The 6th Northwest Power and Conservation Plan

It's About Carbon

Tom Eckman
Manager, Conservation Resources
Northwest Power and Conservation Council

Presented at
Bonneville Power Administration
SECURING OUR ENERGY FUTURE
UTILITY ENERGY EFFICIENCY SUMMIT
March 18, 2009

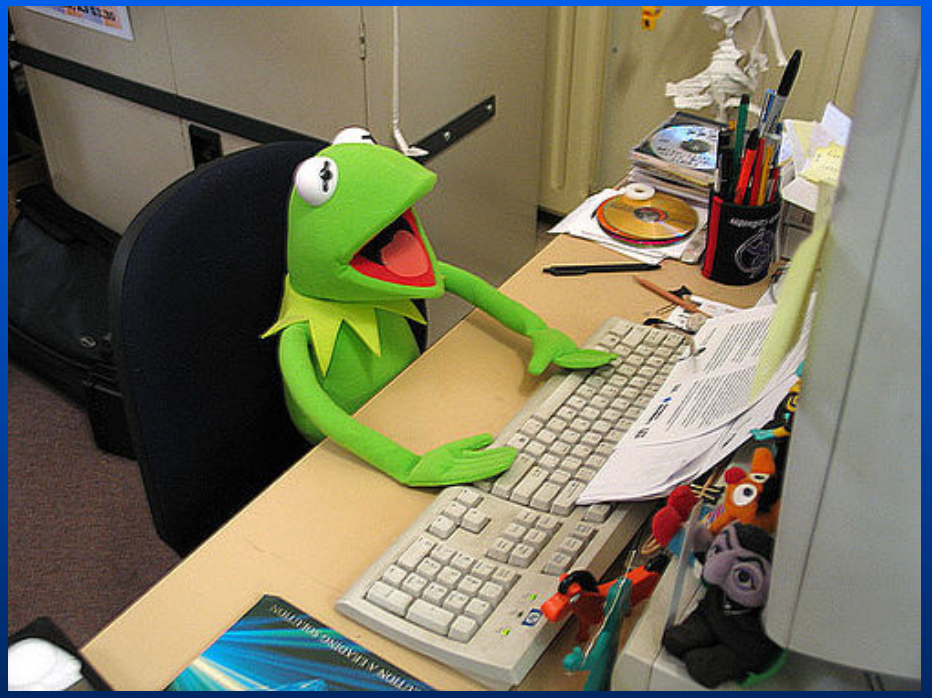
Northwest Power and Conservation Council

Before I Start

- The Northwest's Energy Efficiency Labor Force Has Expanded Rapidly

- Bonneville's regional meetings revealed a need for more background on the PNW *Energy Efficiency Network*

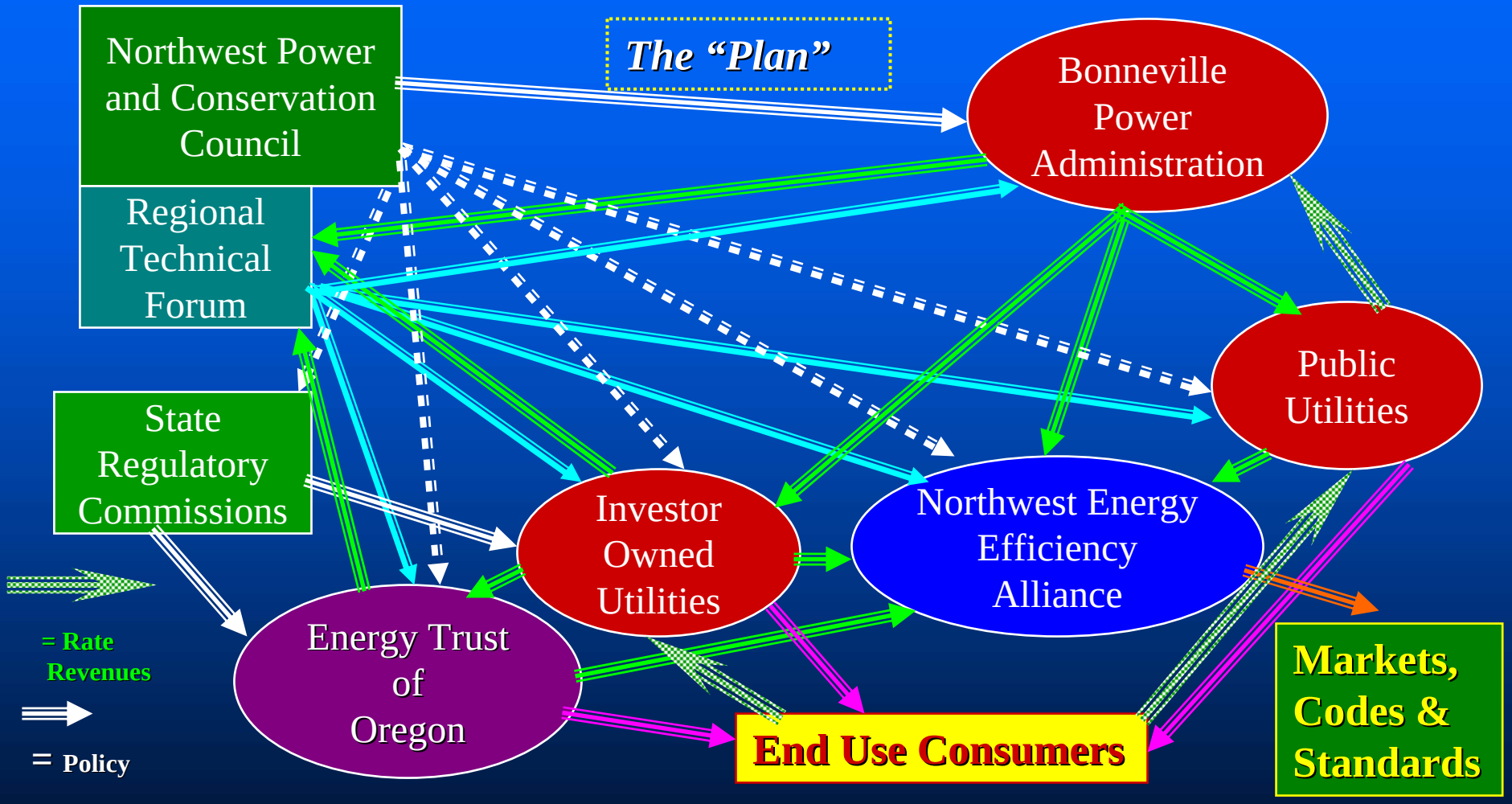
Because . . .



