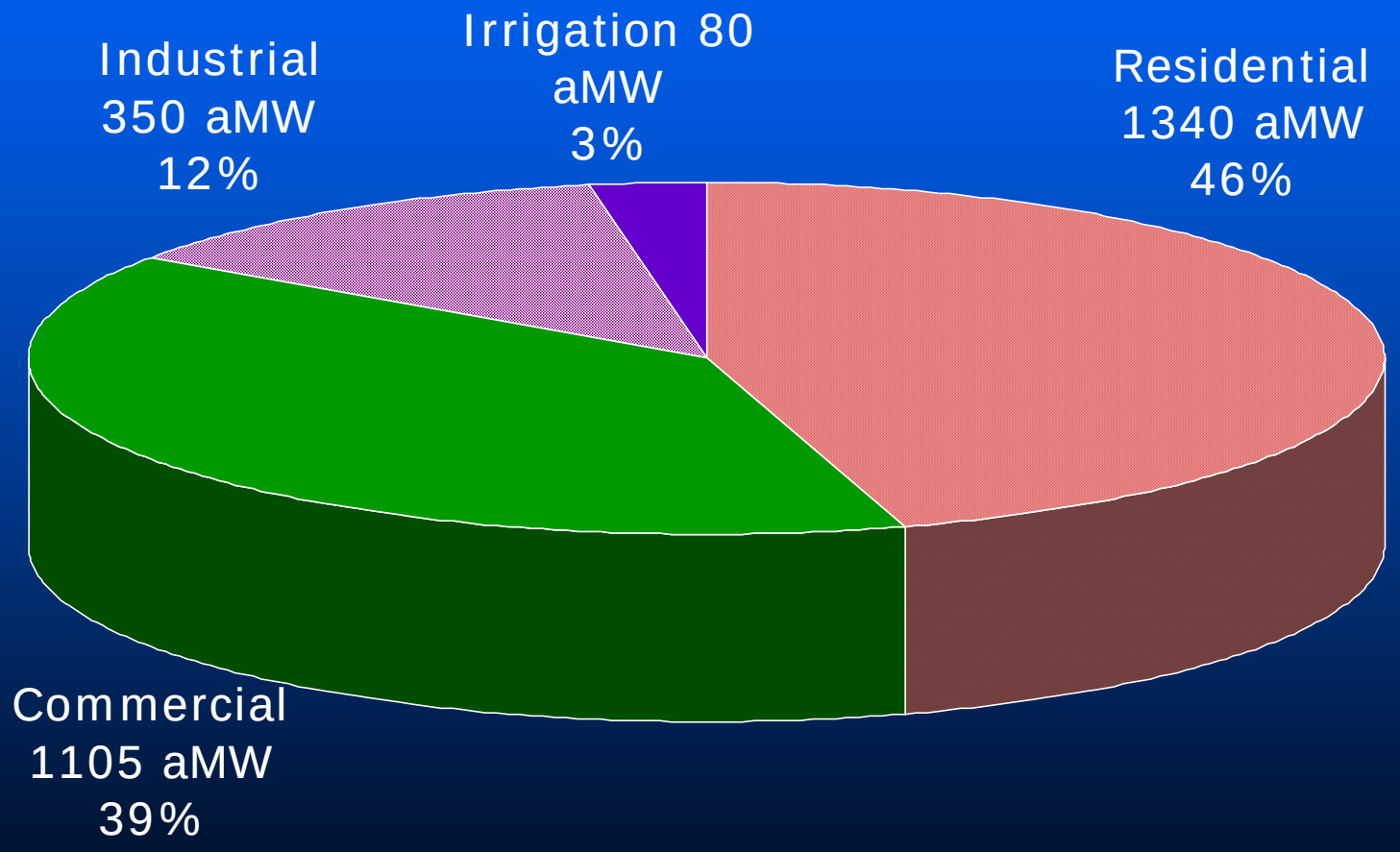
Sources of Savings by Sector



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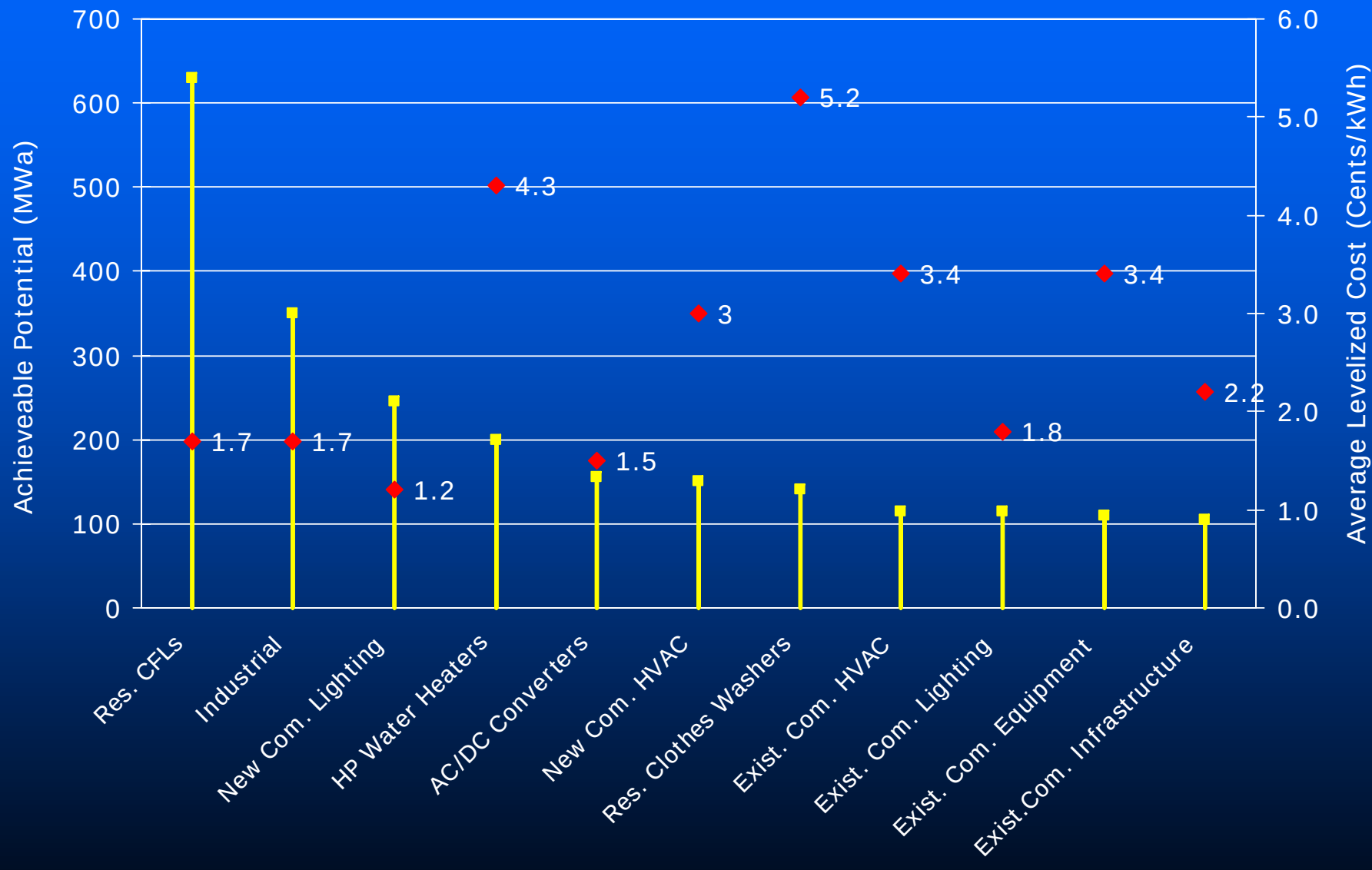
Major Sources of Efficiency Resource

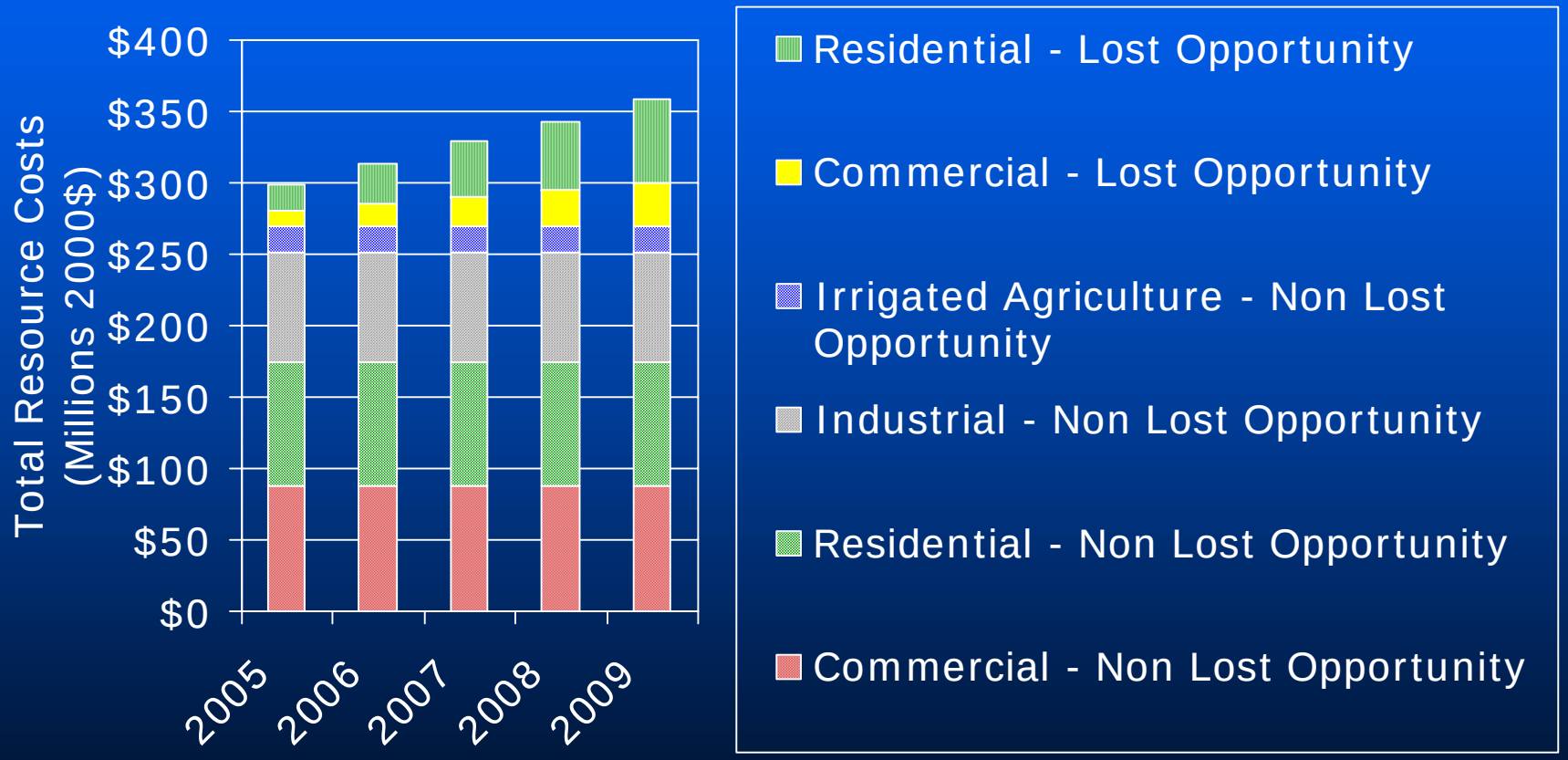


Implementation Challenges

5th Plan
Conservation Action Items

- Ramp up "Lost Opportunity" conservation
  - » Goal => 85% penetration in 12 years
  - » 10 to 30 MWa/year 2005 through 2009
- Accelerate the acquisition of "Non-Lost Opportunity" resources
  - » Return to acquisition levels of early 1990's
  - » Target 120 MWa/year next five years
- Employ a mix of mechanisms
  - » Local acquisition programs (utility, SBC Administrator & BPA programs)
  - » Regional acquisition programs and coordination
  - » Market transformation ventures

The Total Resource Acquisition Cost* of 5th Plan's Conservation Targets 2005 – 2009 = $1.64 billion



*Incremental capital costs to install measure plus program administration costs estimated at 20% of capital.

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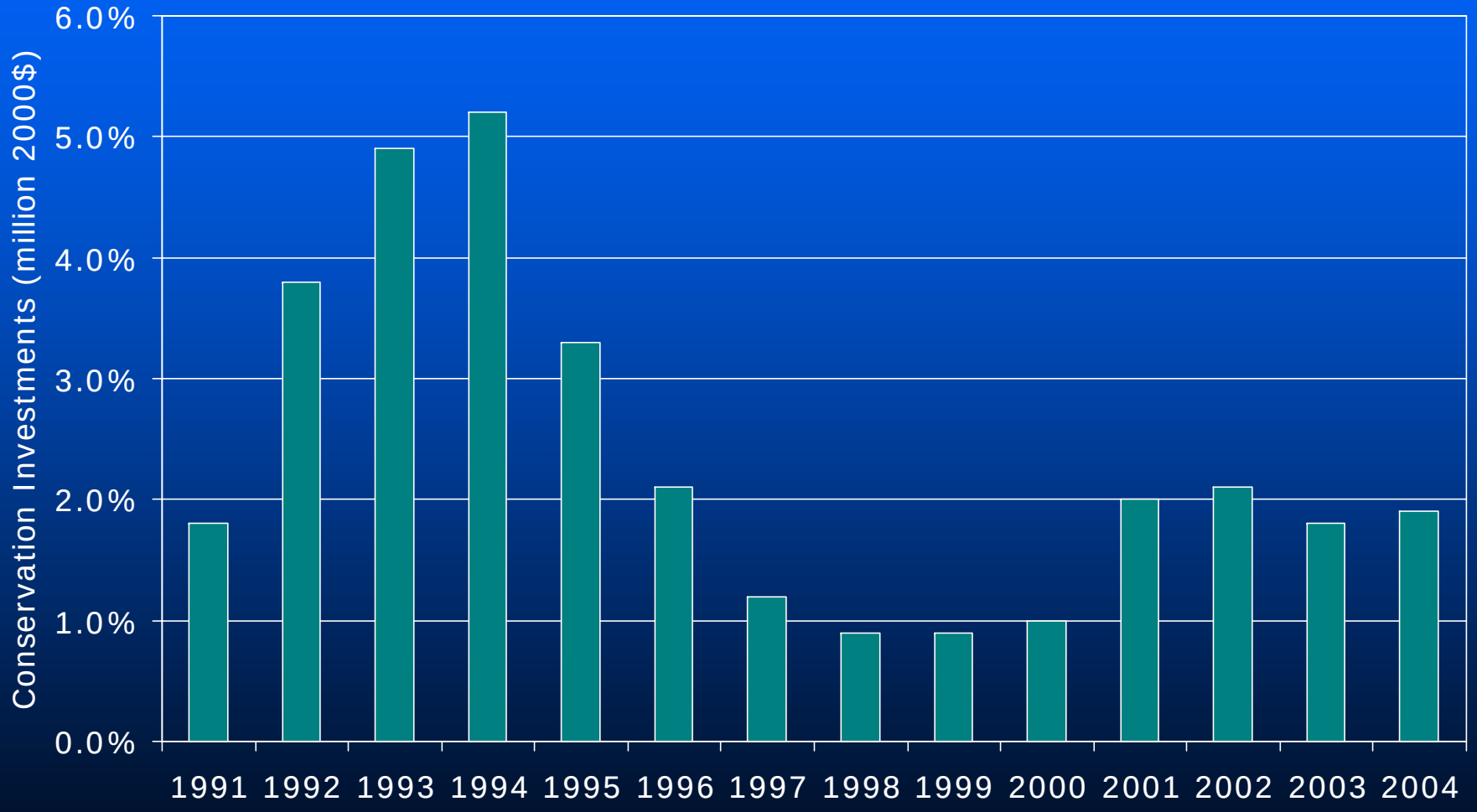
PNW Utilities Now Invests Less Than 2% of Their Retail Sales Revenues in Energy Efficiency



