Northwest Power and Conservation Council

June 27, 2007

MEMORANDUM

TO: Council Members

FROM: Charlie Grist and Tom Eckman

SUBJECT: Staff Presentation and Public Comment on Achievable Conservation Potential

Council staff has prepared a white paper that provides an overview of the Council's conservation planning methodology and an assessment of its current planning assumptions regarding the level of savings that are "achievable". We briefed the power committee on the paper in May. The paper was released for public comment in June. At the July Council meeting, staff will present an overview of the paper. There will be an opportunity for public comment.

Several factors have lead to a resurgence of interest in the Council's approach to integrated resource planning in general, and its methodology for incorporating conservation in its plans in particular. Of particular interest at the moment, are the Council's assumptions on how much of identified conservation potential is "achievable".

The staff paper concludes that there is ample empirical evidence to support retaining the Council's planning assumptions for the amount of conservation potential that is achievable. The paper reviews assumptions about the amount and timing of achievable conservation from the Council's 1983 power plan and compares those assumptions to what happened in the region in the years since. For example, before the end of 1992 -- not quite 10 years after the Council issued its first power plan -- Washington and Oregon, the two most populous states in the region, already had met 100 percent of the energy-savings goals for new homes in the first power plan. By 2002 all four Northwest states had met the goals of the plan for residential conservation in new homes, achieving the conservation assumptions for new homes made in the 1983 power plan. Similar examples, where experience meets or exceeds planning assumptions, are presented for new manufactured homes, appliances, lighting in new commercial buildings, new motors and other measures where data are available.

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Achievable Savings – A Retrospective Look At The Council's Conservation Planning Assumptions

June 27, 2007

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Reasons for Review Now

- Resurgence of Interest in IRP
  - Bonneville's proposed Tiered Rates
  - Conservation as risk avoidance
- Washington Legislation
  - » HB 1010 – Resource Adequacy
  - » I-937 – Conservation consistent w/ Council methodology
- We have evidence to inspect

Findings

- Empirical evidence supports Council's forecast of achievable conservation potential
- Council's assumed near-term achievable acquisition rates are well supported and may be conservative

Issue: How Much is Achievable?

- How much of the identified conservation potential:
  - Can we expect to ‘achieve’
  - Over what time frame?

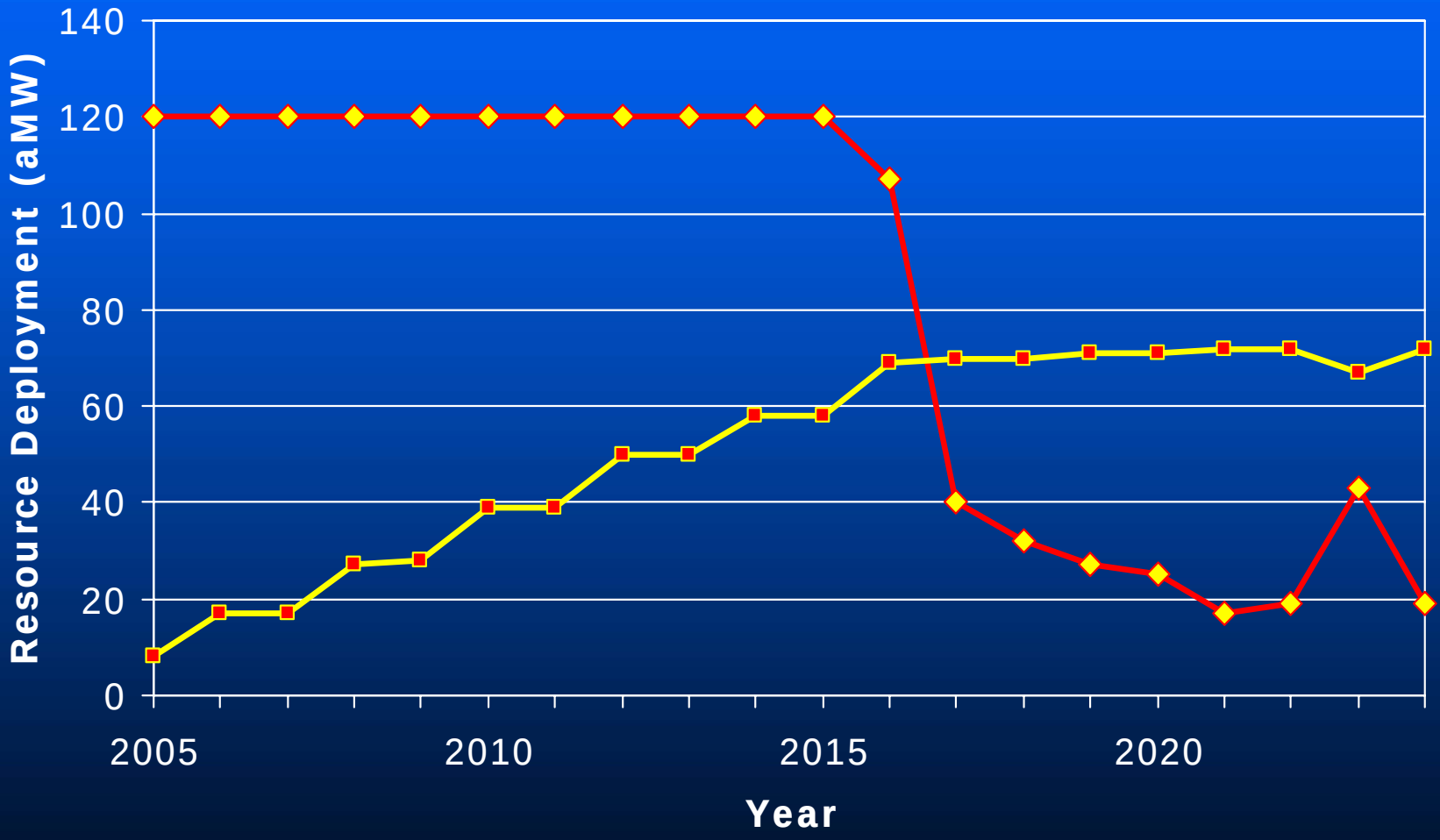
Council Conservation Methodology

- Regional Act requires that resources are included in the plan if they are available:
  - '*at an estimated incremental system cost no greater than that of the least-cost similarly reliable and available alternative'*
- This Establishes Three Screening Filters
  - Technically Feasible
  - Economically Feasible
  - Achievable Potential

Achievable Potential Constraints
Fifth Power Plan

- Non-Lost Opportunity
  - Maximum of 120 Average Megawatts/year
  - 85% of Economically Achievable over 20 years
- Lost-Opportunity
  - 15% of Economically Achievable Savings in first year increasing to 85% by 12-years
  - About 65% over 20 years
  - About 50% over 10 years

Annual Achievable Conservation Deployed
Fifth Power Plan (Mean Deployment Schedule)



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What Evidence Do We Have?