It's Not Easy Being Green.

How A Kilowatt-Hour is Saved:

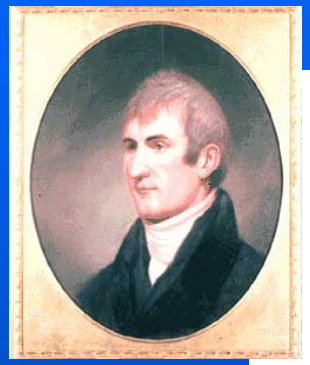
The Northwest Energy Efficiency Implementation Web

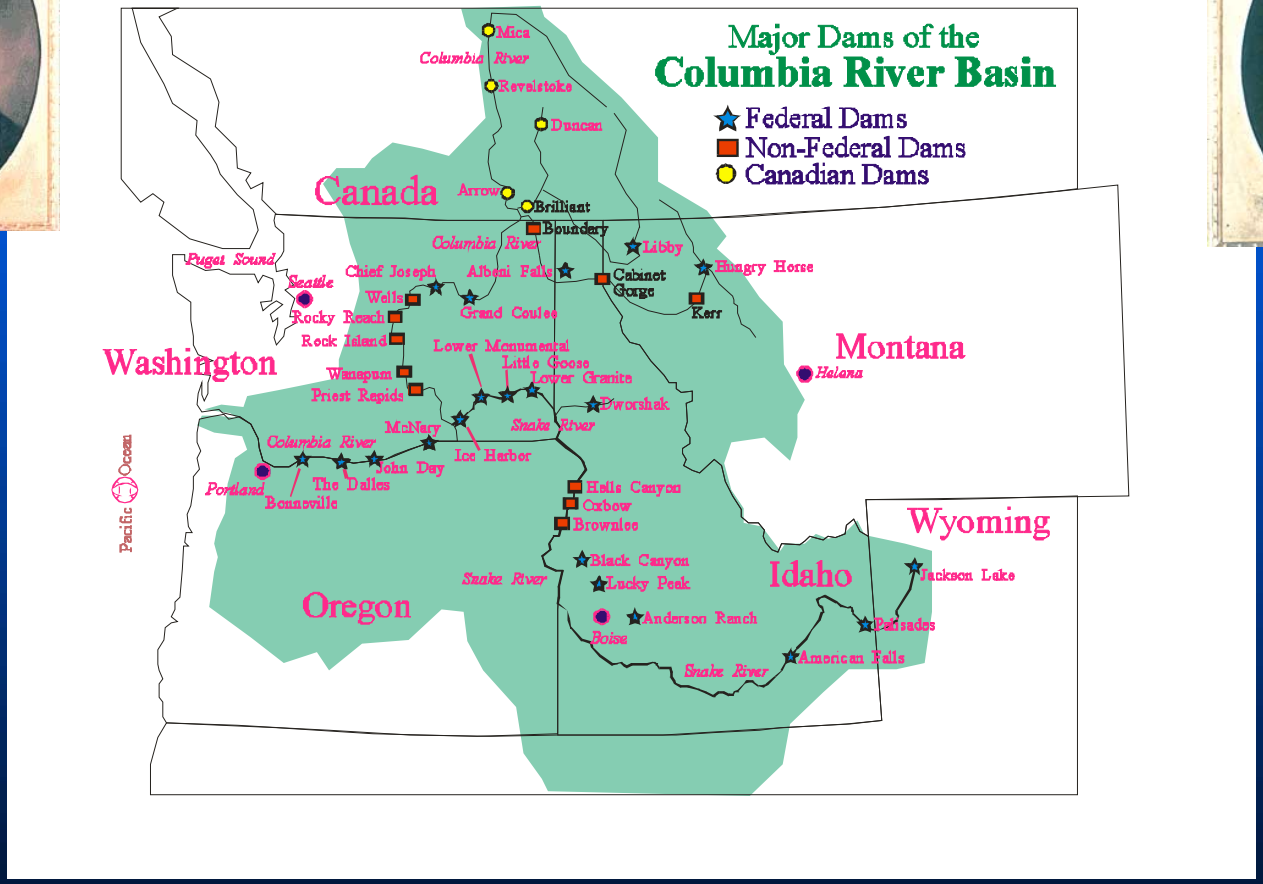


Why Is It So *&%# Complicated?

To Understand the Present, You Need to Know Our Past

What Happened After Lewis and Clark Left?





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 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*"