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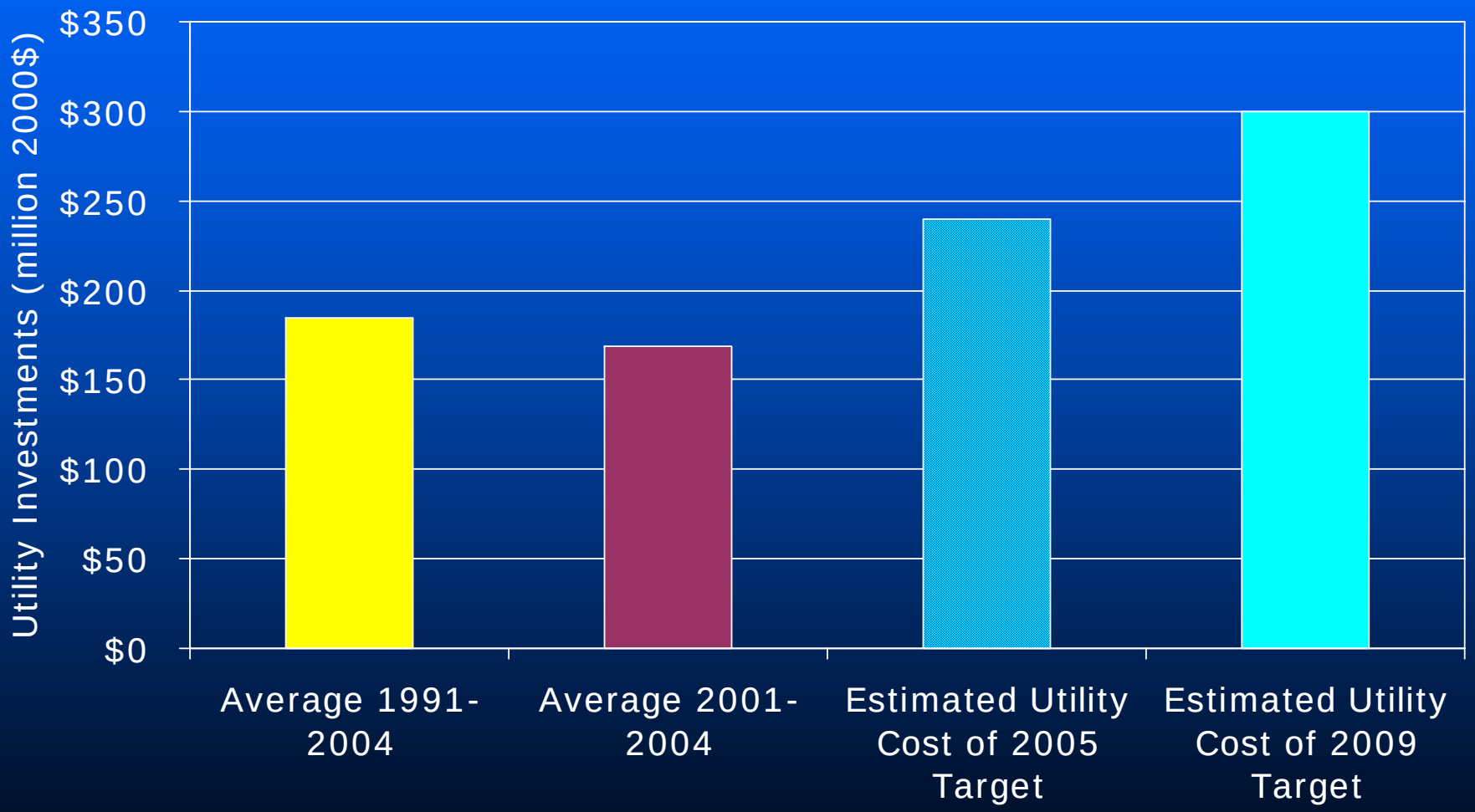
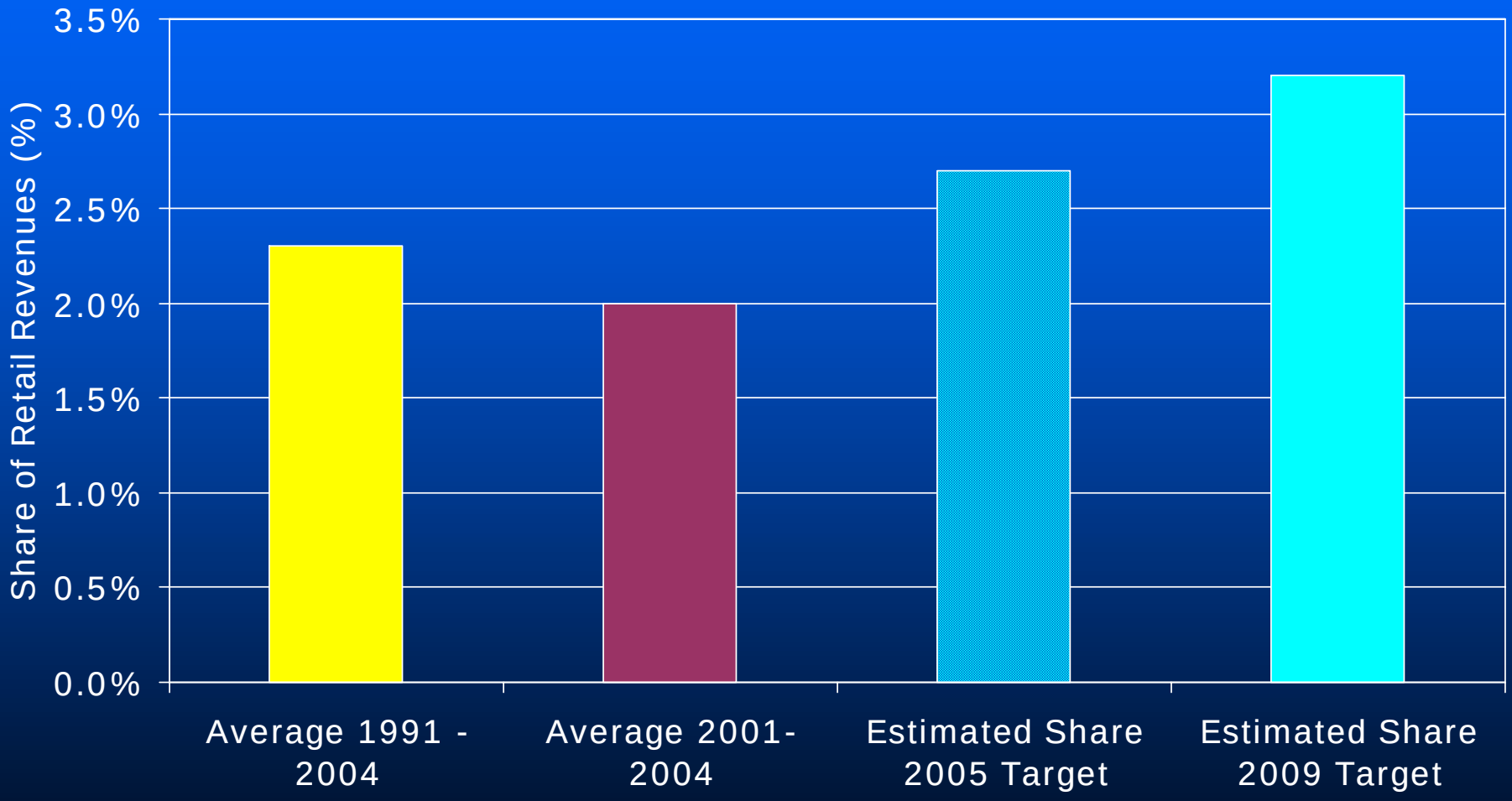
Meeting the Plan's Efficiency Targets Will Likely Require Increased Regional Investments



Although, The Share of Utility Revenues Required is Modest



Regional Average Revenues/kWh will need to increase by $0.000006/kWh

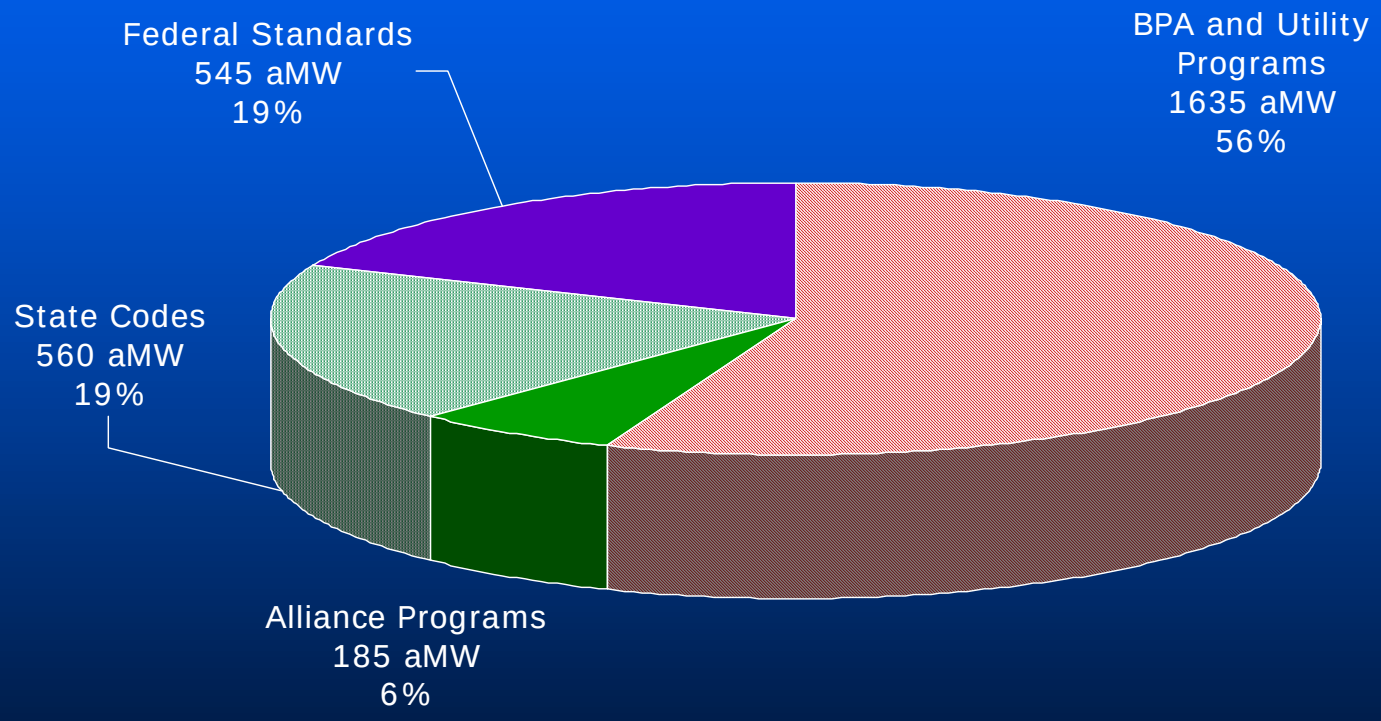
Summary

- The 5th Plan's Goal Is To Make The *Inefficient* Use of Electricity . . .
  - ***Immoral***
  - ***Illegal***
  - ***Unprofitable***