- Hood River Conservation Project
- Performance relative to 1983 Plan expectations
- Annual BPA & Utility Program Performance

Evidence: Hood River

- Hood River Conservation Project
- 1982-84 experiment in Hood River County
- Try to weatherize all electric-heated homes
- Measures installed at no cost to participants
- Result: 85% Achieved
  - 85% of Technically Feasible Residential Weatherization Savings Achieved Over 2 years

Evidence: Performance Relative to 1983 Plan Expectations

- New Residential and Commercial Construction (Model Conservation Standards)
- Residential Appliances
- Residential Water Heating
- Commercial Lighting
- Commercial HVAC Equipment
- Irrigation (kWh/acre)
- Industrial

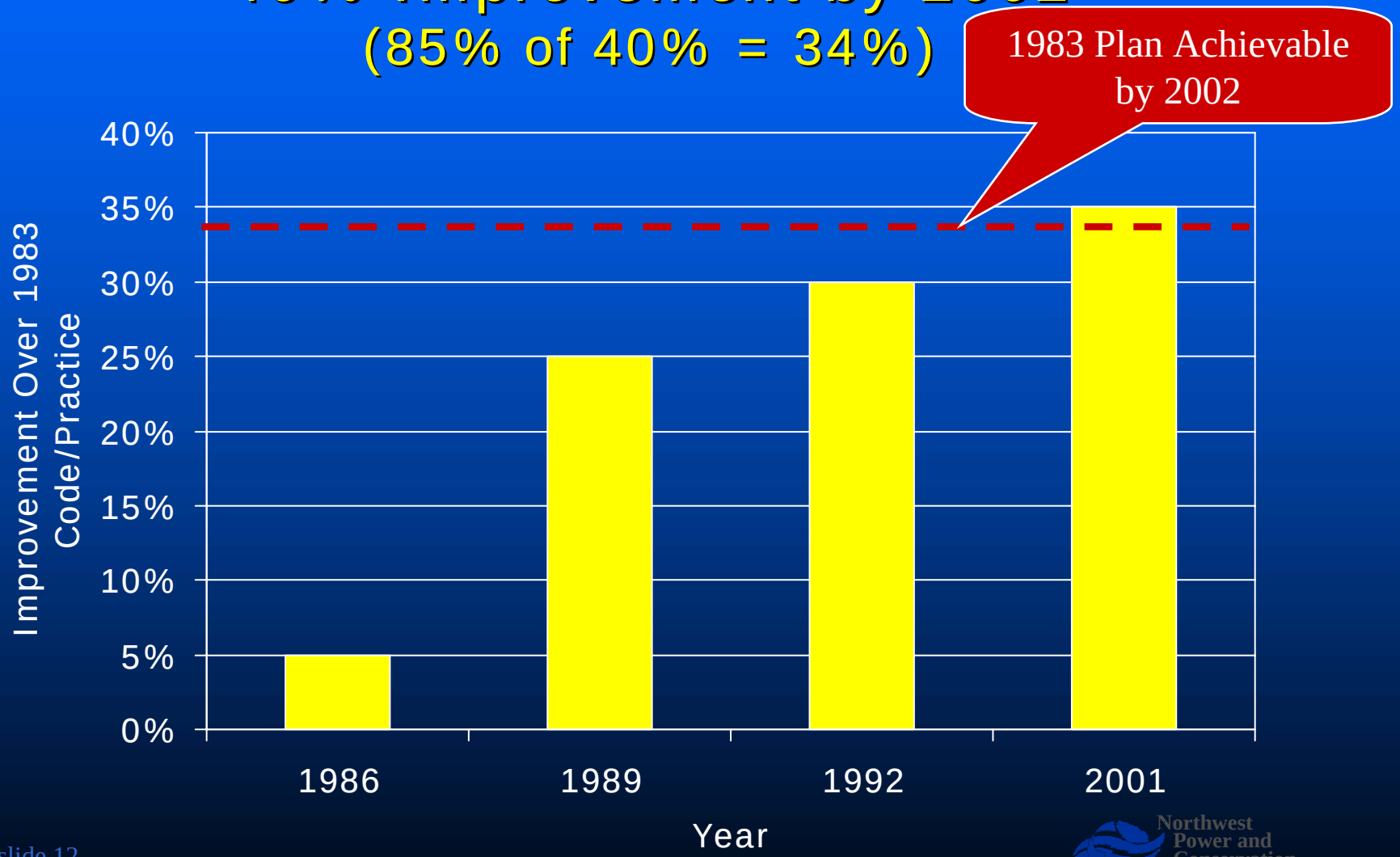
New Buildings & Equipment

Compare 1983 MCS to what Happened

- 1983 Model Conservation Standards
  - 1983 MCS represent 1983 expectations for new buildings & equipment
- Compare 1983 MCS to historic:
  - Building codes
  - Appliance Efficiency Standards
  - Market Penetration

Lost-Opportunity Residential New Construction Council Goal 40% Improvement by 2002

(85% of 40% = 34%)