Imp sponse
nic
De Plans

slide 8

Northwest Power and Conservation Council

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

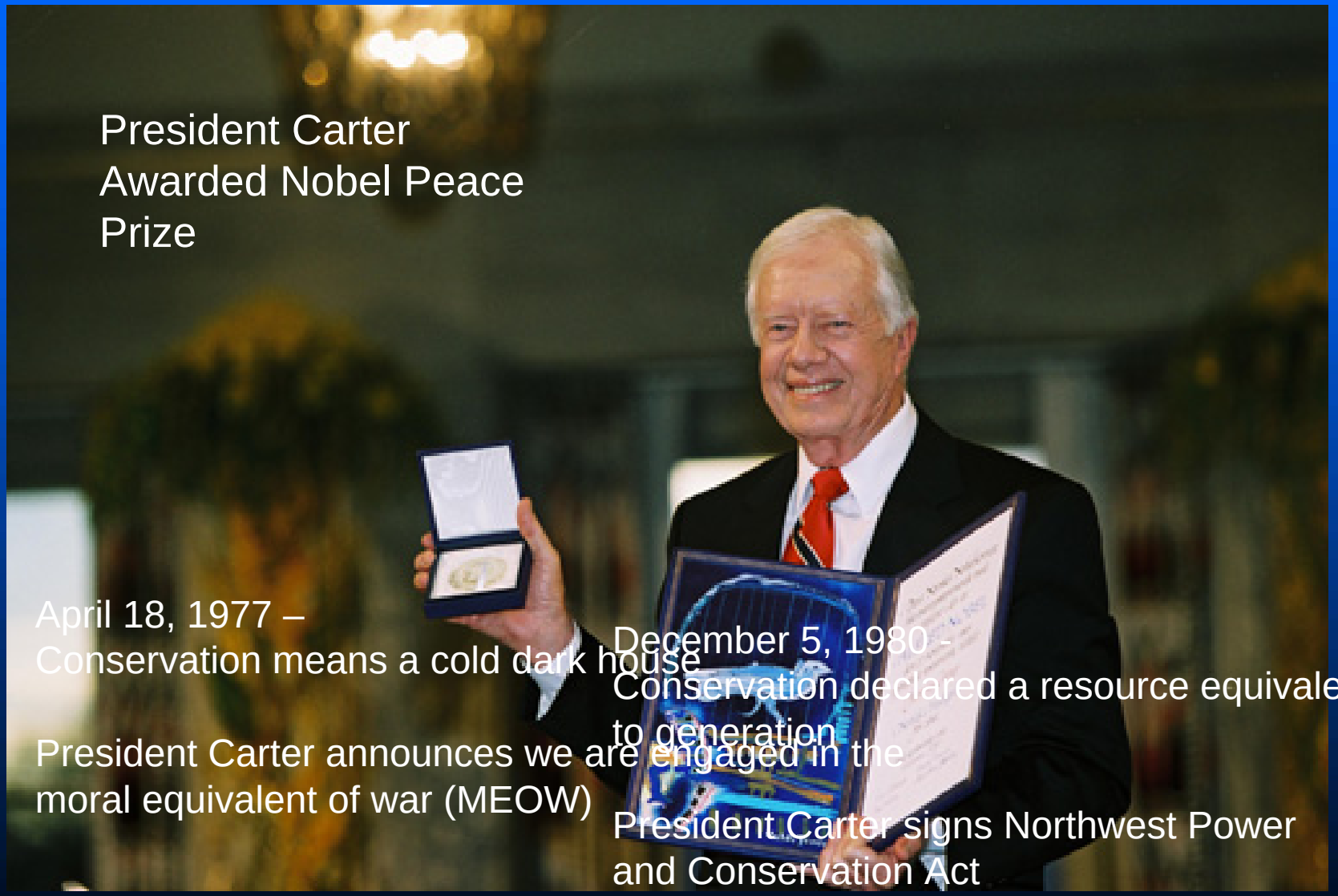
- Terminate or mothball 9 nuclear and 5 coal plants at a cost to the region's consumers of more than ***$7 billion***.

- Motivated 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*

Slide 9

Northwest Power and Conservation Council

The Evolution of Energy Policy



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
  - "The Plan" shall call for the development of the ***least cost*** mix of resources
  - "The Plan" shall consider ***conservation (energy efficiency) its highest priority resource*** equivalent to generation with a 10% cost advantage over power generating resources
- Mandated ***public involvement*** in Council's planning process.

Who Are Those Guys?

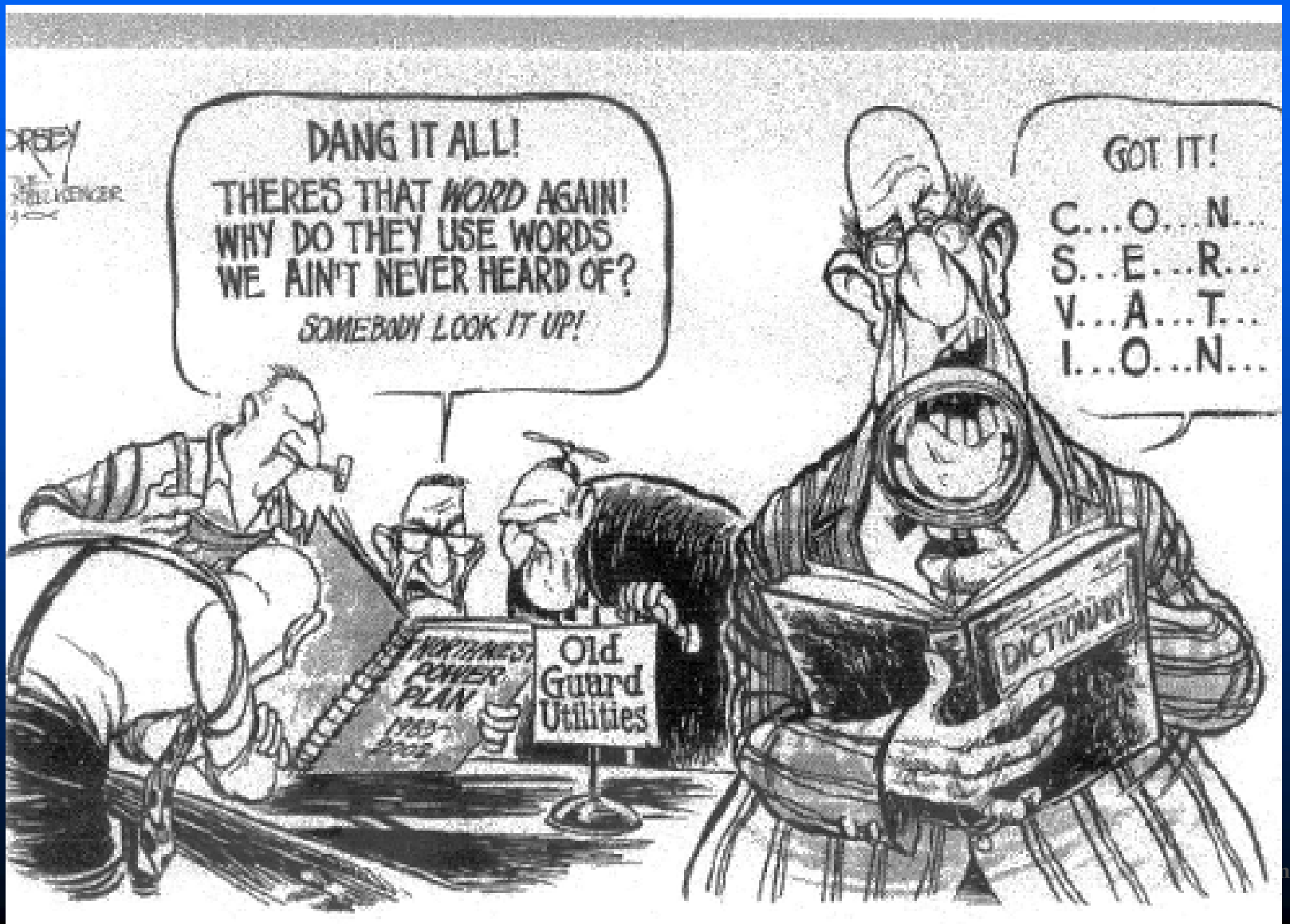
- Eight Council Members
- Two From Each PNW State
- Appointed by Governors
- Cabinet Level Positions in State Government