If We Fail Both ***Costs*** and ***Risk*** Will Be Higher

Backup Slides

Cumulative 1978 - 2004 Efficiency Achievements by Source



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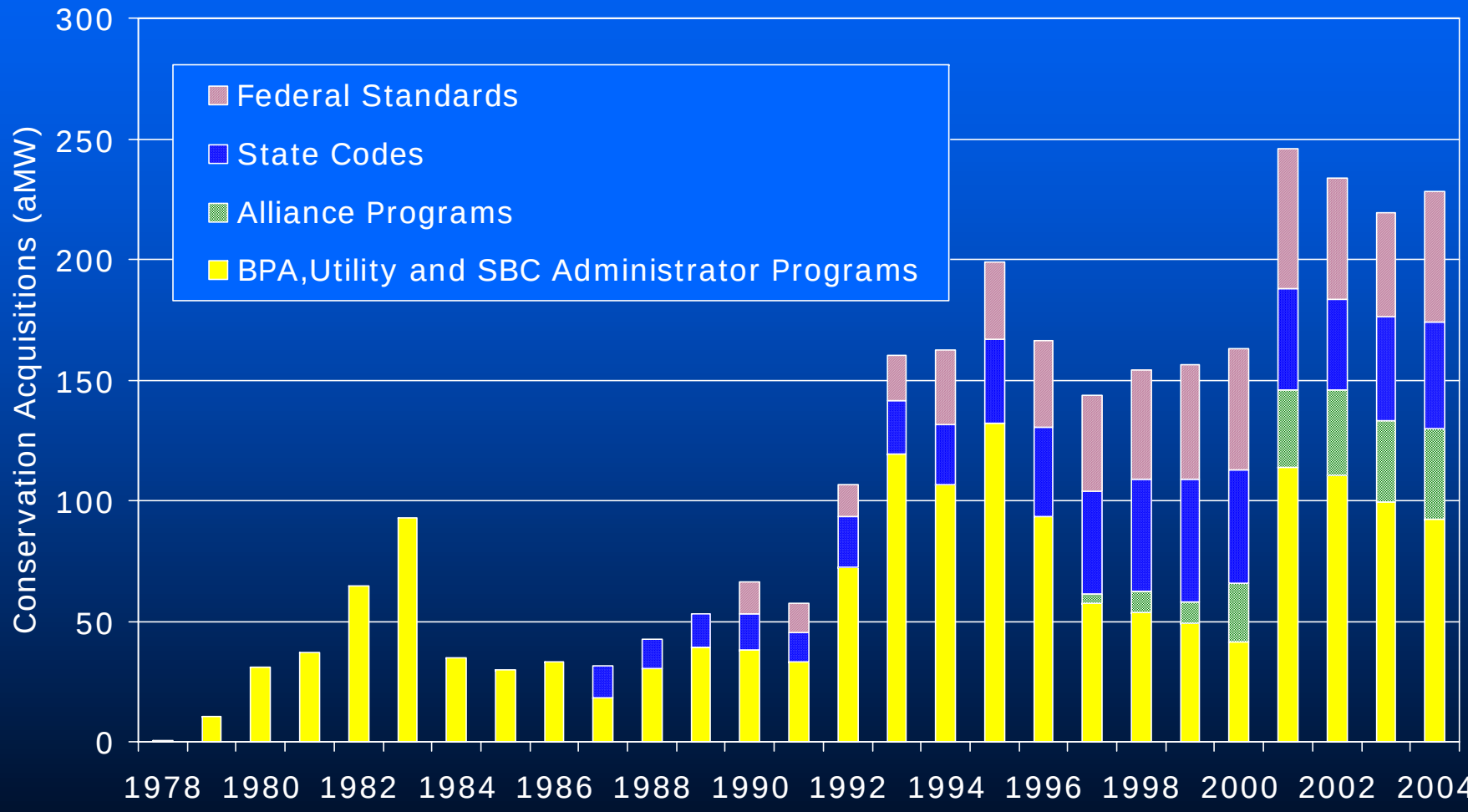
Total PNW Annual Energy Efficiency Achievements Have Been Growing, Largely Due To The Impact of Energy Codes and Standards



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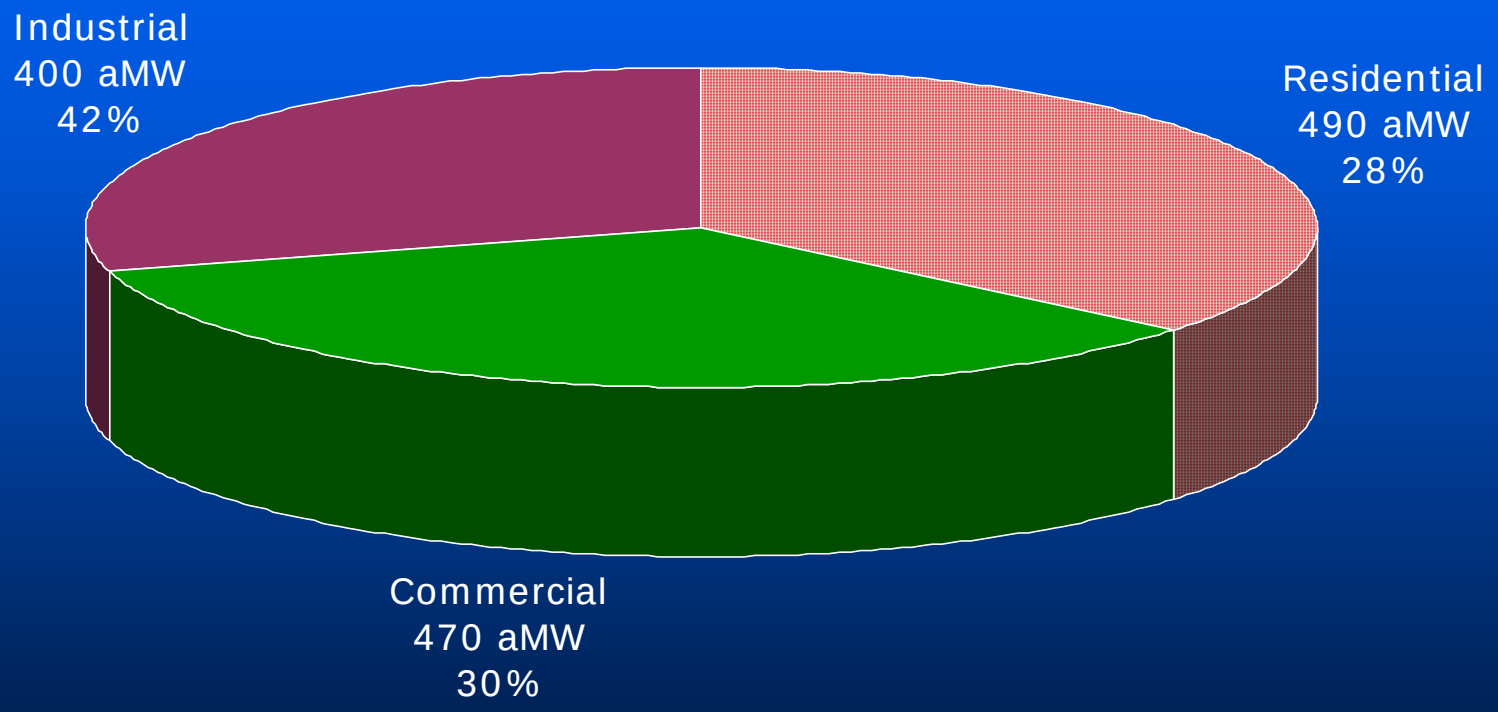
Maine's Electric Sales 1,360 aMW in 2004



Source: US DOE/EIA

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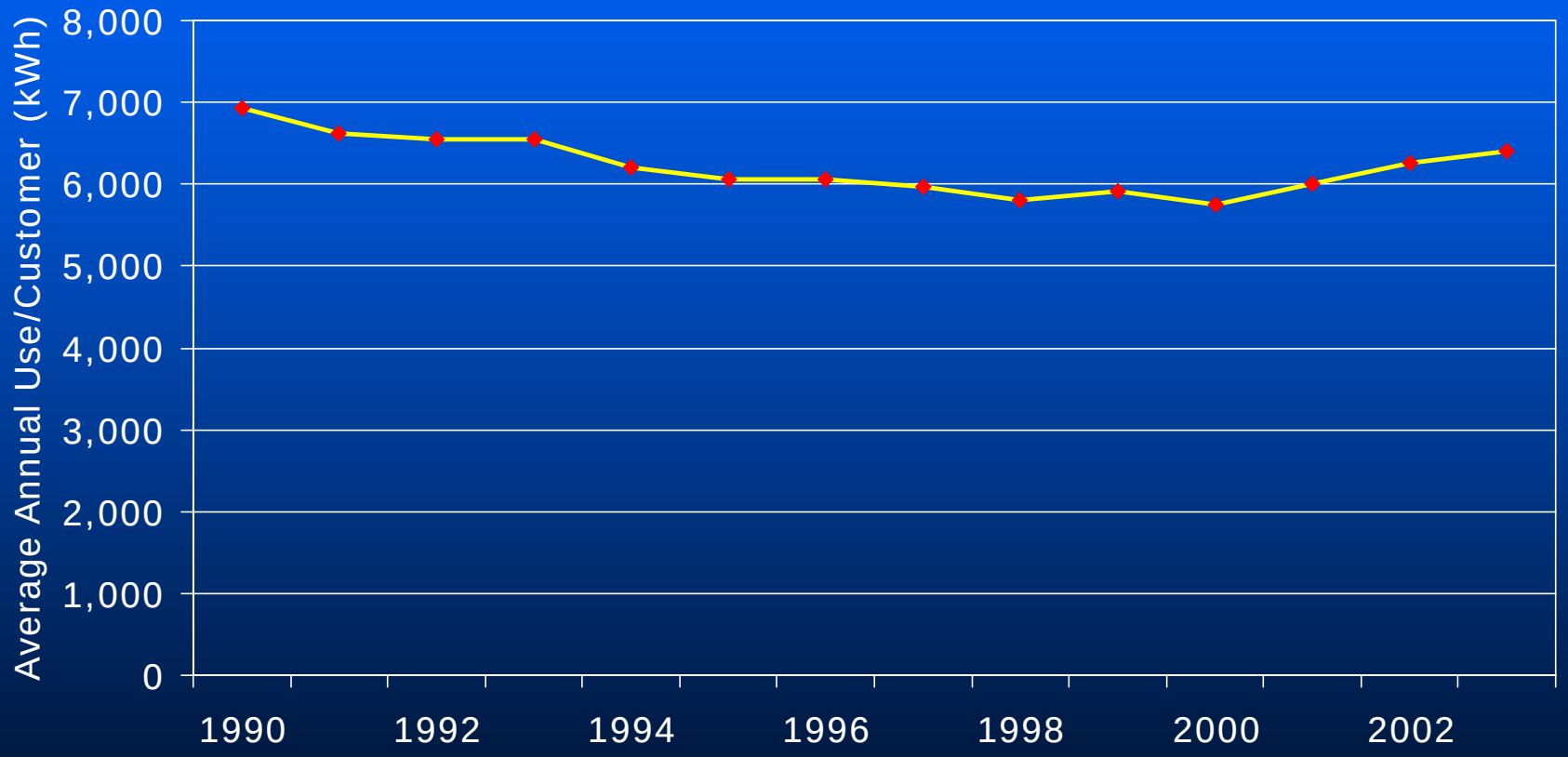
Maine Residential Electricity Use per Customer Declined in the 1990s ... But Recently It's Been Increasing



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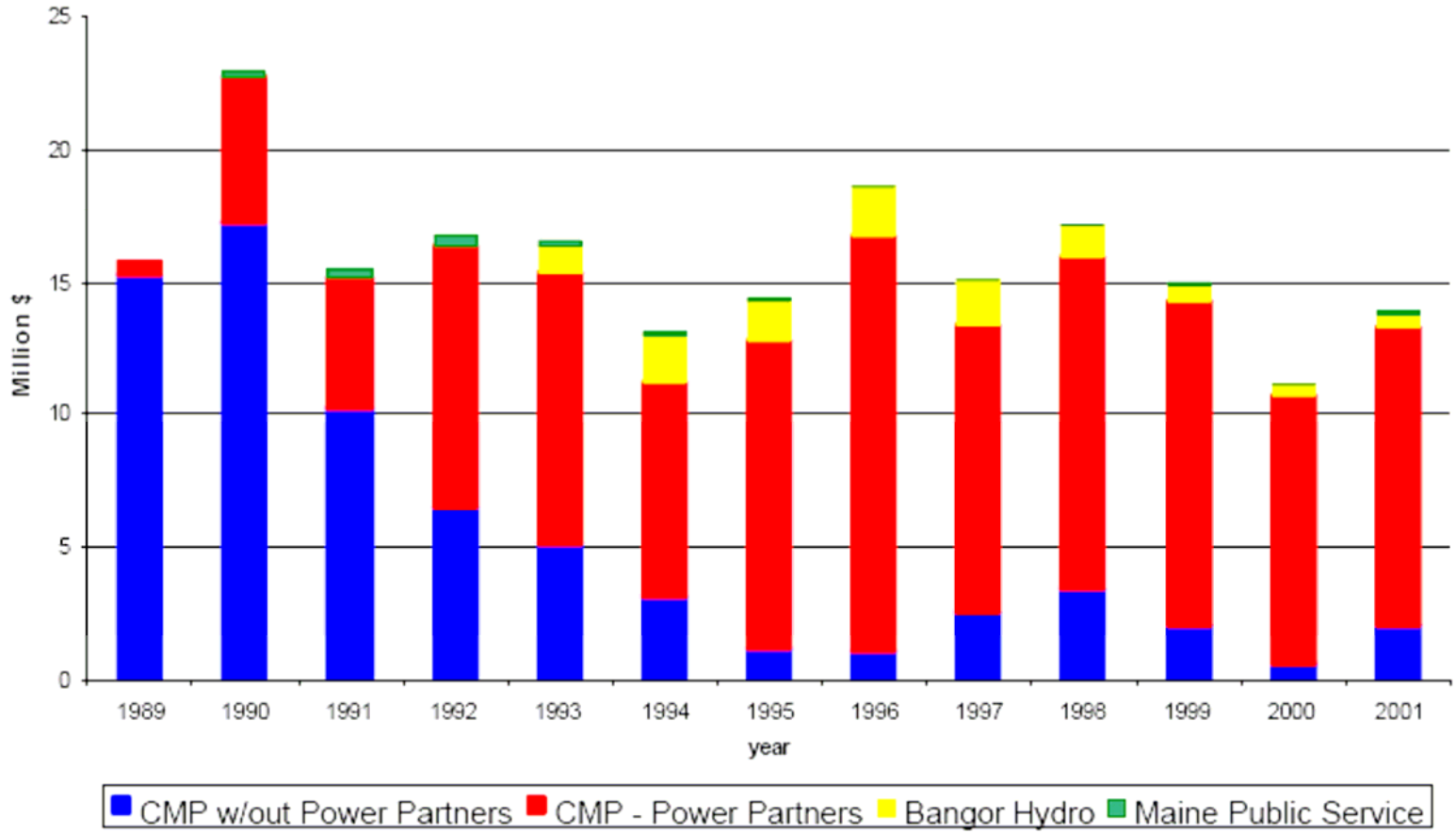
Energy Efficiency Spending in CMP, BHE, and MPS Since the Late 1980s