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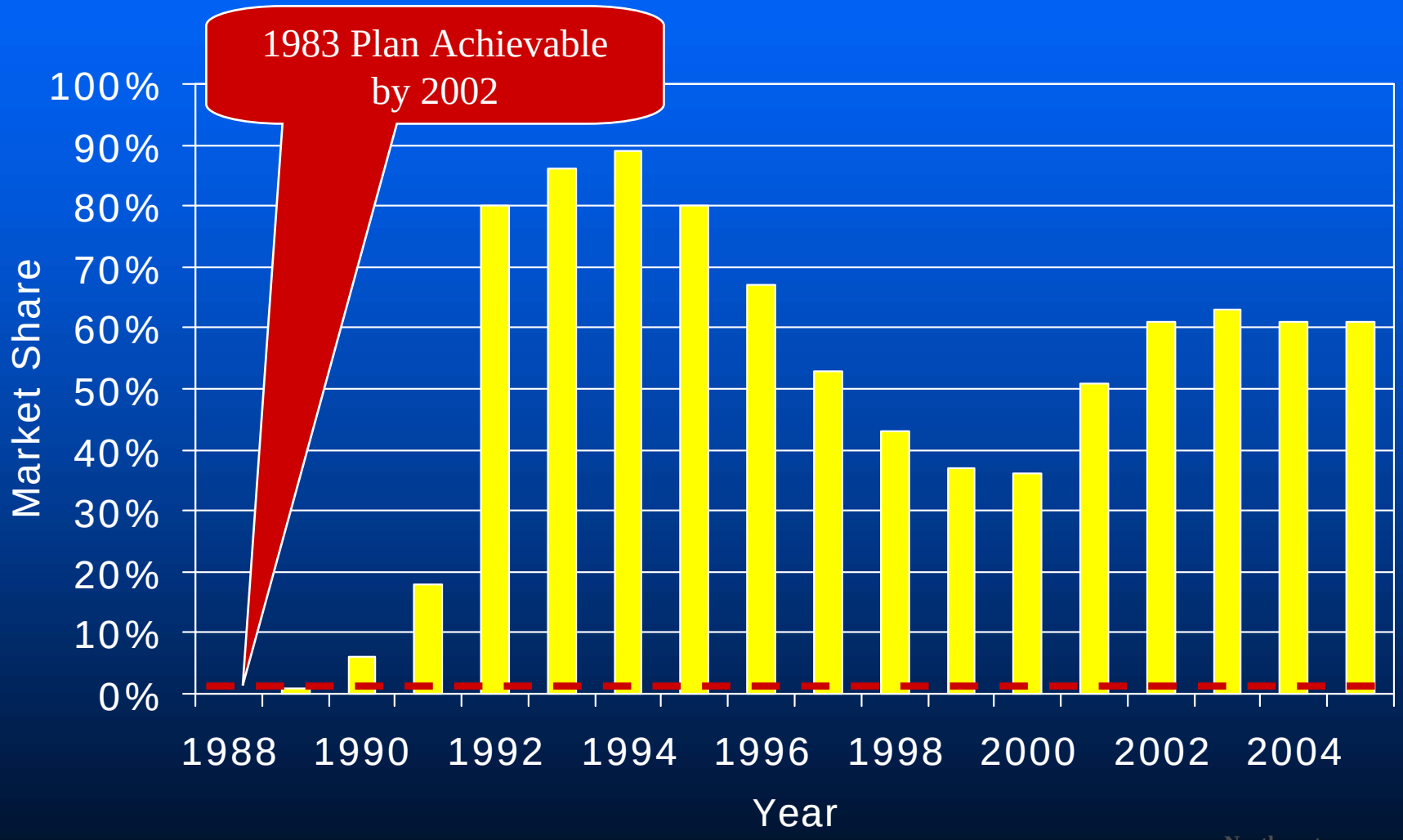
Regional Average Annual Space Heating Use of New Single Family Homes Constructed Between 1983 and 2002

Vintage	Annual Use (kWh/sq.ft./yr)	Percent of 1983 Use	Improvement over 1983
1983	6.3	100%	0%
1986	5.5	88%	12%
1989	5.4	86%	14%
1992	4.0	64%	36%
2001 (MCS)	3.7	59%	41%

1983 Plan Forecast “0” Market Share of Energy Efficient Manufactured Housing



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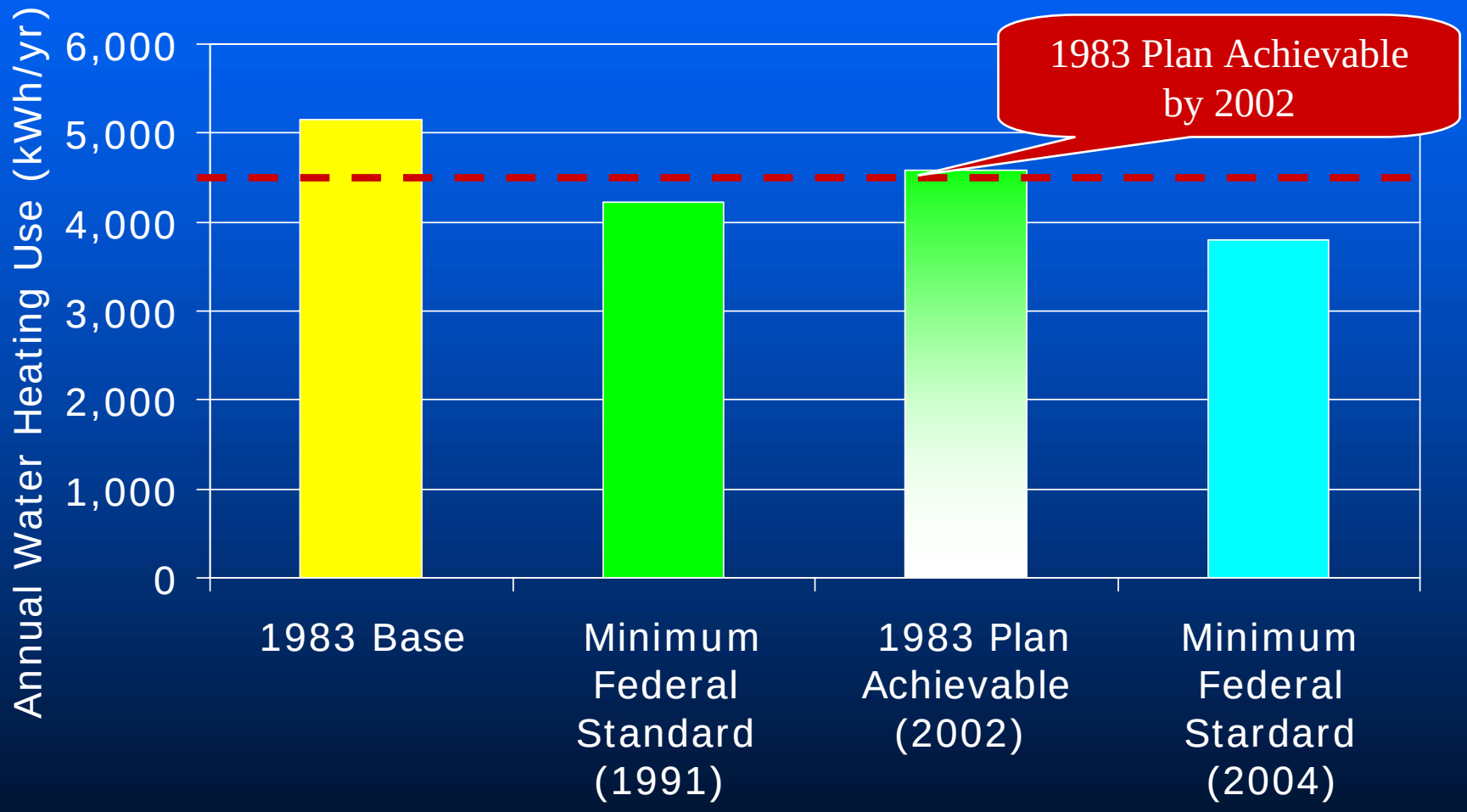
Residential Water Heating Use