slide 12

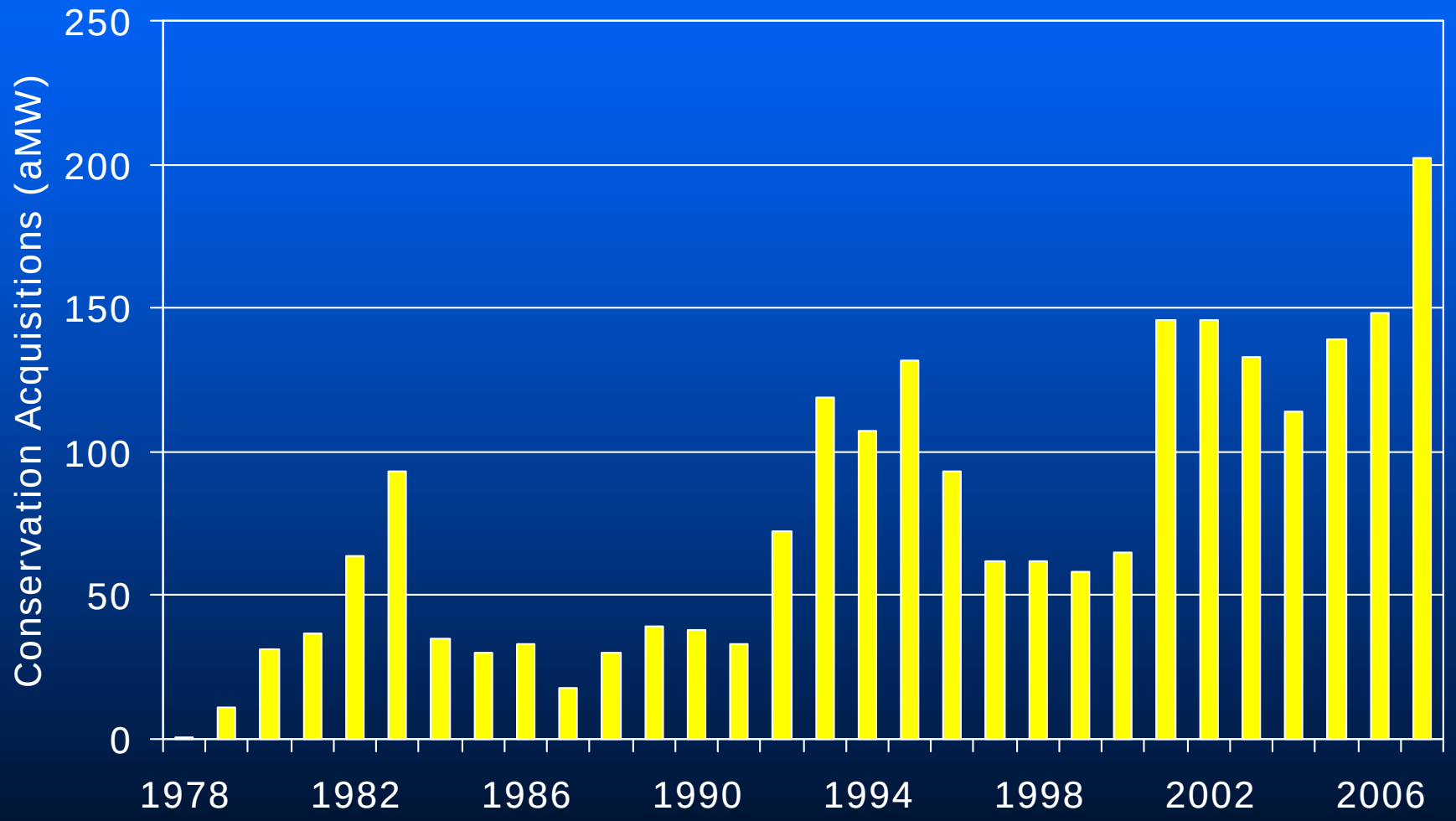
How Has It Worked?

Slide 13

Utility Reaction to Council's First Plan Was "Mixed"



Over the Last Three Decades Regional Utility Conservation Acquisitions Resulted in "Mr. Toad's Wild Ride"* for the PNW's Energy Efficiency Industry



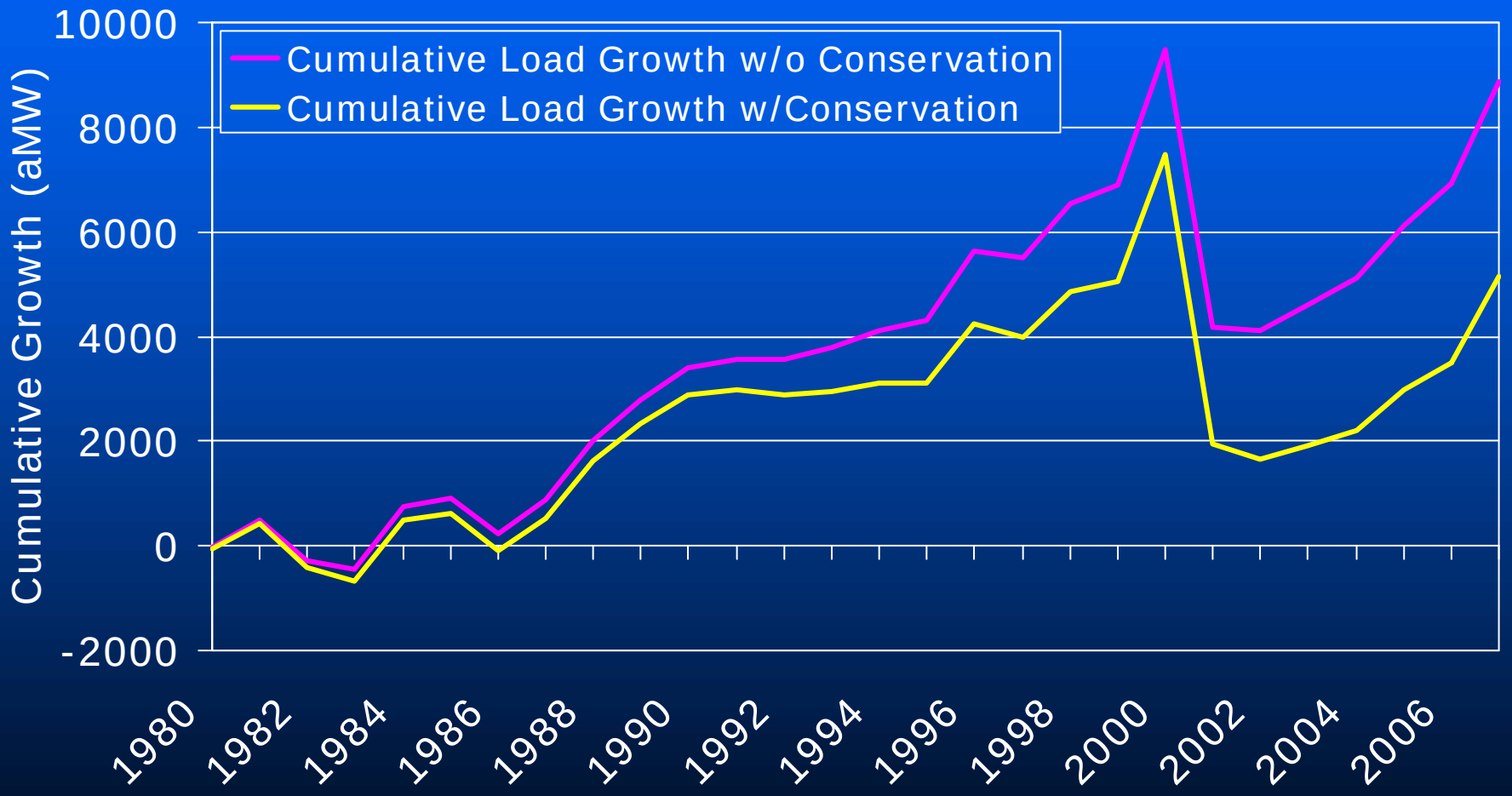
See: http://en.wikipedia.org/wiki/Mr._Toad's_Wild_Ride