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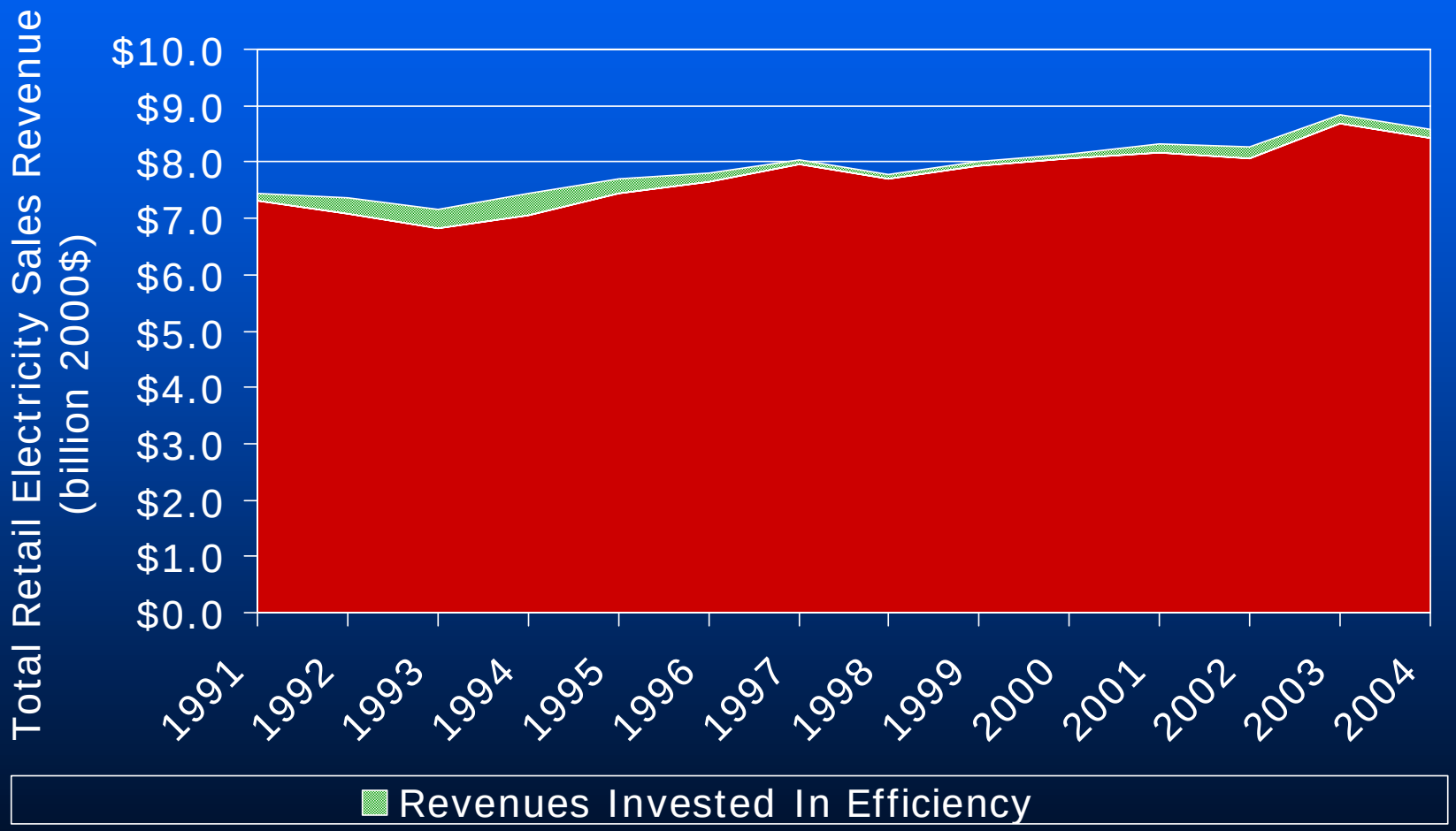
Efficiency Maine Projected Investments

Program					
	2005	2006	2007	2008	2009
Low Income	$1,961,500	$2,528,880	$2,709,763	$2,942,161	$3,056,384
Residential Lighting	$1,289,450	$1,600,000	$2,100,000	$2,050,000	$2,300,000
Small Business	$1,961,500	$2,528,880	$2,709,763	$2,942,161	$3,056,384
Commercial&Industrial	$2,047,290	$3,200,000	$3,250,000	$3,250,000	$4,000,000
Public Facilities	$1,640,000	$1,000,000	$1,000,000	$1,000,000	$1,000,000
Education & Outreach	$579,800	$600,000	$600,000	$600,000	$600,000
Administration	$932,700	$950,000	$960,000	$970,000	$1,060,000
Market Research	$171,900	$236,450	$220,000	$200,000	$200,000
Total	**$10,584,140**	**$12,644,130**	**$13,549,527**	**$13,954,321**	**$15,272,269**

The Share of PNW Retail Electricity Sales Revenues Invested In Energy Efficiency Has Declined Since The Early 1990's



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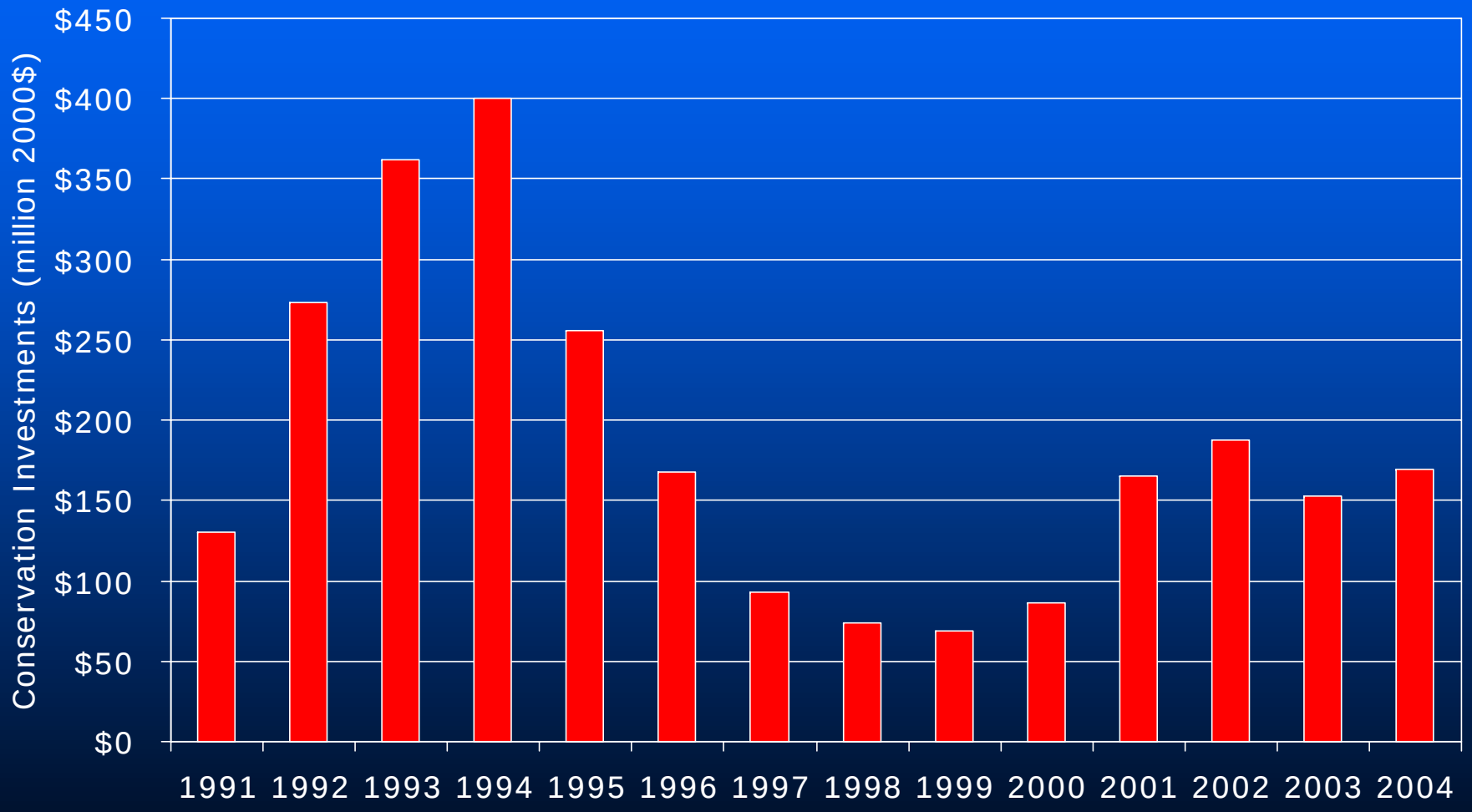
PNW Annual Utility System Investments in Energy Efficiency



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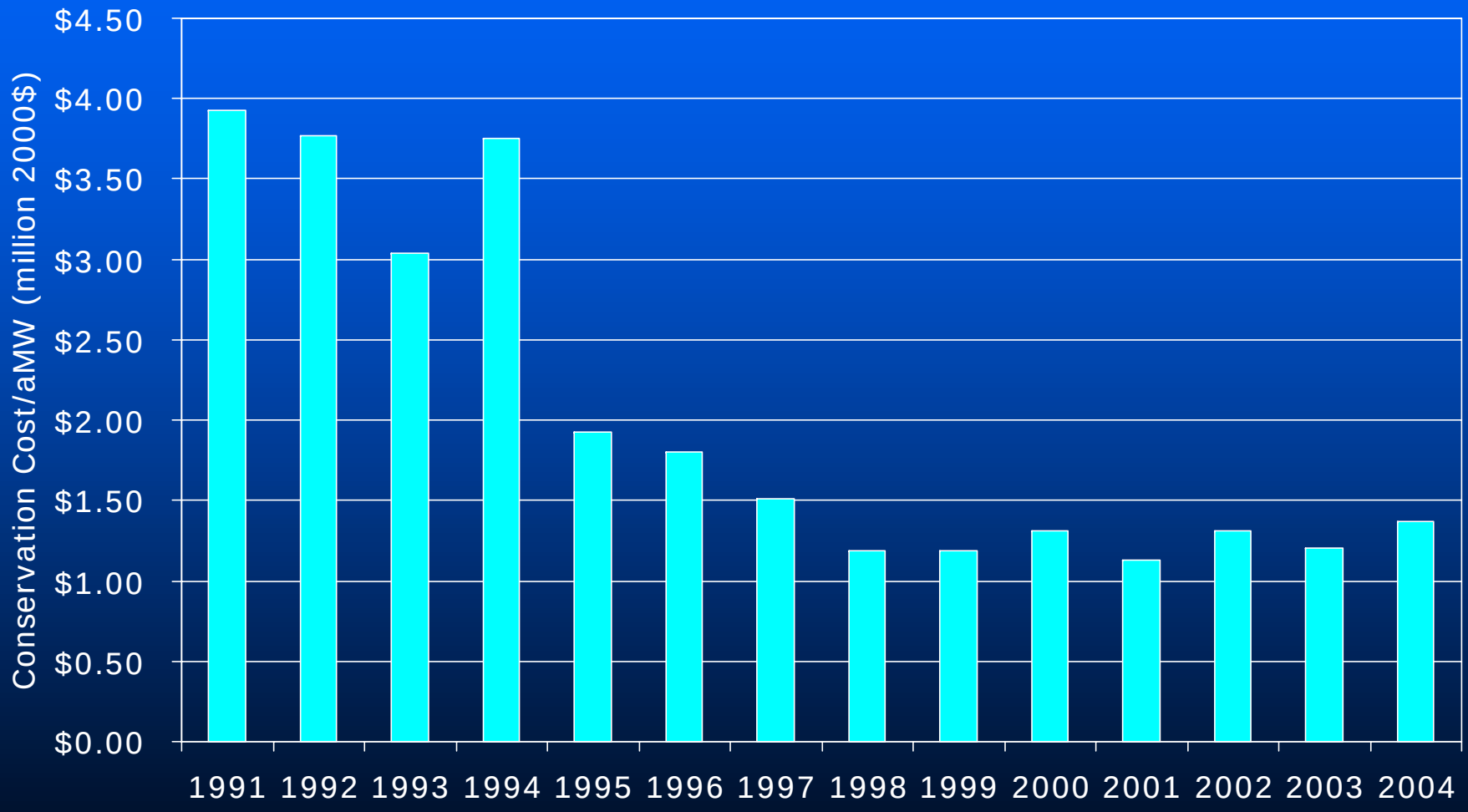
The "First Year" Cost ($/aMW) of Utility Acquired Energy Efficiency Has Declined



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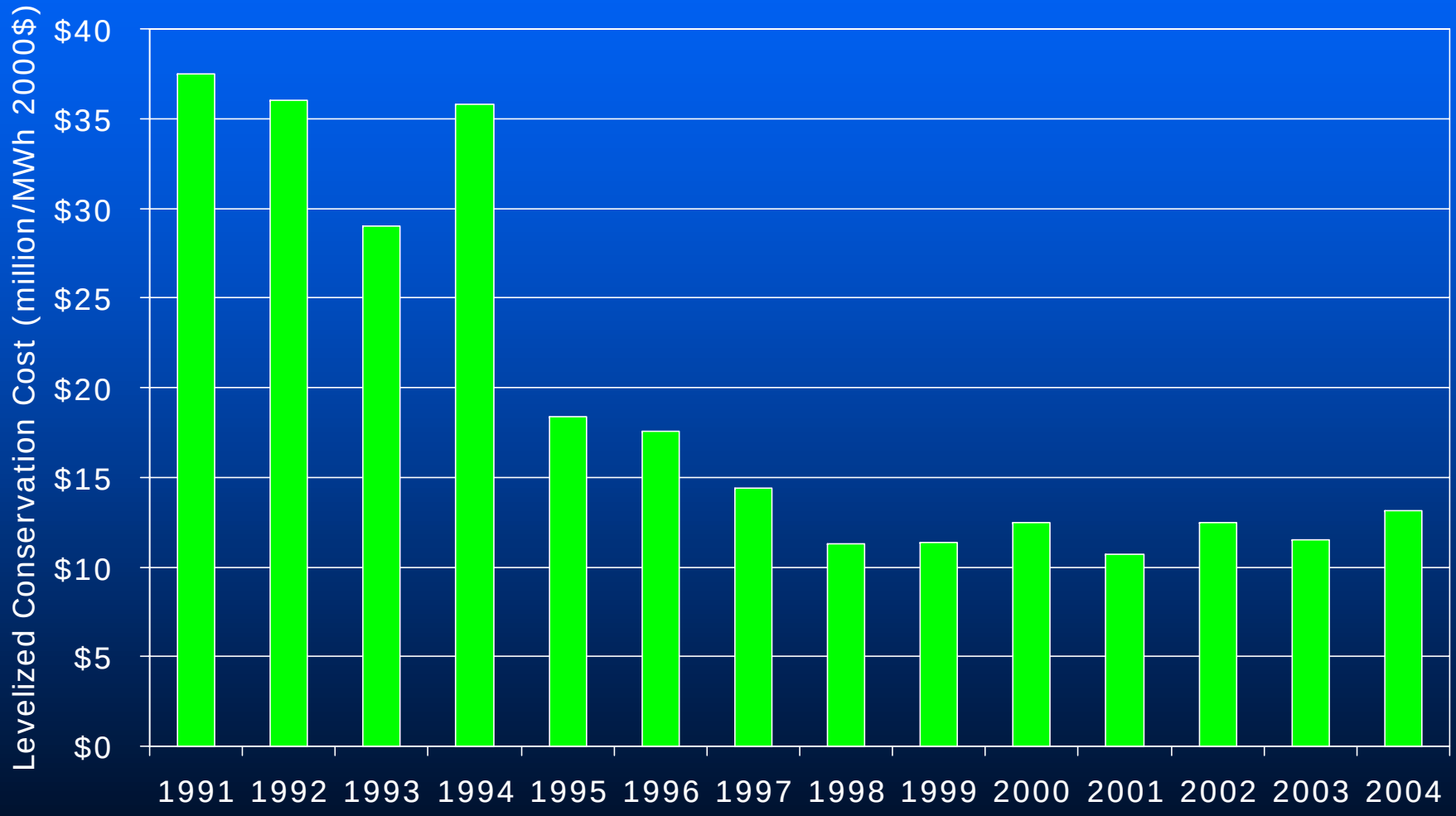
PNW Utilities Have Gotten More Efficient at Acquiring Energy Efficiency - Cost Are Now Below $15 MWH