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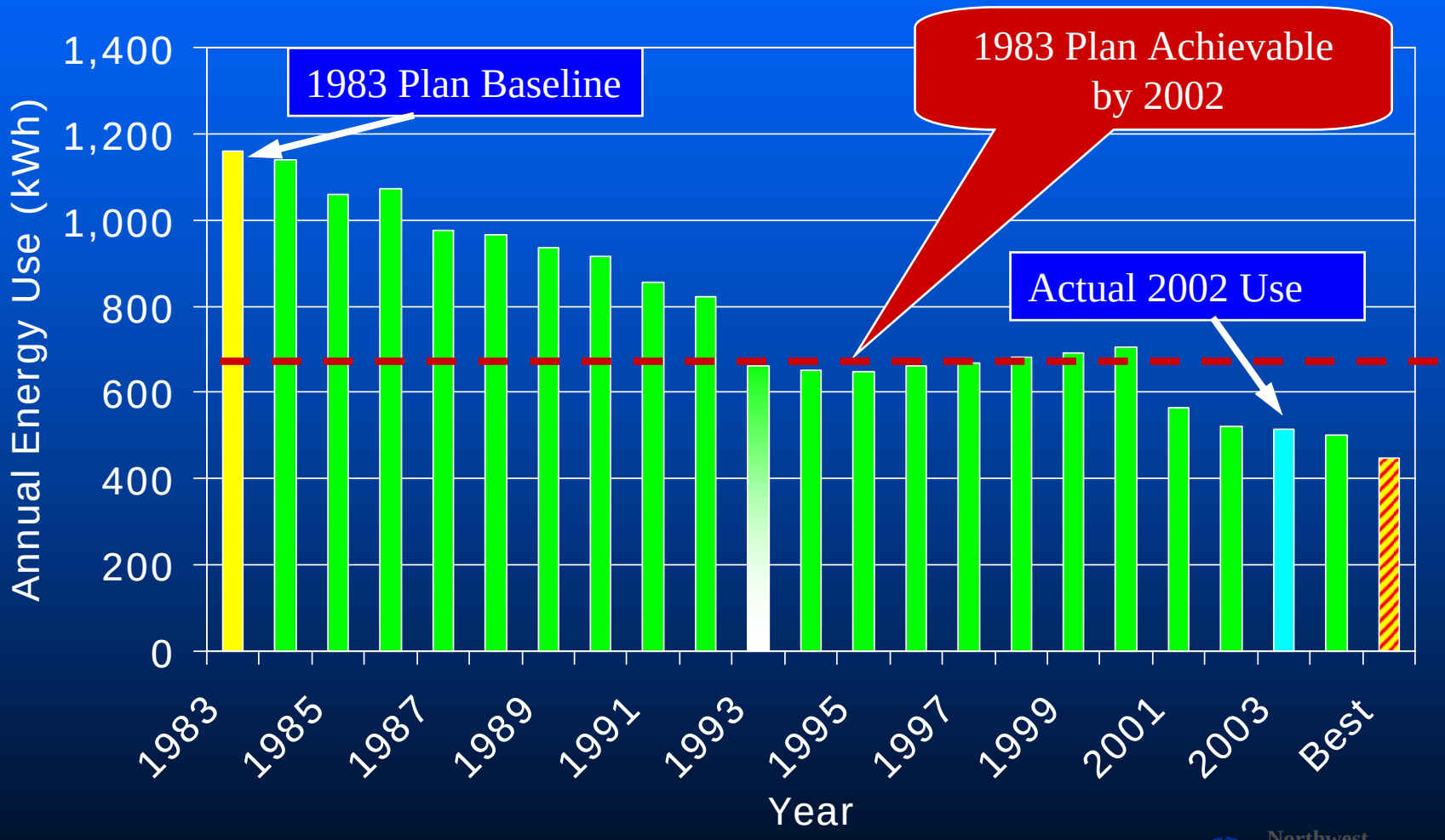
Average Energy Use of New Refrigerators



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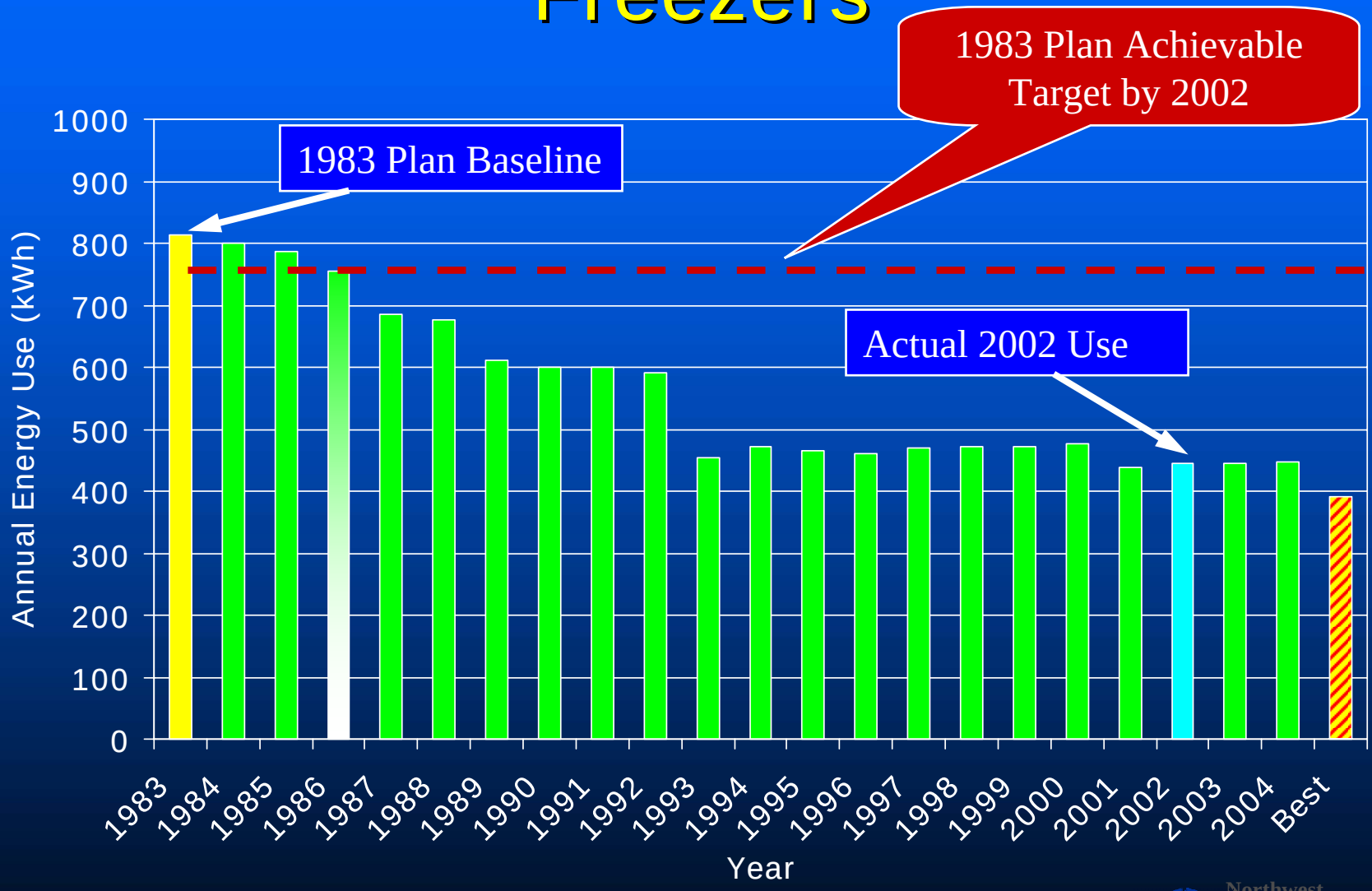
Average Energy Use of New Freezers