Nevertheless – We've Accomplished "Mass Quantities"

So What's 3600 aMW?

- It's enough electricity to serve more than the ***entire*** ***state of Idaho*** and ***all of Western Montana***
- It saved the region's consumers nearly than ***$1.6 billion*** in 2007
- It lowered 2007 PNW carbon emissions by an estimated ***14.1 million*** tons.

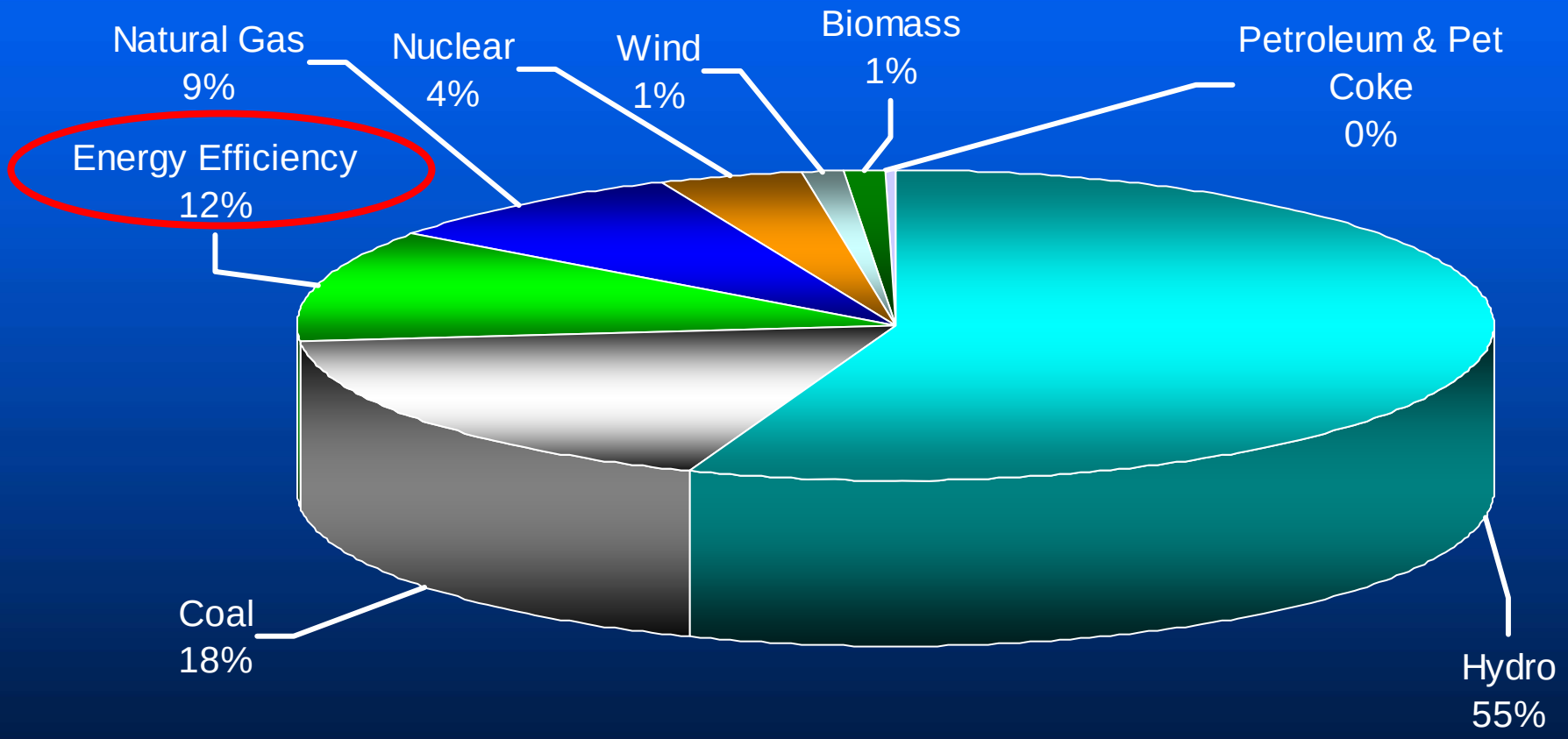
Since 1980 Energy Efficiency Resources Met About Half of PNW Load Growth