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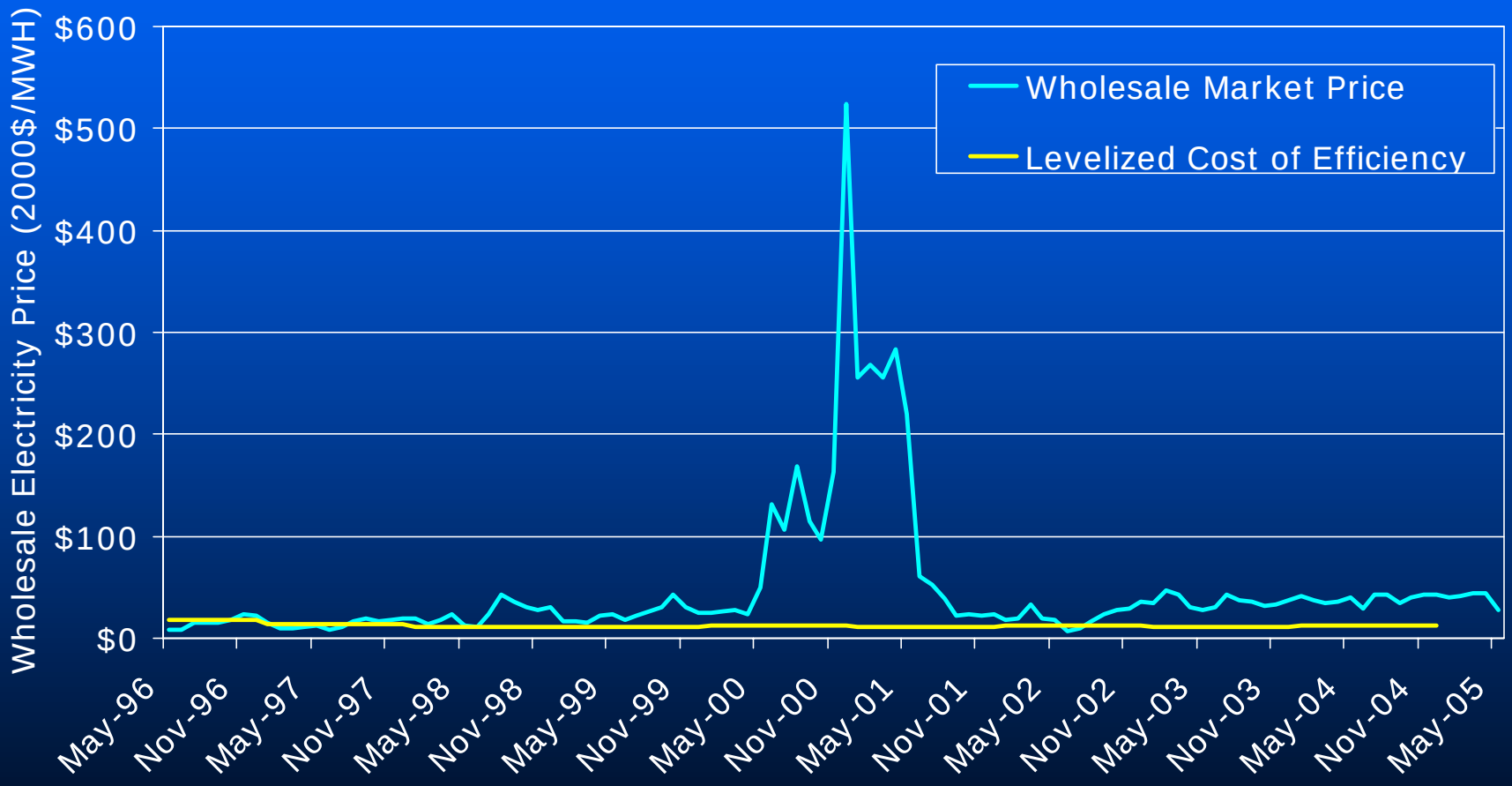
Utility Acquired Energy Efficiency Has Been Cost-Competitive with Market Purchases



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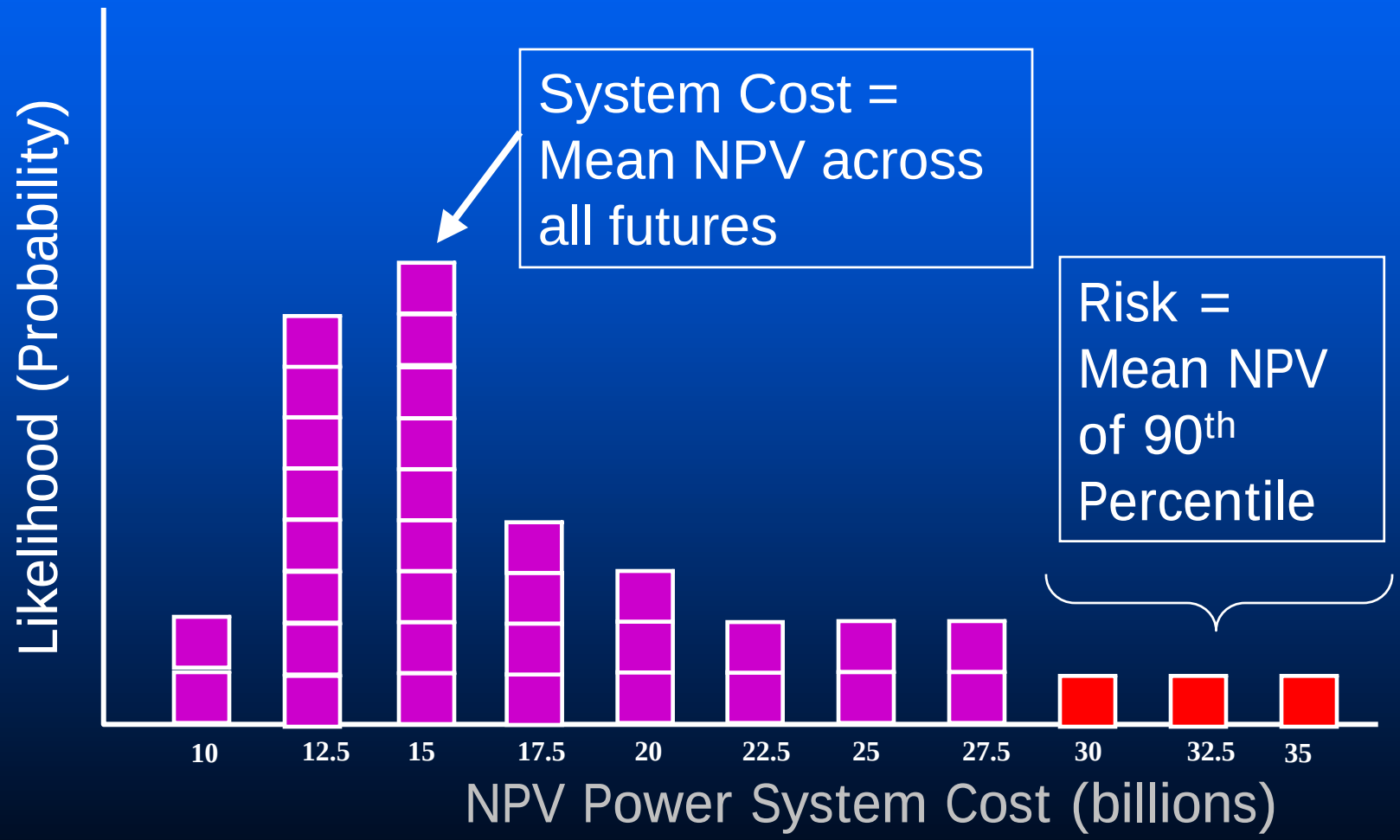
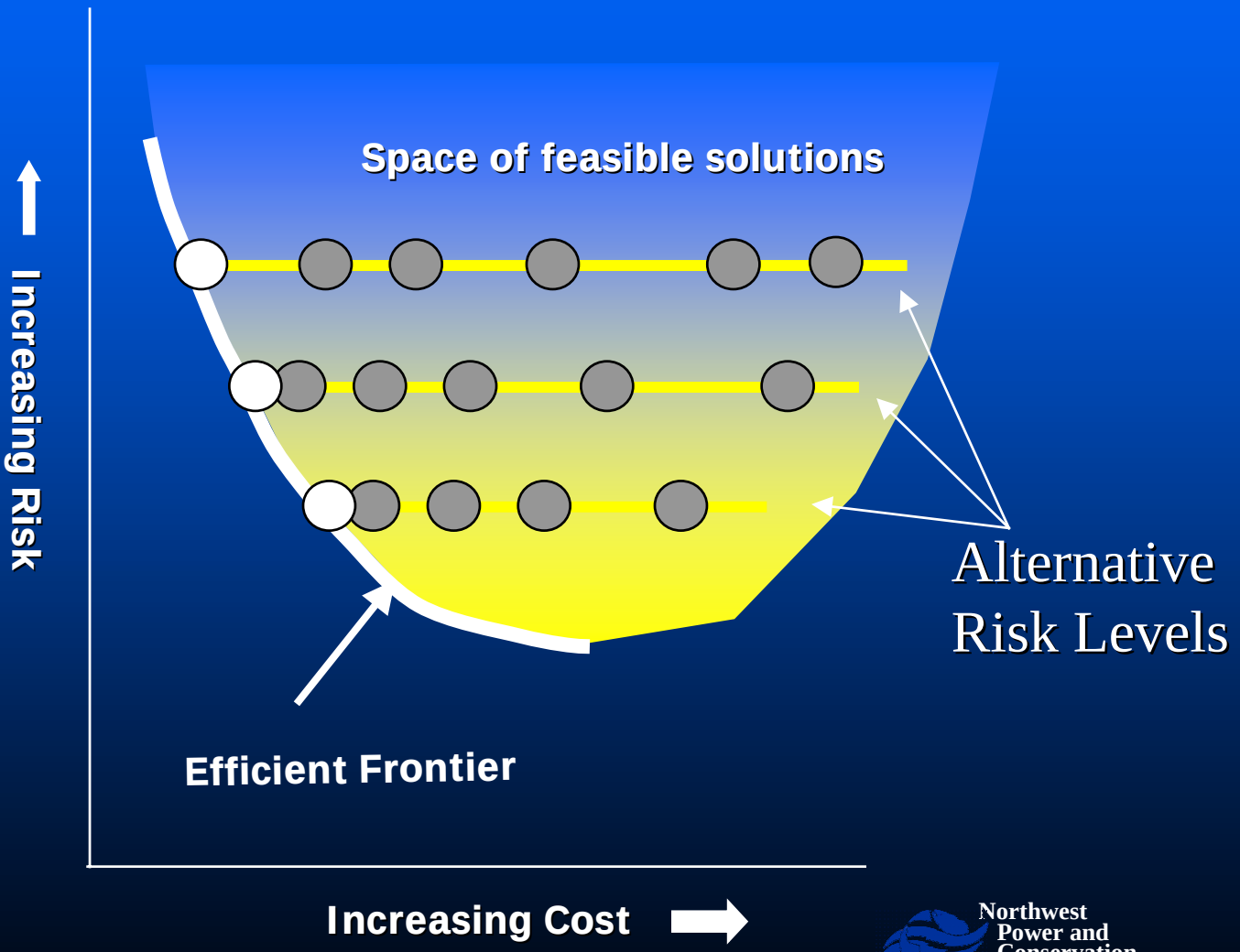
Comparing Plans for System Cost and Risk