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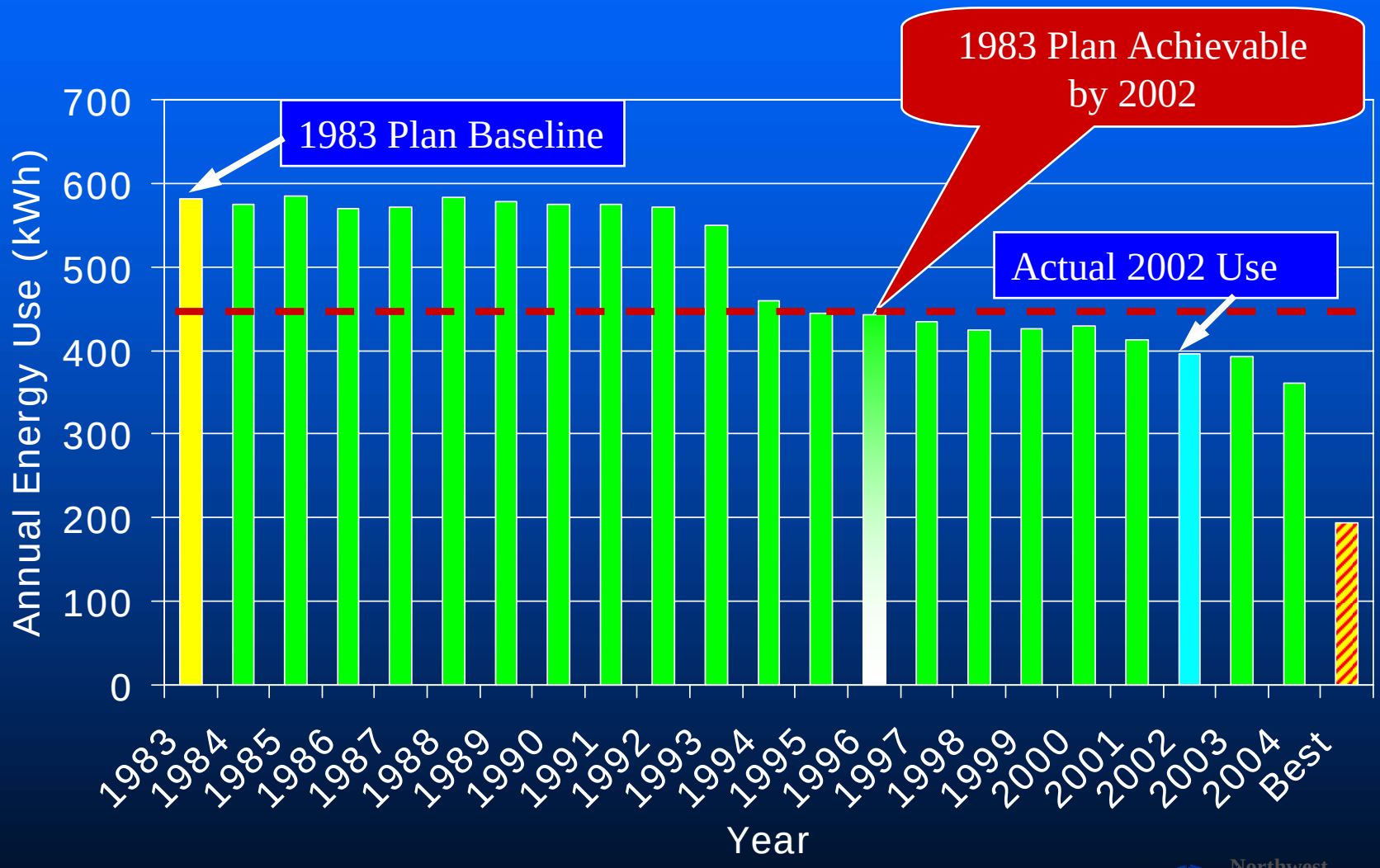
Average Energy Use of New Dishwashers



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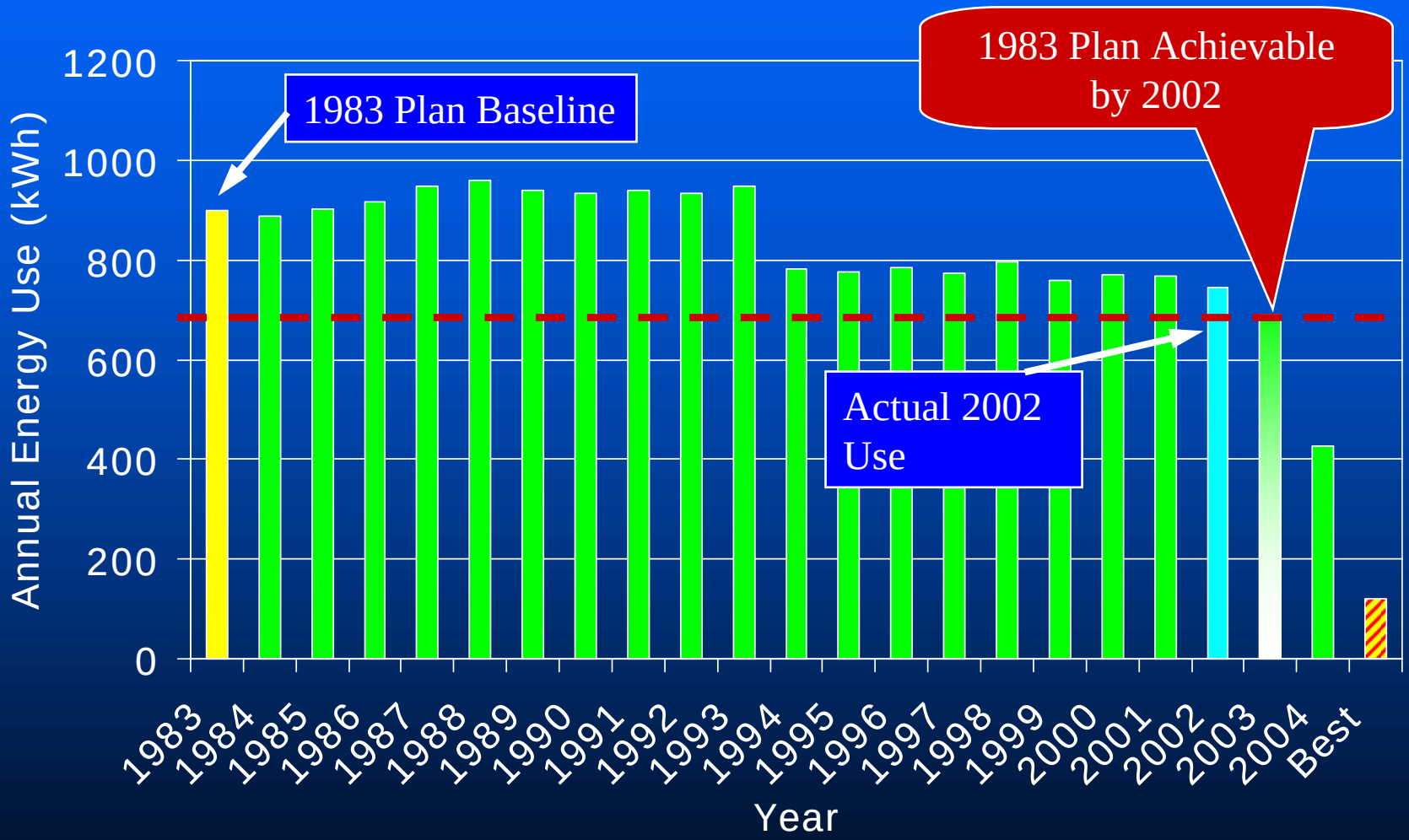
Average Energy Use of New Clothes Washers