Slide 18

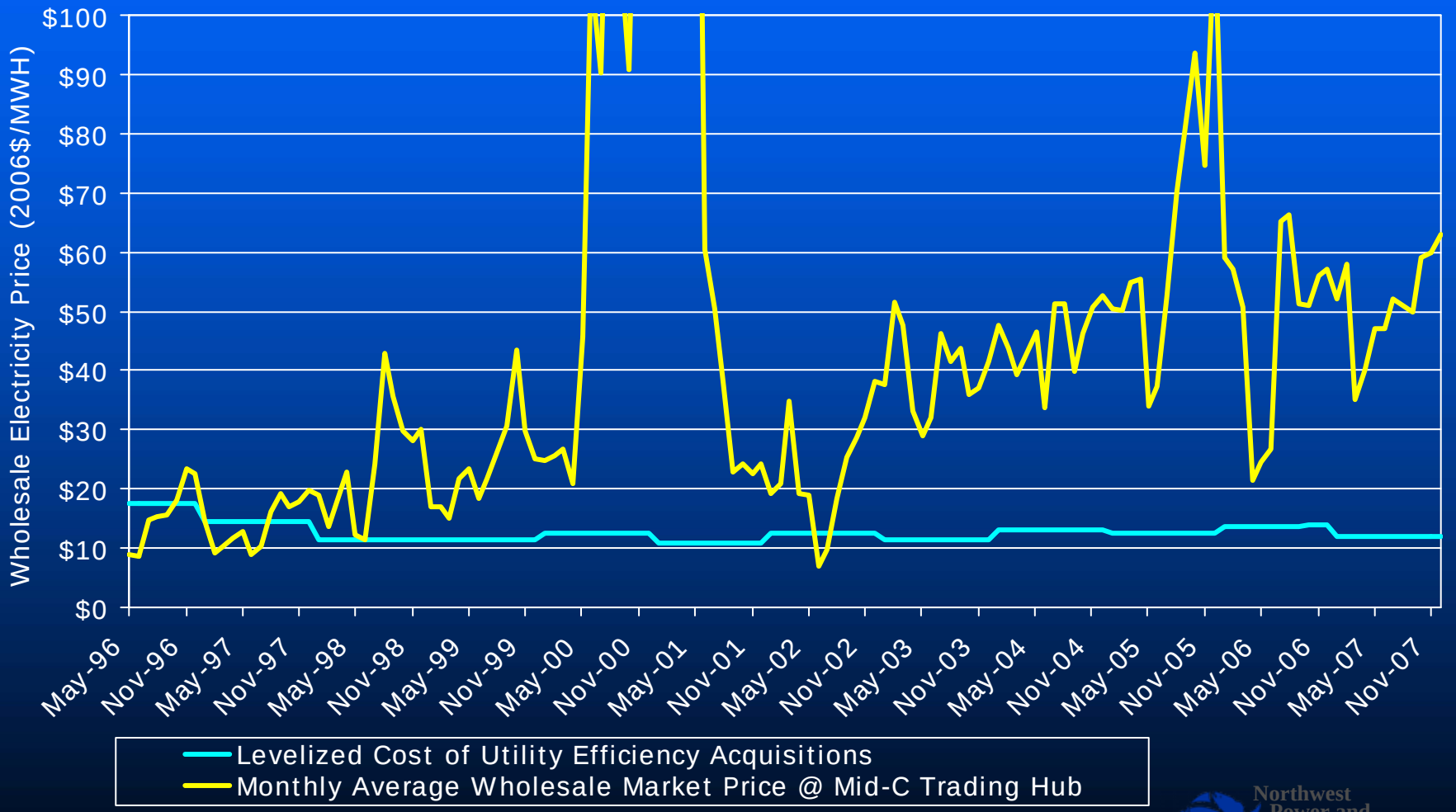
Northwest Power and Conservation Council

Energy Efficiency Is The Region's Third Largest Resource



slide 19

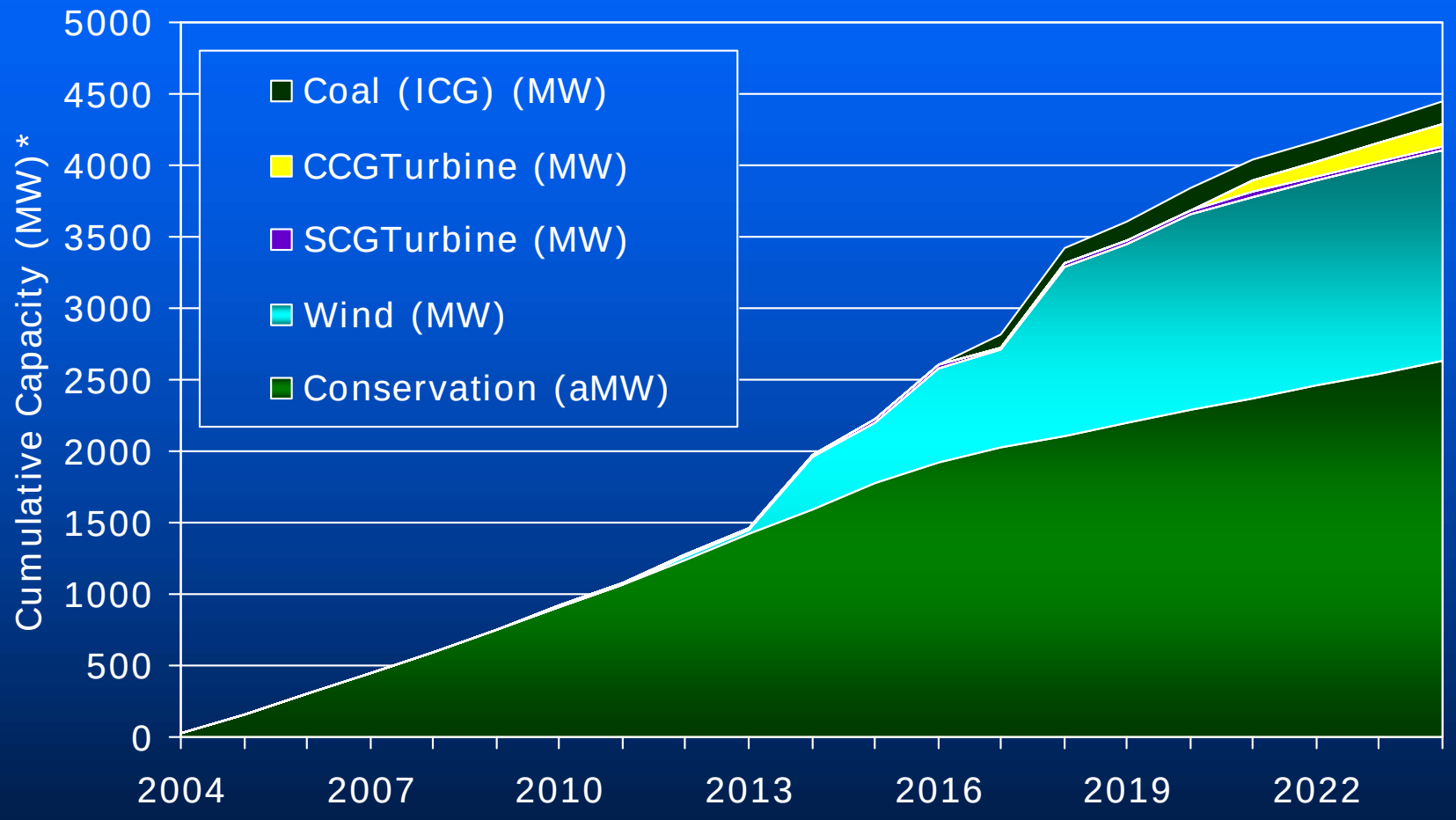
Utility Acquired Energy Efficiency Has Been A ***BARGAIN!***