Efficient Frontier = Least Cost Plans for Given Level of Risk



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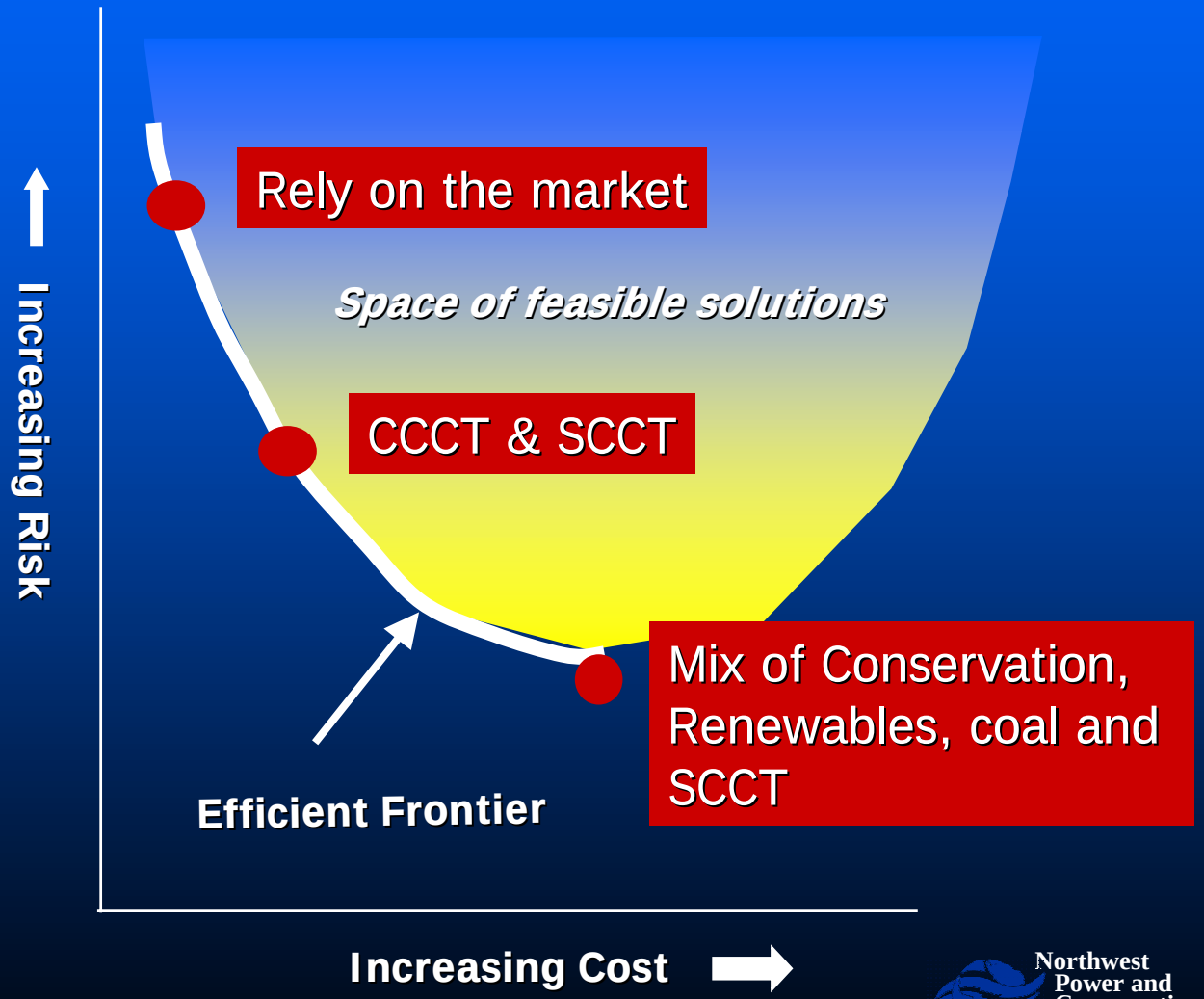
Insights from 5th Plan Portfolio Analysis – Diverse Portfolios Decrease Risk, but Increase Cost



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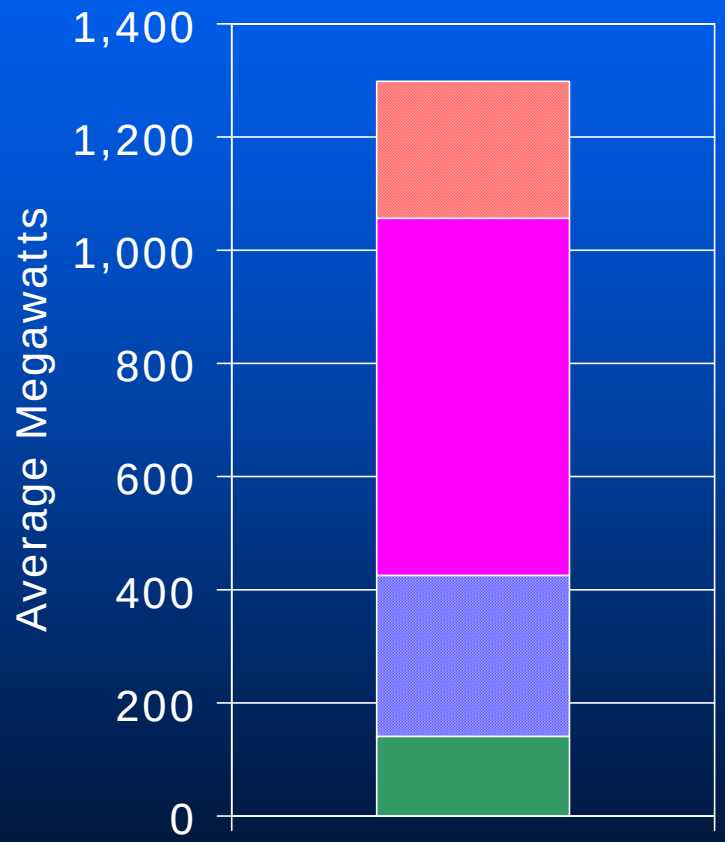
Residential Sector Target = 1340 aMW



- Residential Space Conditioning - 245 aMW
- Residential Lighting - 630 aMW
- Residential Water Heating - 285 aMW
- Residential Appliances - 140 aMW

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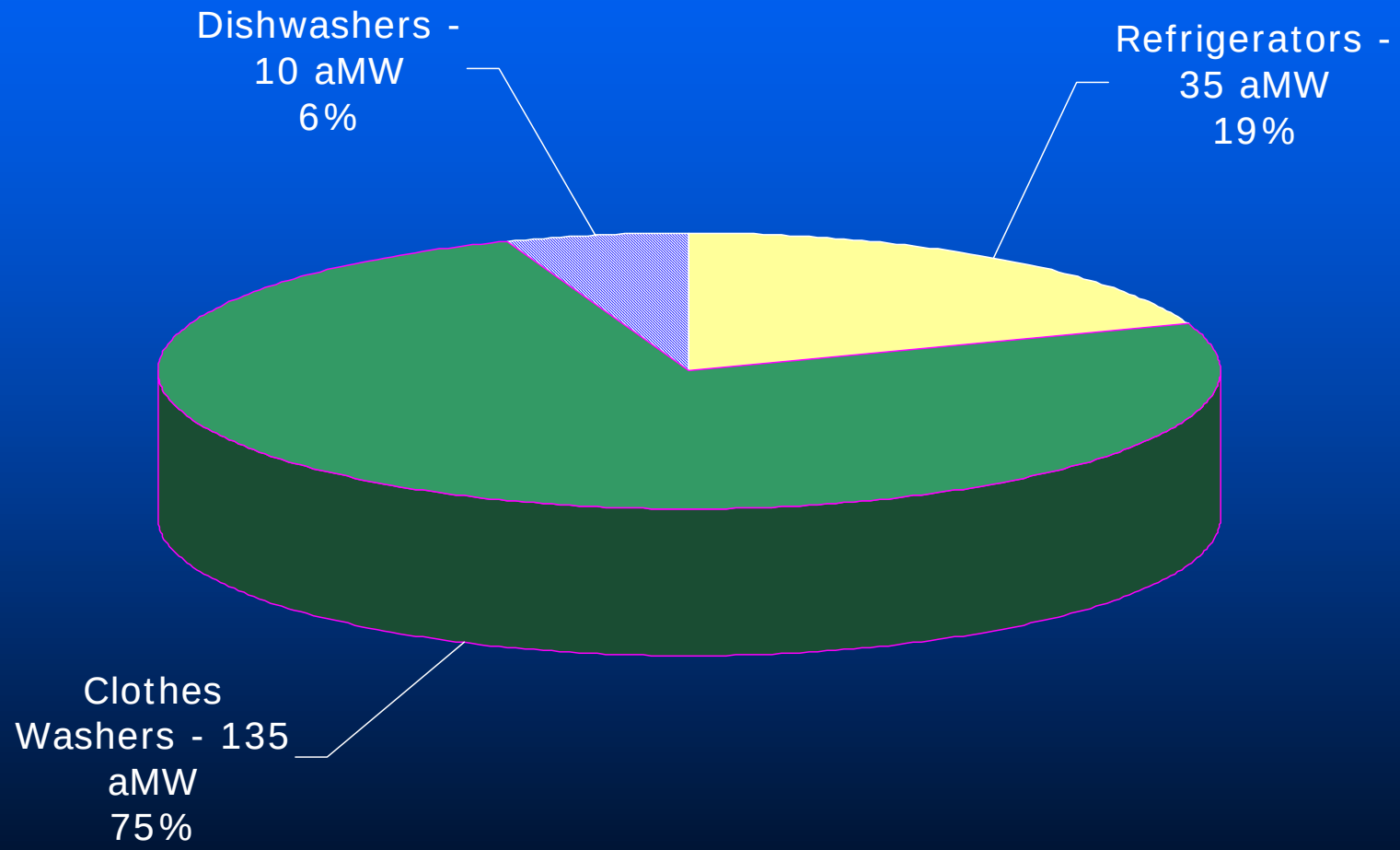
Regional Residential Sector Realistically Achievable Potential for Appliances



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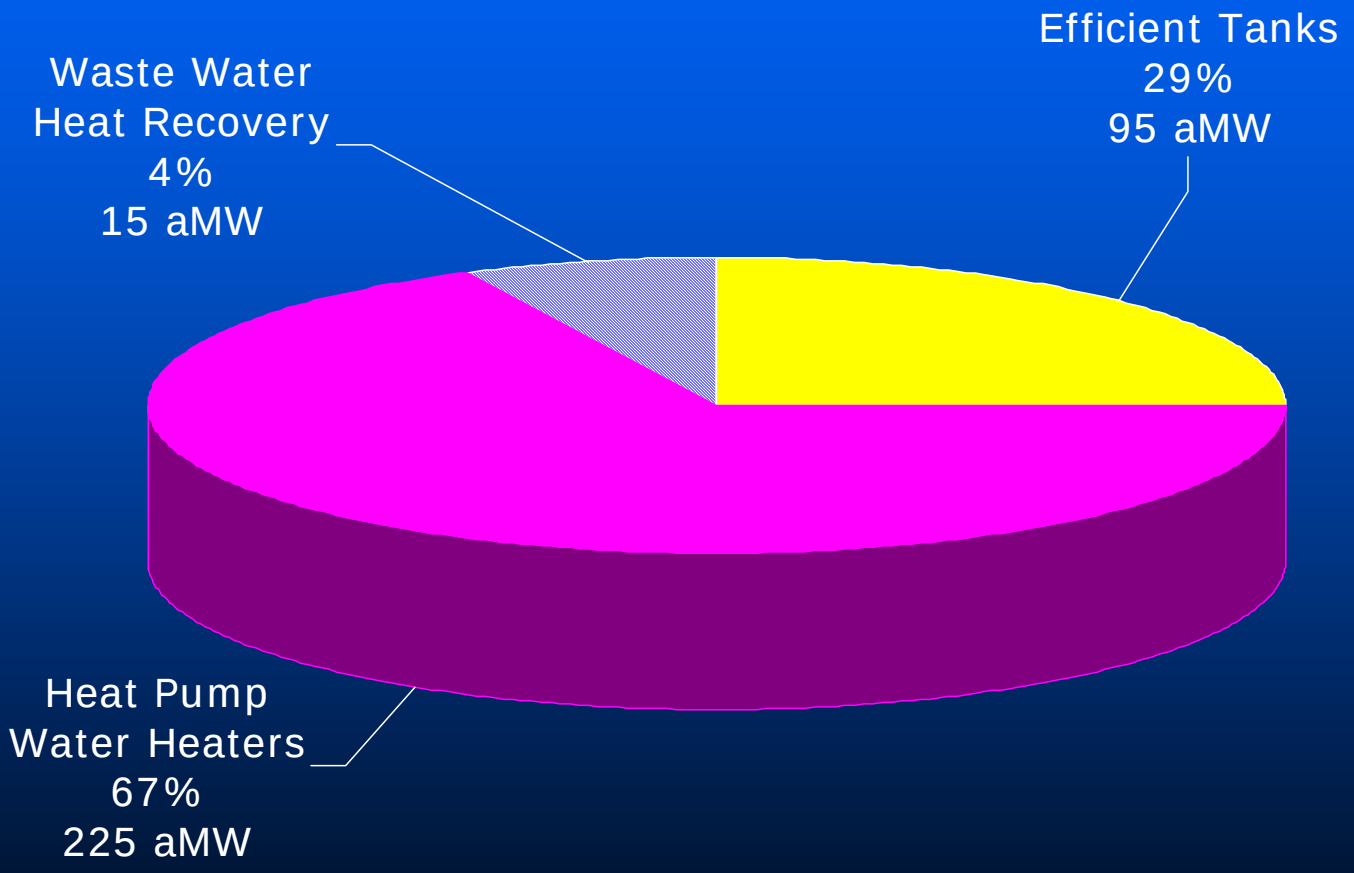
Regional Residential Sector Realistically Achievable Potential for Water Heating



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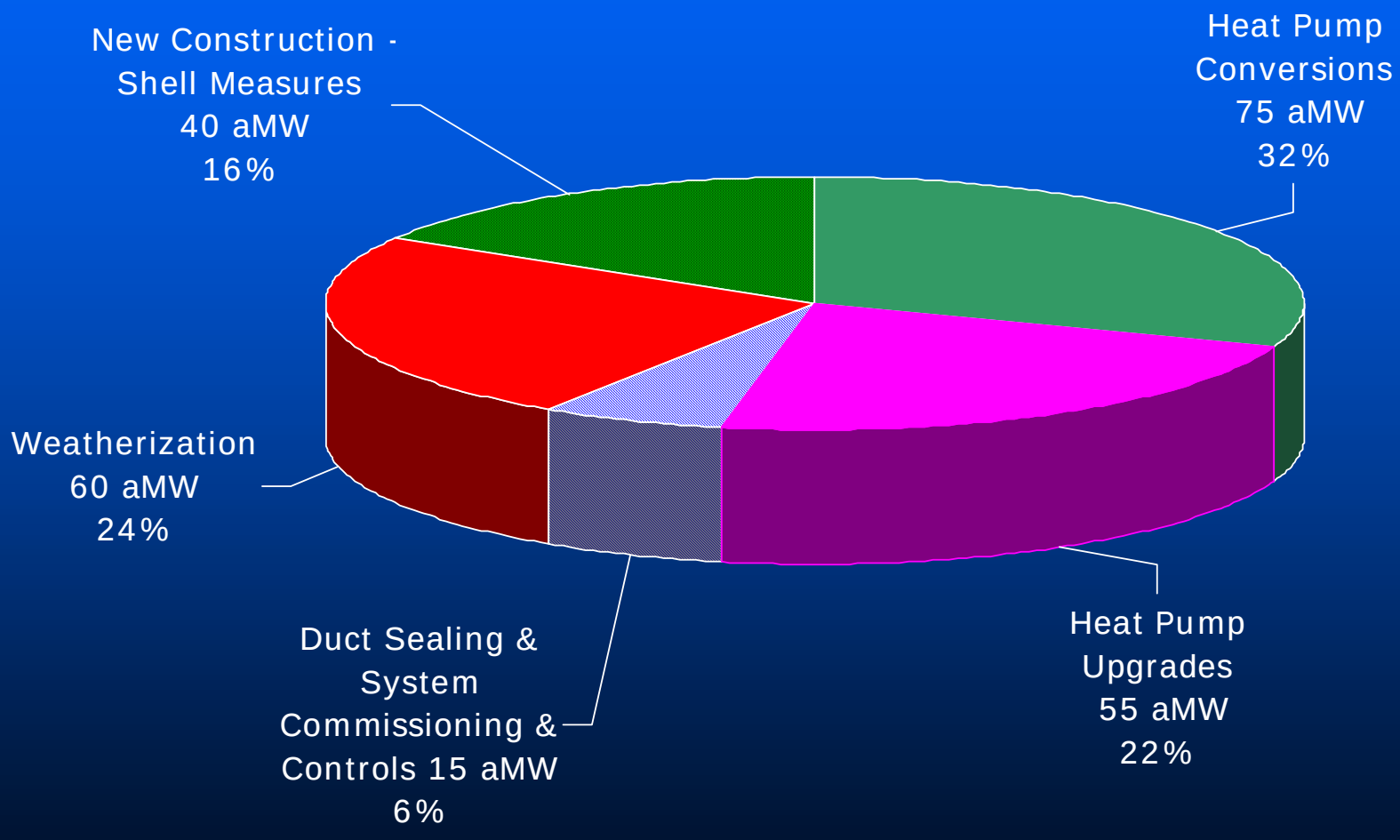
Regional Residential Sector Realistically Achievable Potential for Space Conditioning