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Commercial Lighting Power Density

Codes Surpass 1983 MCS

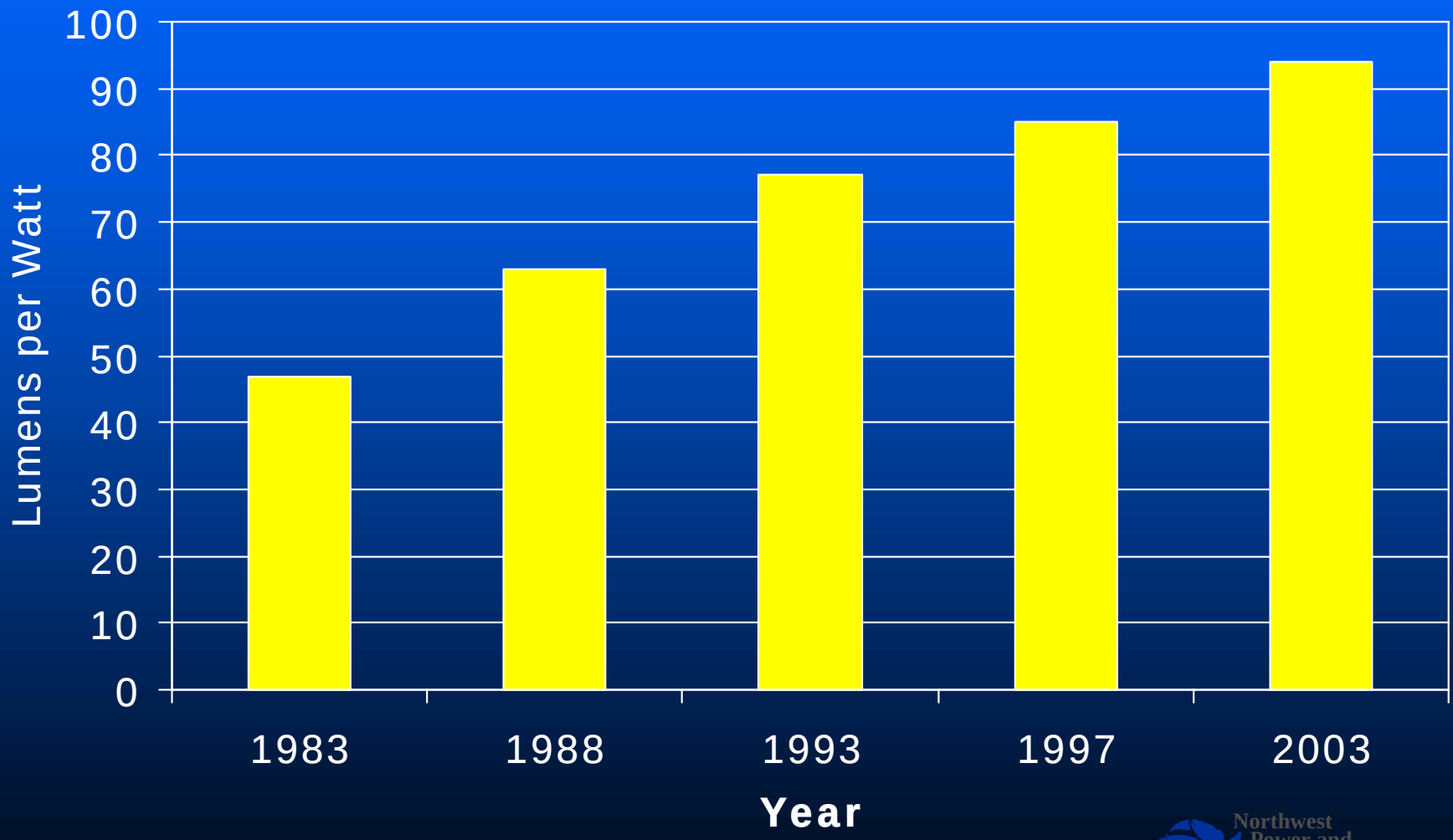
Building Type	Lighting Power Density (Watts/sq.st.)				
	1983 Plan Target (MCS)	Oregon 2004	Washington 2004	Idaho and Montana	Seattle 2004
Office	1.5	1.0	1.0	1.0	1.0
Retail Stores	1.5	Varies 1.5+	Varies 1.5+	Varies 1.5+	Varies 1.5+
Schools	2.0	1.1	1.35	1.2	1.2
Warehouses	0.7	0.5	0.8	0.8	0.5

Change in Lighting Power Density of Existing Buildings

Audit Date	Lighting Power Density (Watts/sq.ft.)			Reduction in Lighting Power Density (%)		
	All Buildings	Offices	Retail	All Buildings	Office	Retail
As found in 1987	1.5	1.6	1.9			
As found in 2001	1.2	1.4	1.5	20%	13%	21%