slide 20

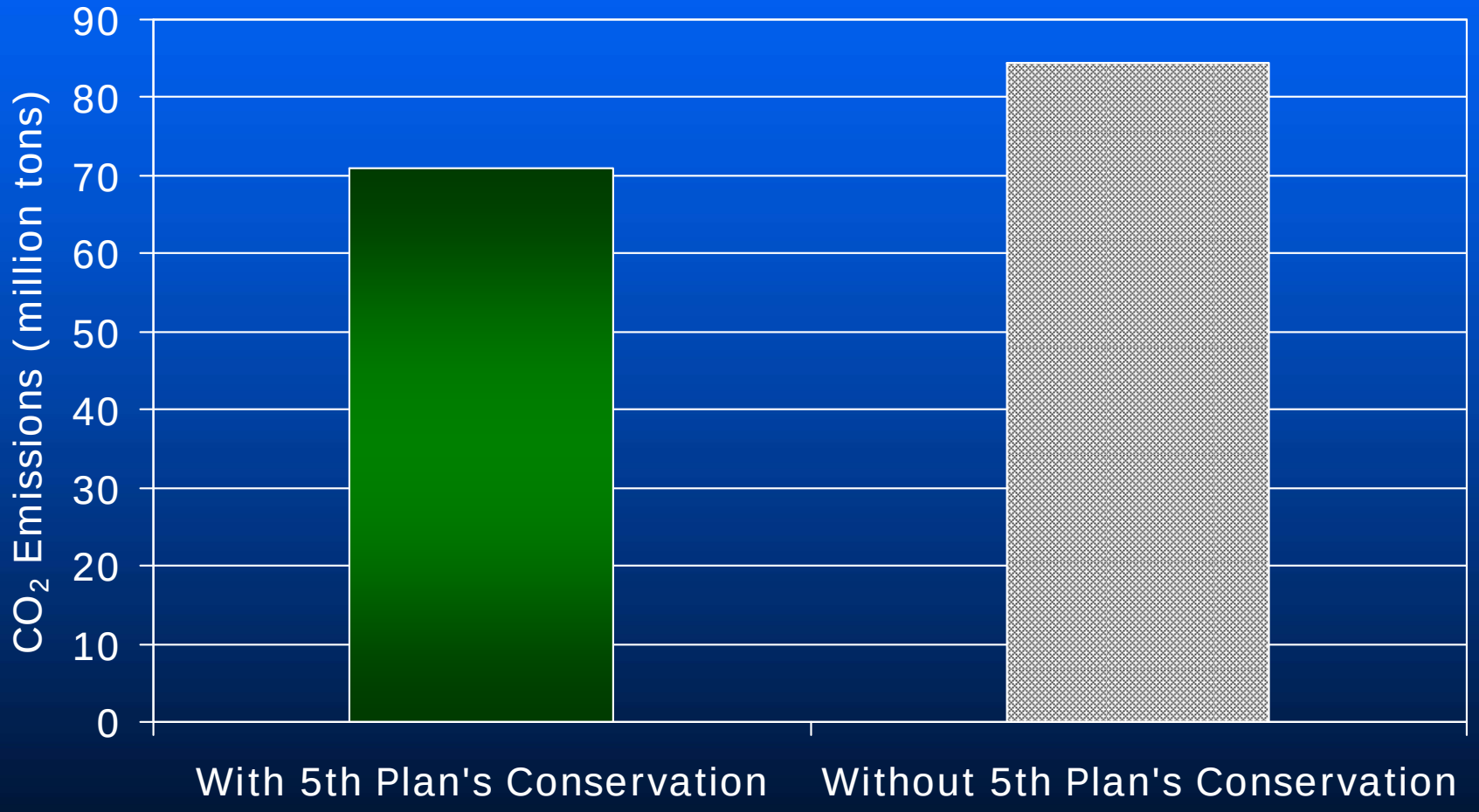
Northwest Power and Conservation Council

5th Plan Relied on Conservation and Renewable Resources to Meet Nearly All Load Growth