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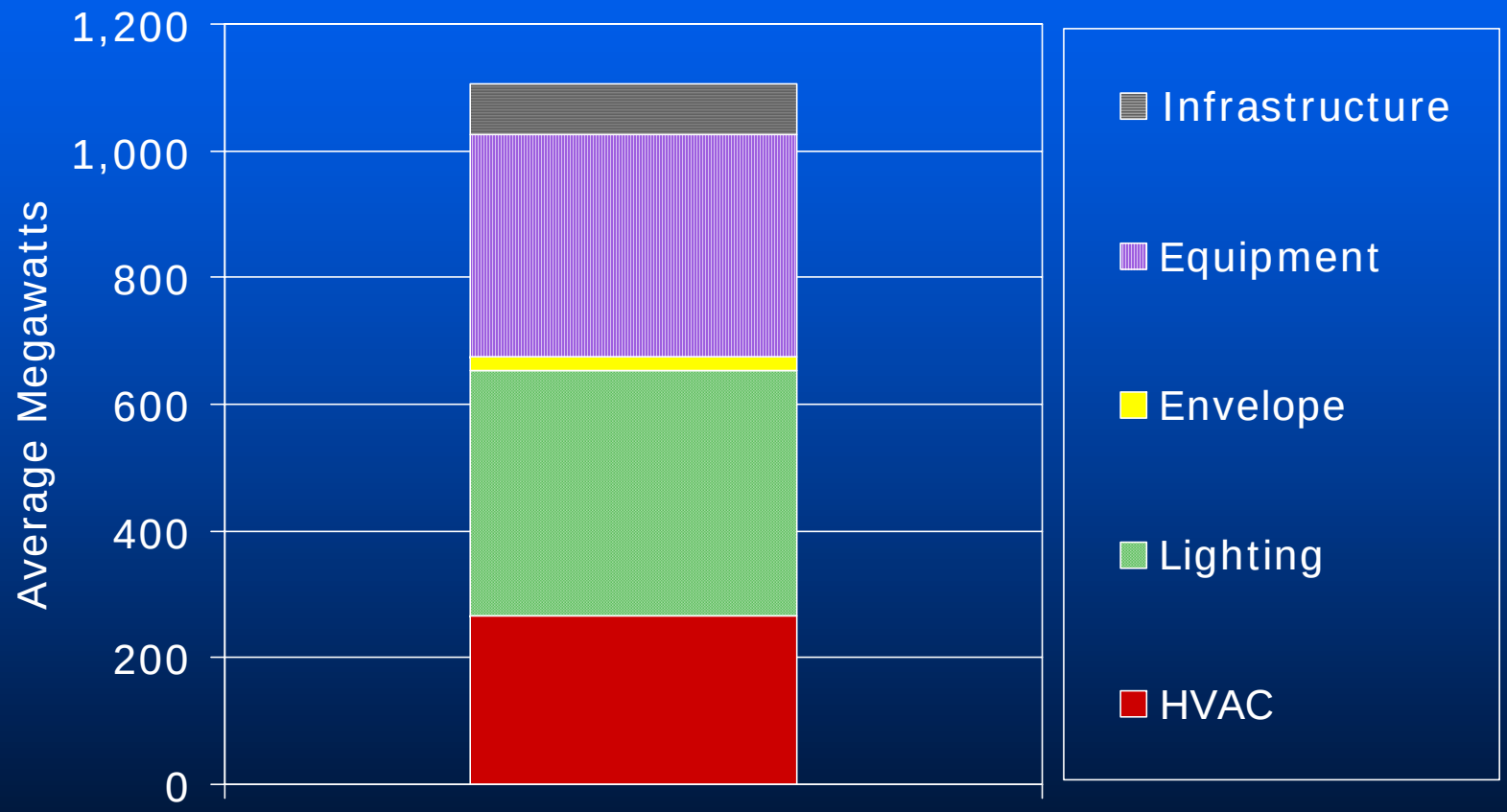
Commercial Sector Target = 1105 aMW



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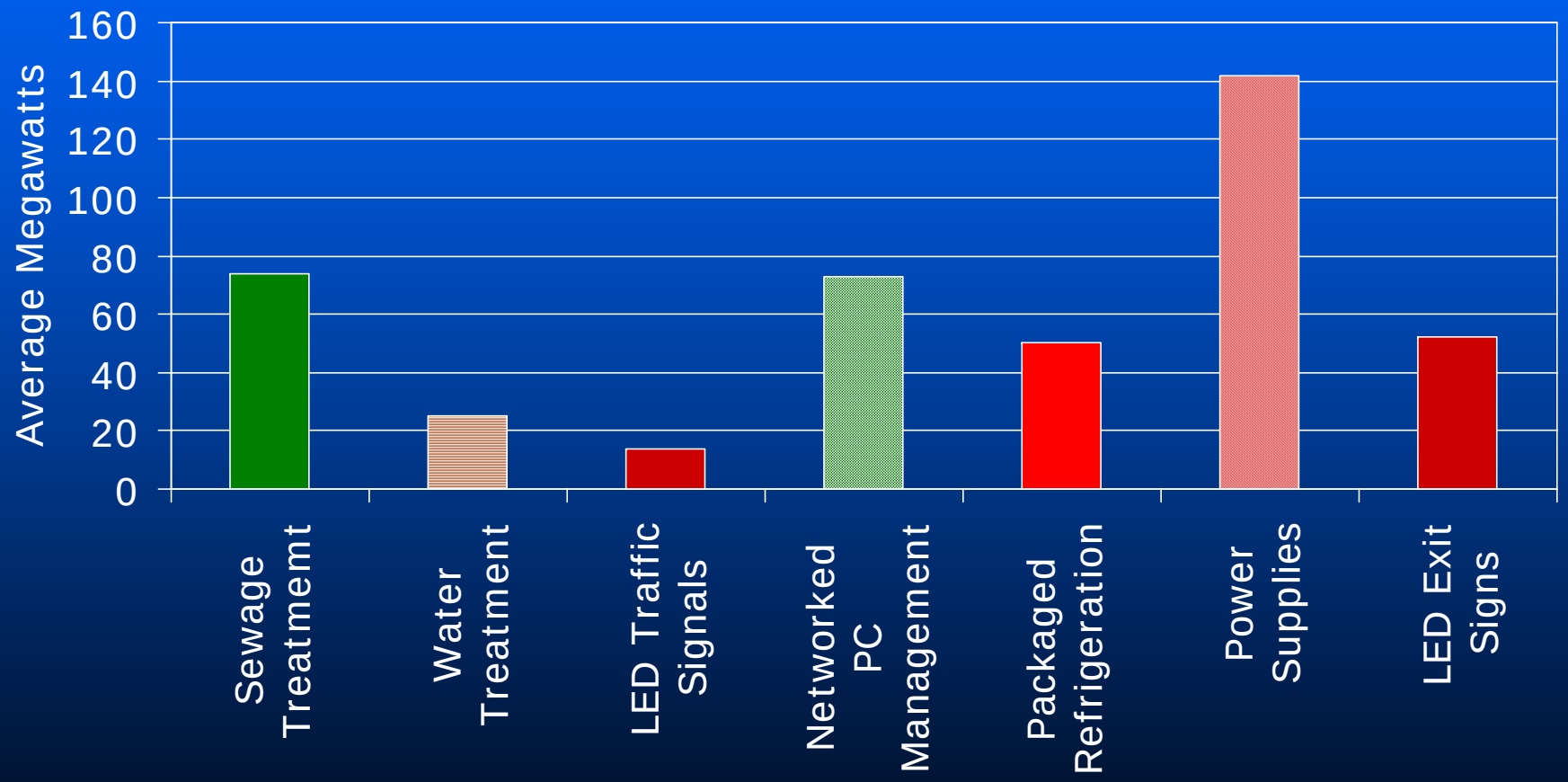
Regional Non-Building Resource Potential = 430 aMW



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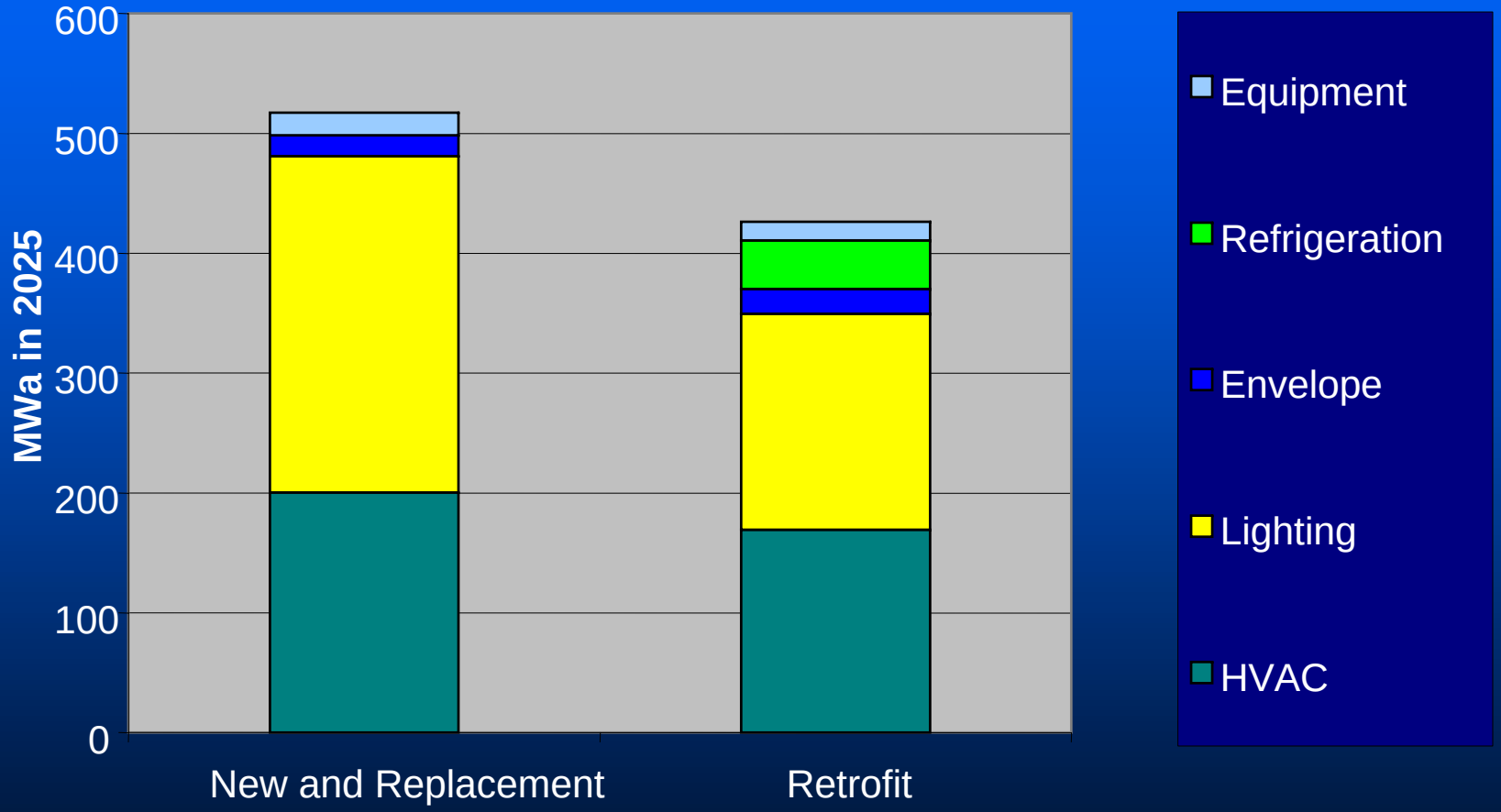
Cost-Effective Commercial Conservation Potential in 2025 For Building Lighting, HVAC & Equipment- Regional = 950 aMW