Technology Exceeded Expectations

Change in Fluorescent Lighting Efficacy 1983 - 2003



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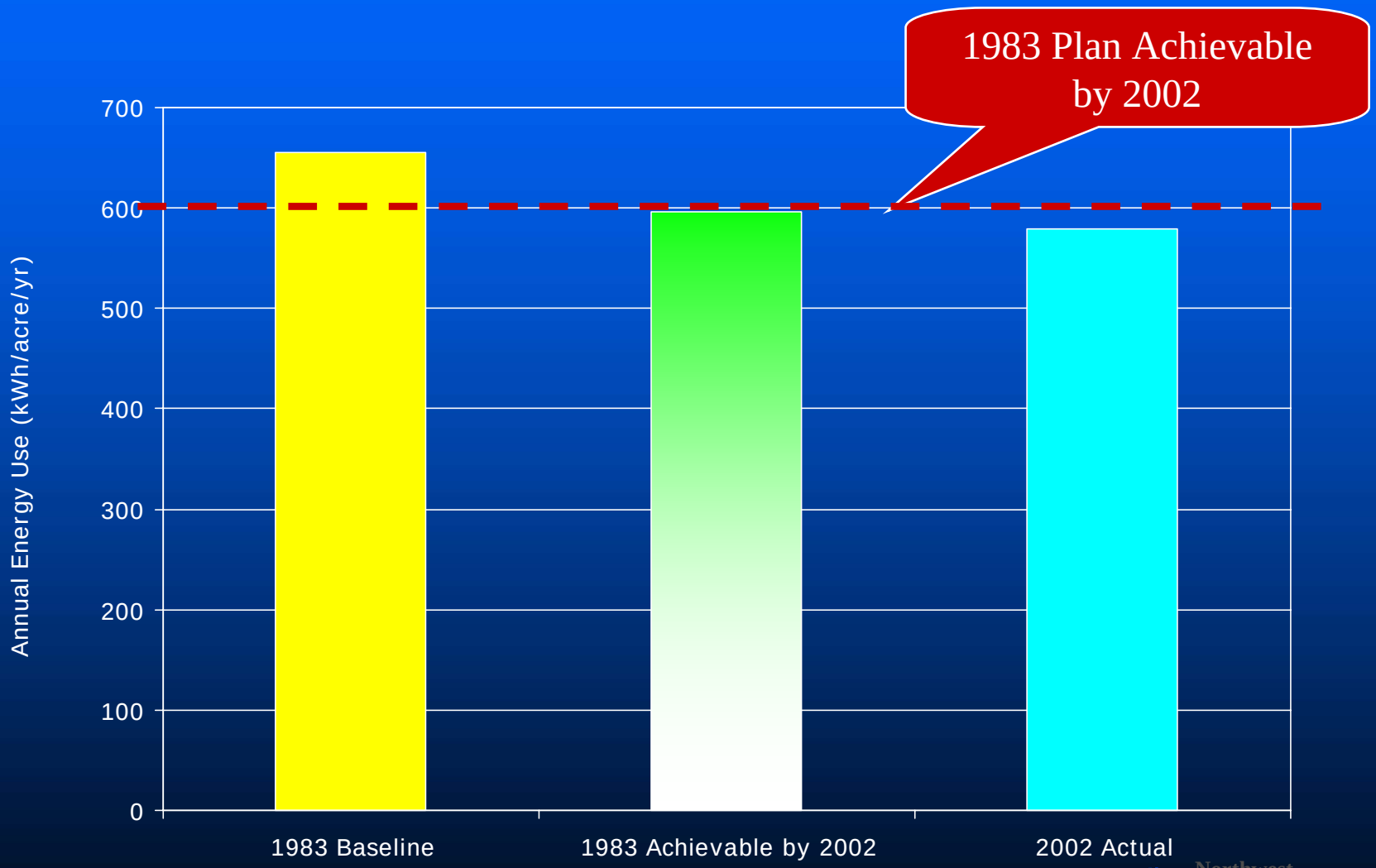
Commercial HVAC Equipment Efficiency Requirements

System Type	Capacity Under 65,000 Btu/hr		Capacity 65,000 Btu/hr and Larger	
	1983 Achievable SEER	Current Code Minimum SEER	1983 Achievable EER	Current Code Minimum EER
Air Cooled	7.8	13	8.2	11.0
Evaporative or Water cooled	8.8	14	9.2	14.0

Irrigation Sector Achievable Potential



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Industrial Sector Achievable Potential

- 1983 Council's forecast of achievable conservation potential was equivalent to about 6 percent of non-DSI industrial electric loads
- Motors comprise approximately 60 percent of industrial energy use
  - Federal minimum efficiency standards required 3 - 10 % improvement over 1983 efficiency levels for covered sizes

Other Documented Industrial Sector Efficiency Improvements

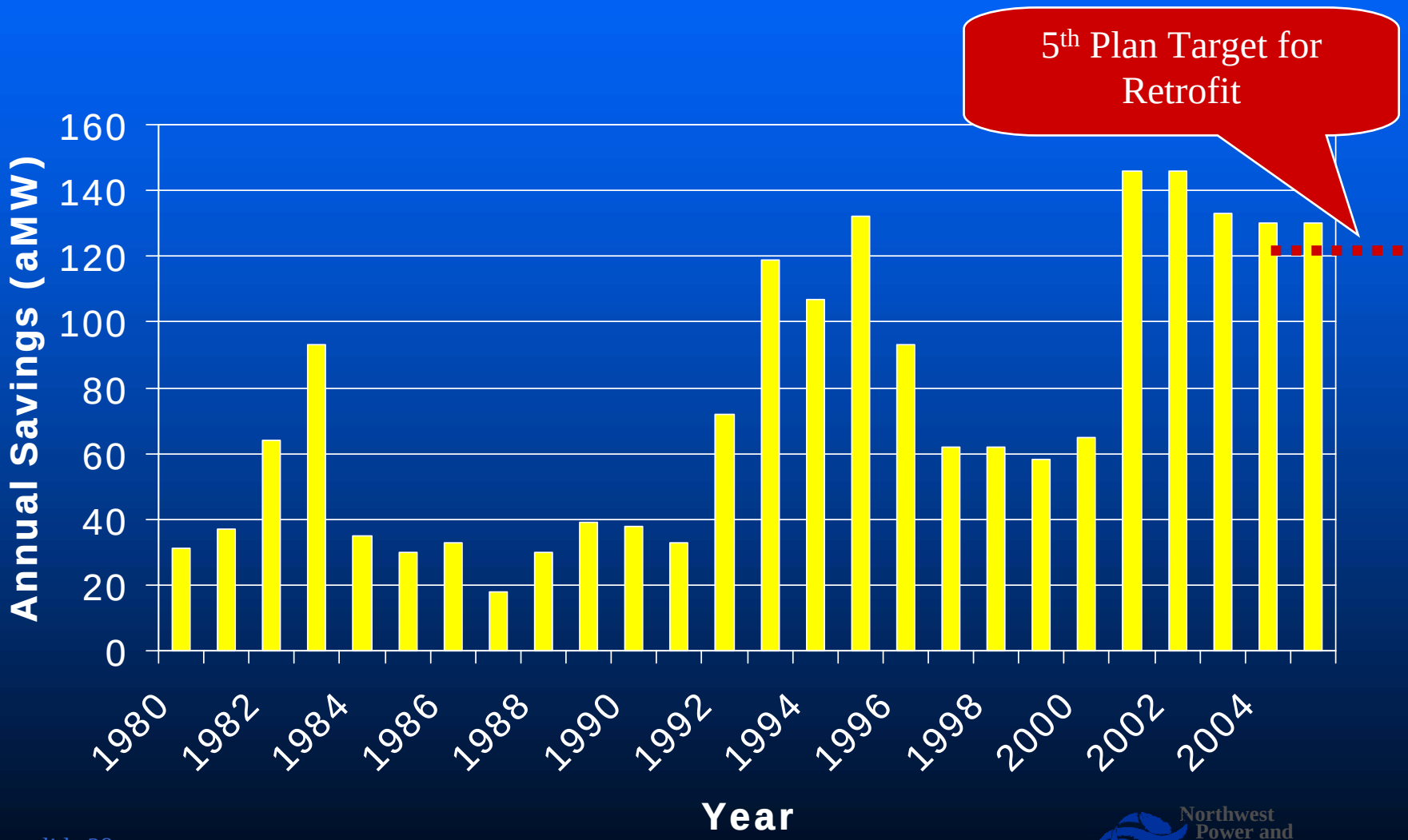
- 20 to 30 % improvement in multiple cold-storage facilities
- 15 to 30 percent improvements in compressed air systems for many plants across different industries
- 50 percent in improvement in lighting in manufacturing spaces with high ceilings; and,
- industry-specific process changes in the range of 20 percent improvement.