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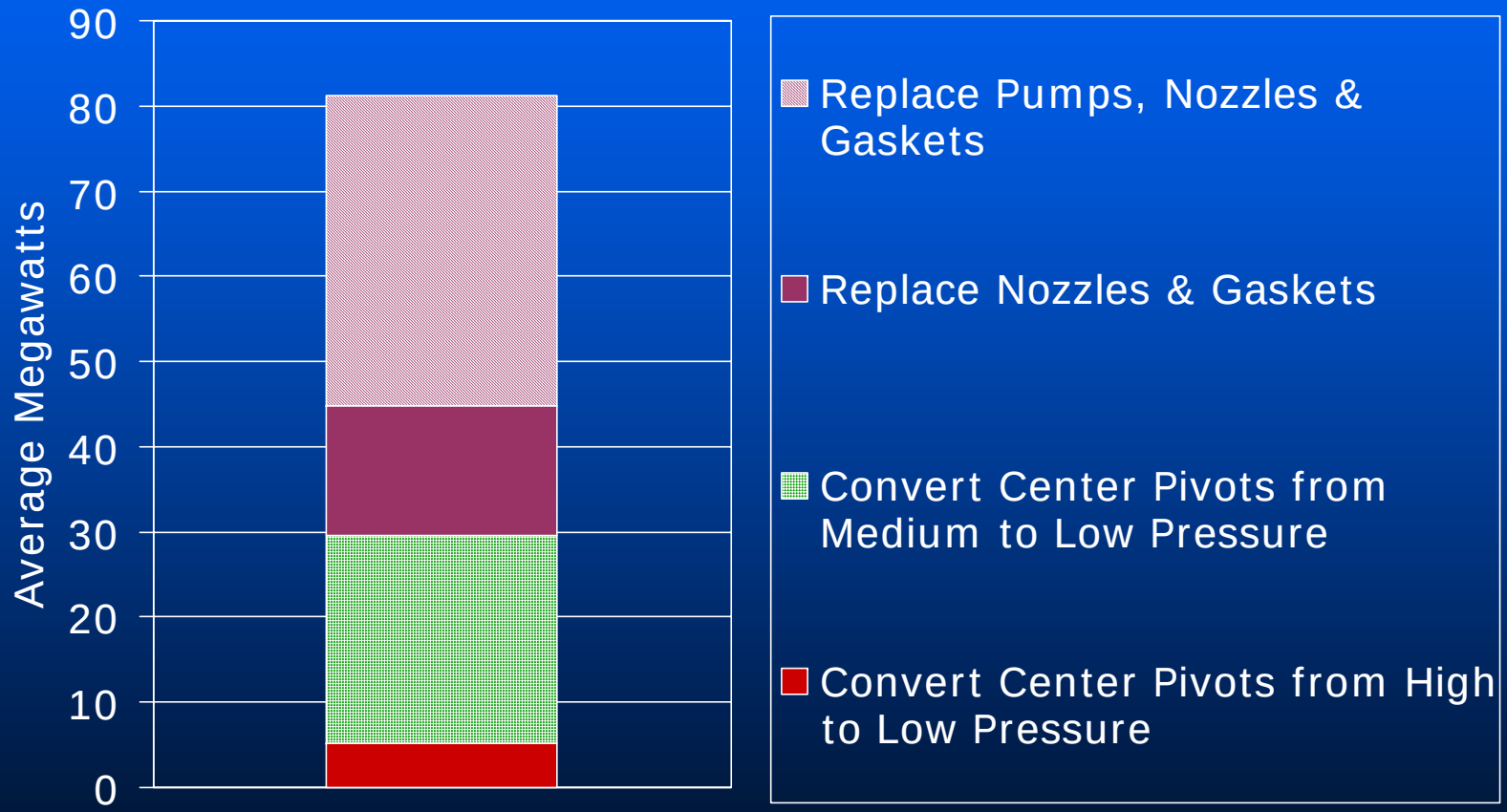
Irrigated Agriculture Sector Target = 80 aMW



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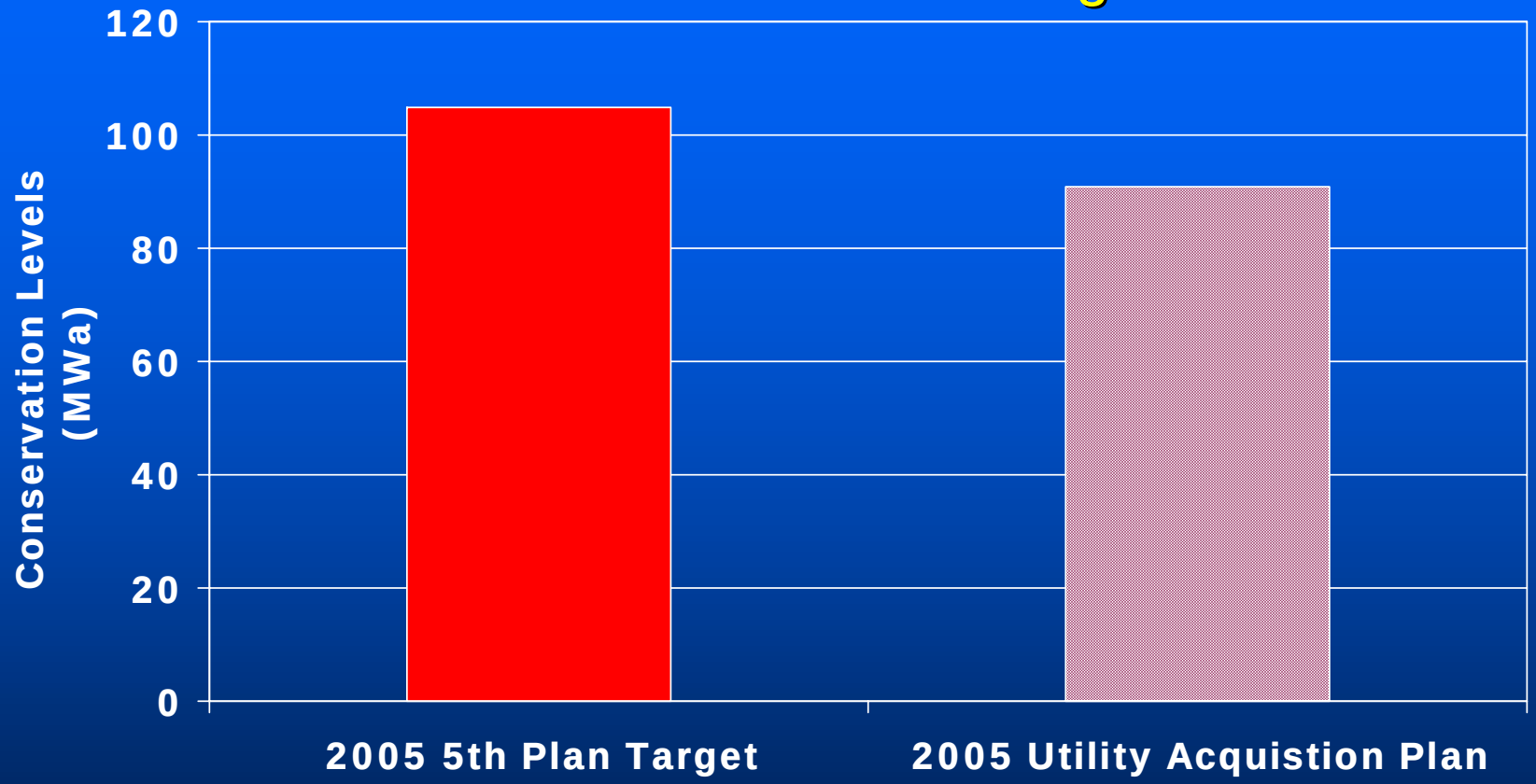
Industrial Sector Target = 350 aMW

- Estimate of 5% of 2025 forecast loads
- 350 aMW at 1.7 cents per kWh
- Process controls, drive systems, lighting, refrigeration, compressed air, etc
- Potential is a function of the ongoing changes in region's industrial mix

Utility* Efficiency Acquisition Plans for 2005 Are Close to 5th Plan Targets



*Targets for 15 Largest PNW Utilities. These utilities represent approximately 80% of regional load.

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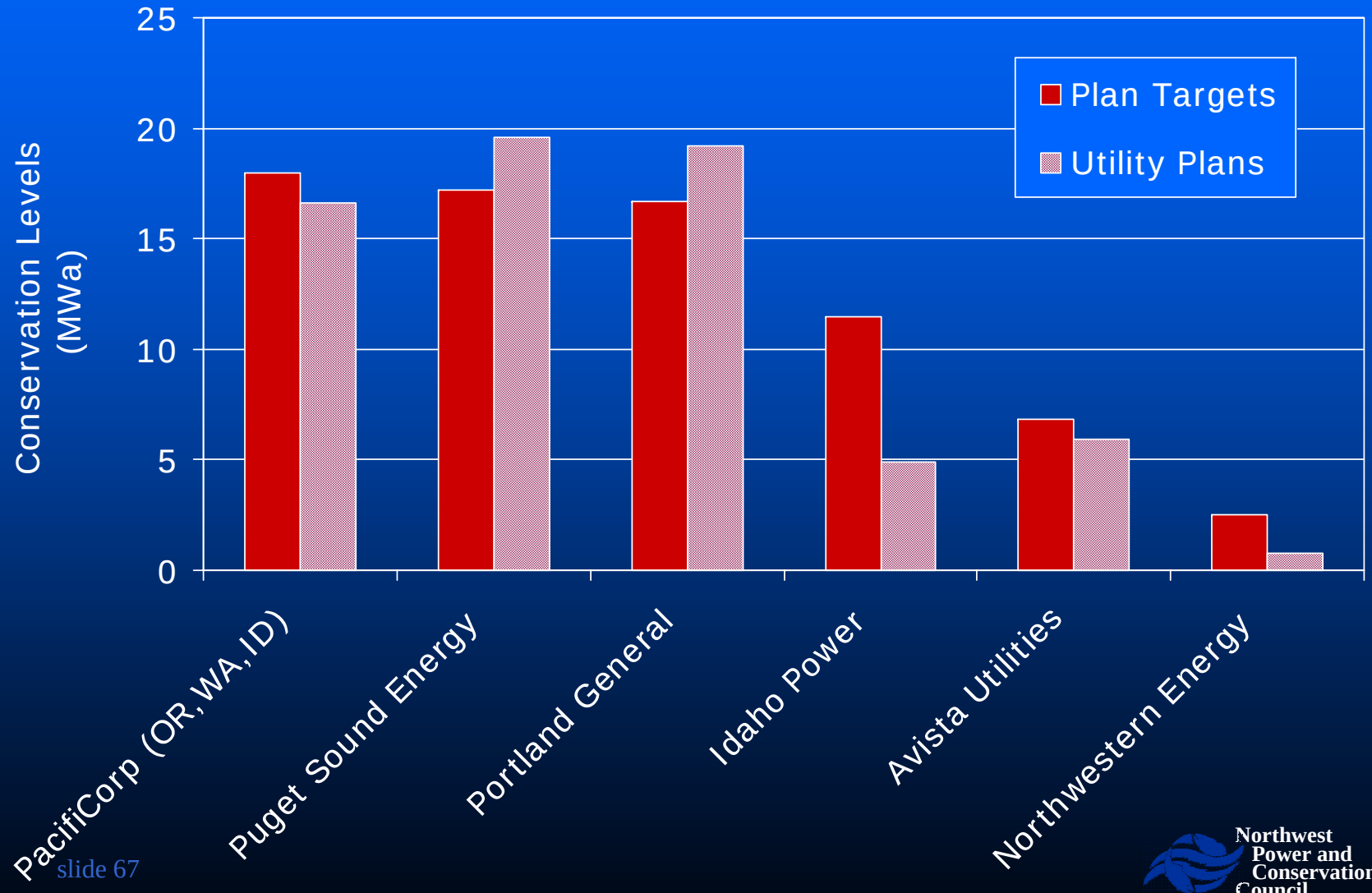
Most IOU Efficiency Plans are Close to 5th Plan's Targets



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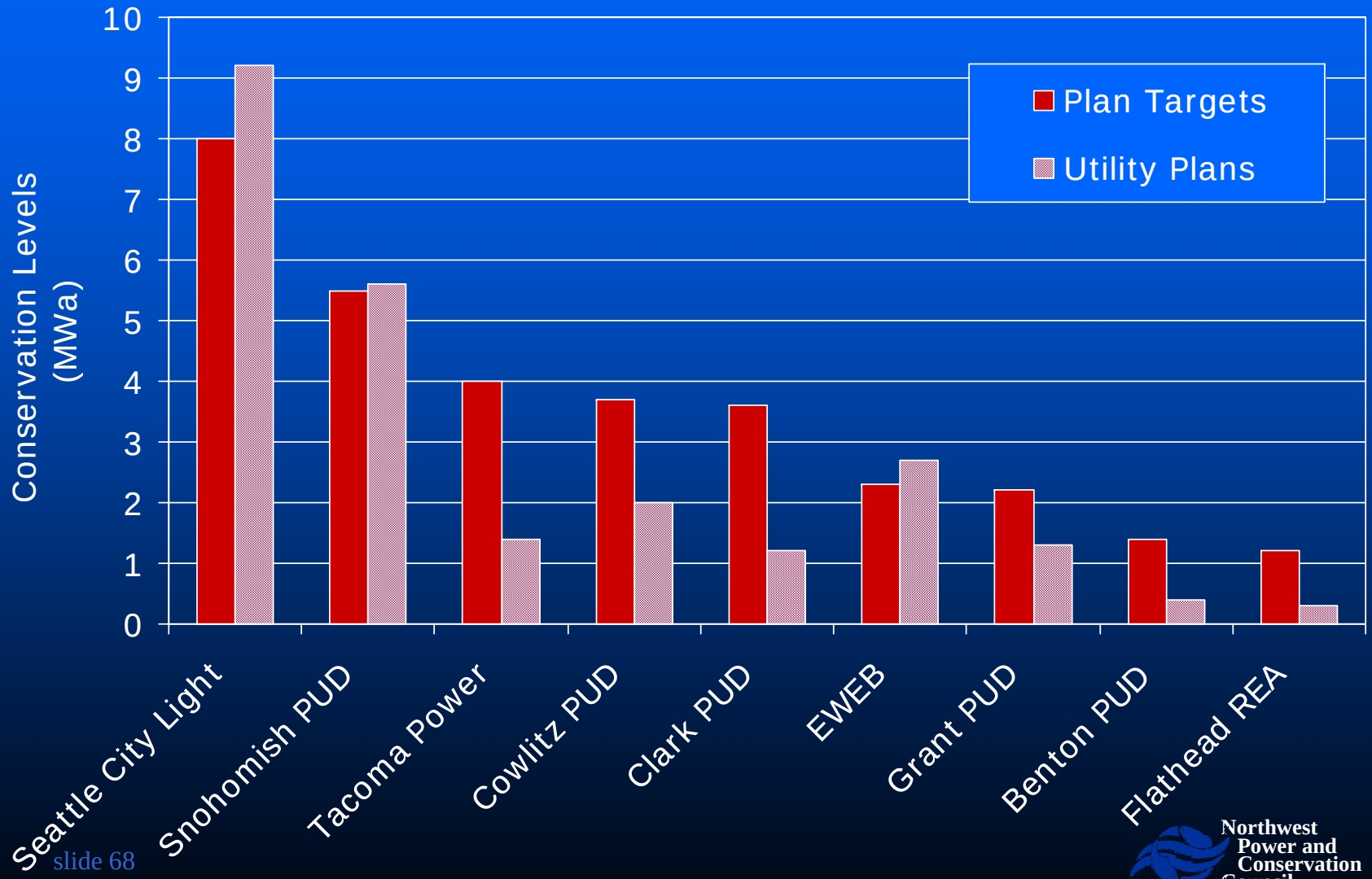
However, Several Large Public Utility Efficiency Plans Are Well Below 5th Plan Targets



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