Pace of Retrofit Conservation

- Limited data due to lack of sustained effort
- History shows
  - Periods of both high and low acquisition rates
- Recent data suggests 5th Plan targets achievable
  - Retrofit target is 120 MWa / year

Historic Utility & BPA & NEEA Acquisitions

(Retrofit & Lost-Opportunity – No Codes & Standards)



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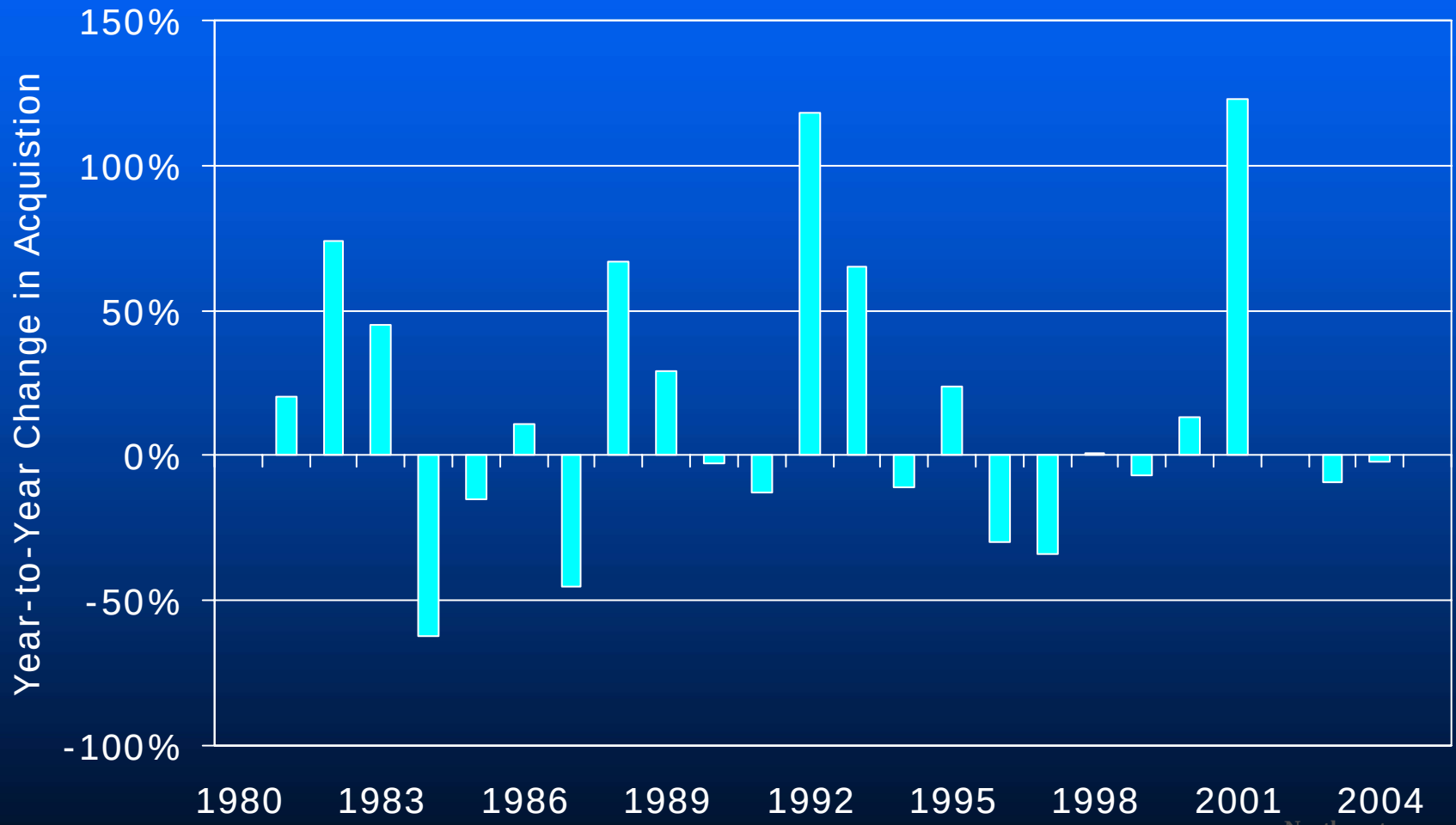
Ramp Rate Constraints

Year-over-Year Change in Conservation Acquisitions Are Not Limiting



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Why the 1983 "Achievable Potential" Forecast Was Important

- In 1983 *lead times* for construction of new generation (coal & nuclear) were 12-15 years
- Average resource size ~ 1000 MW
- Therefore, if conservation resources were to offset the construction of new generation the Council needed to forecast "achievable savings" 12-15 years out
  - Even if successful, "options" would only defer construction lead time by 5-7 years

Why 20-Year Estimates are Less Important Today

- Lead time for new generating resources is 2-5 years
- Average resource size ~ 250 – 350 MW
- Ability to expedite (or delay) construction now greater

What is Important Today

- "Near-term" acquisition rate assumptions
- How fast we can accelerate penetration
  - Fraction of lost-opportunities captured
  - Maximum pace for retrofit conservation
- Keeping cost of conservation low

End