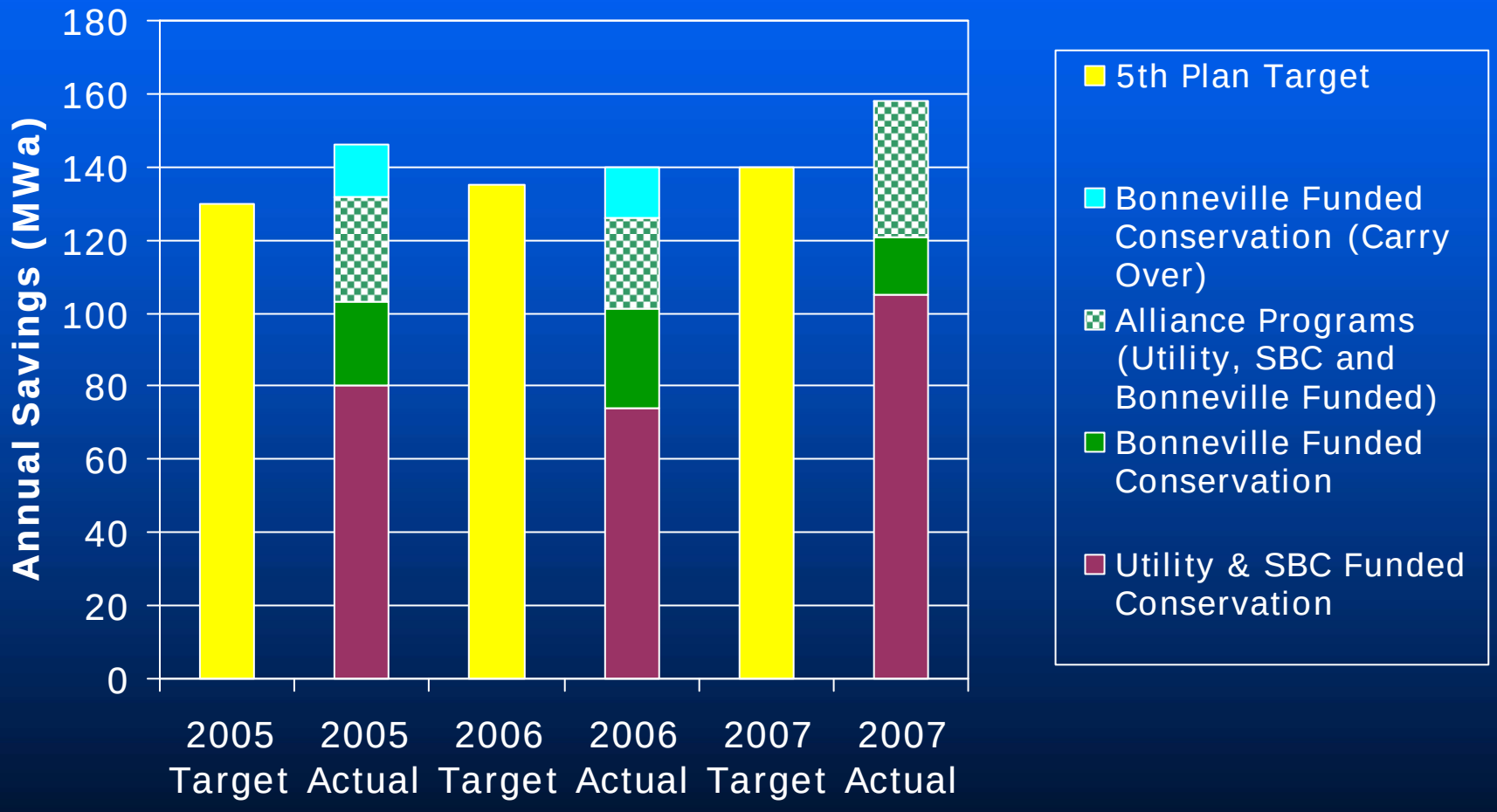


*Actual future conditions (gas prices, CO2 control, conservation accomplishments) will change resource development schedule and amounts.

Meeting 5th Plan's Conservation Targets Reduces Forecast PNW Power System CO_2 Emissions in 2024 by Nearly 20%



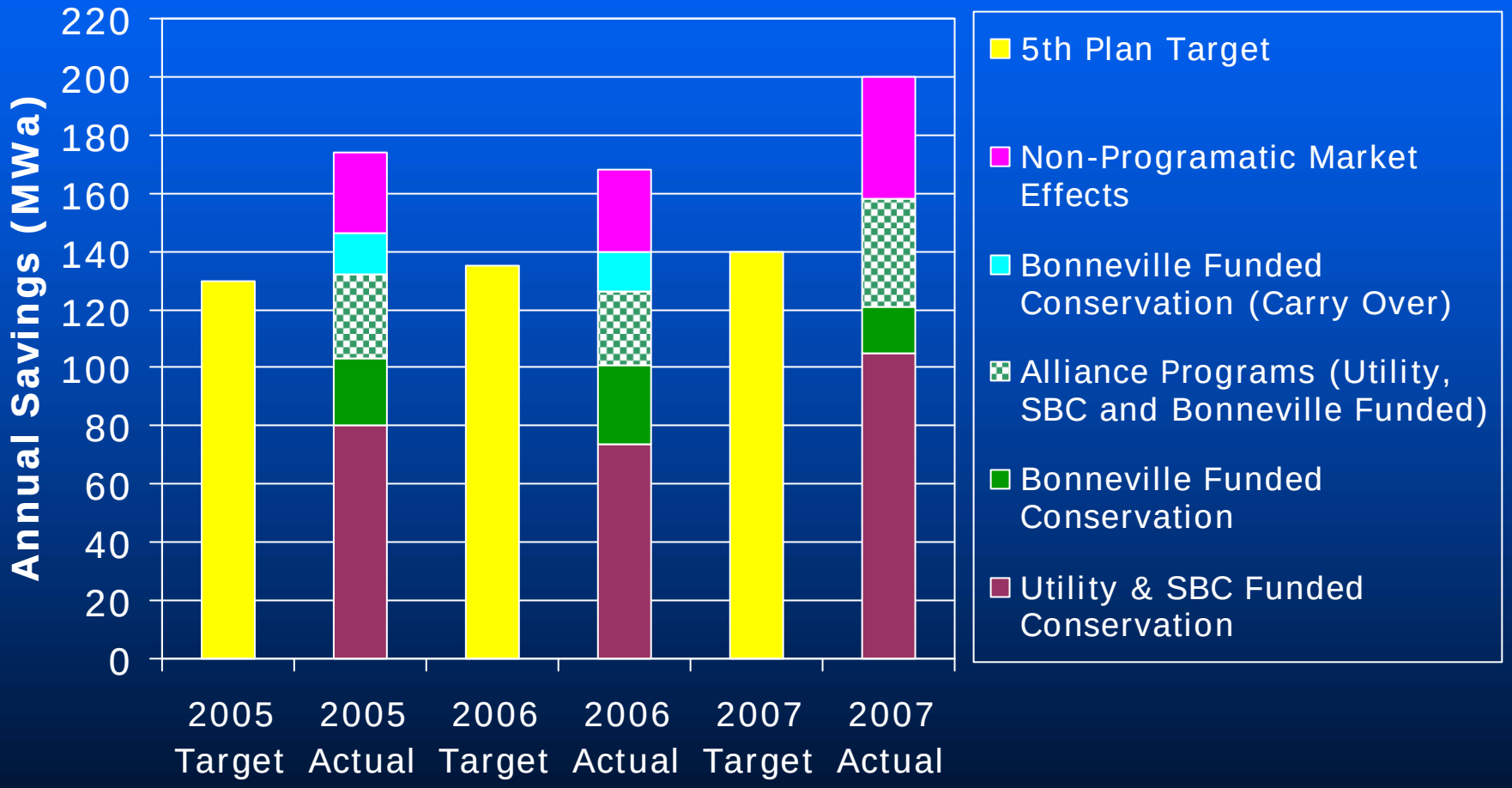
The Region Is *Exceeding* the 5th Plan's Targets With Utility Funded Programs Alone!



Slide 23

Northwest Power and Conservation Council

When Overall Market Changes Are Considered, The Region Set An All Time Savings Record in 2007



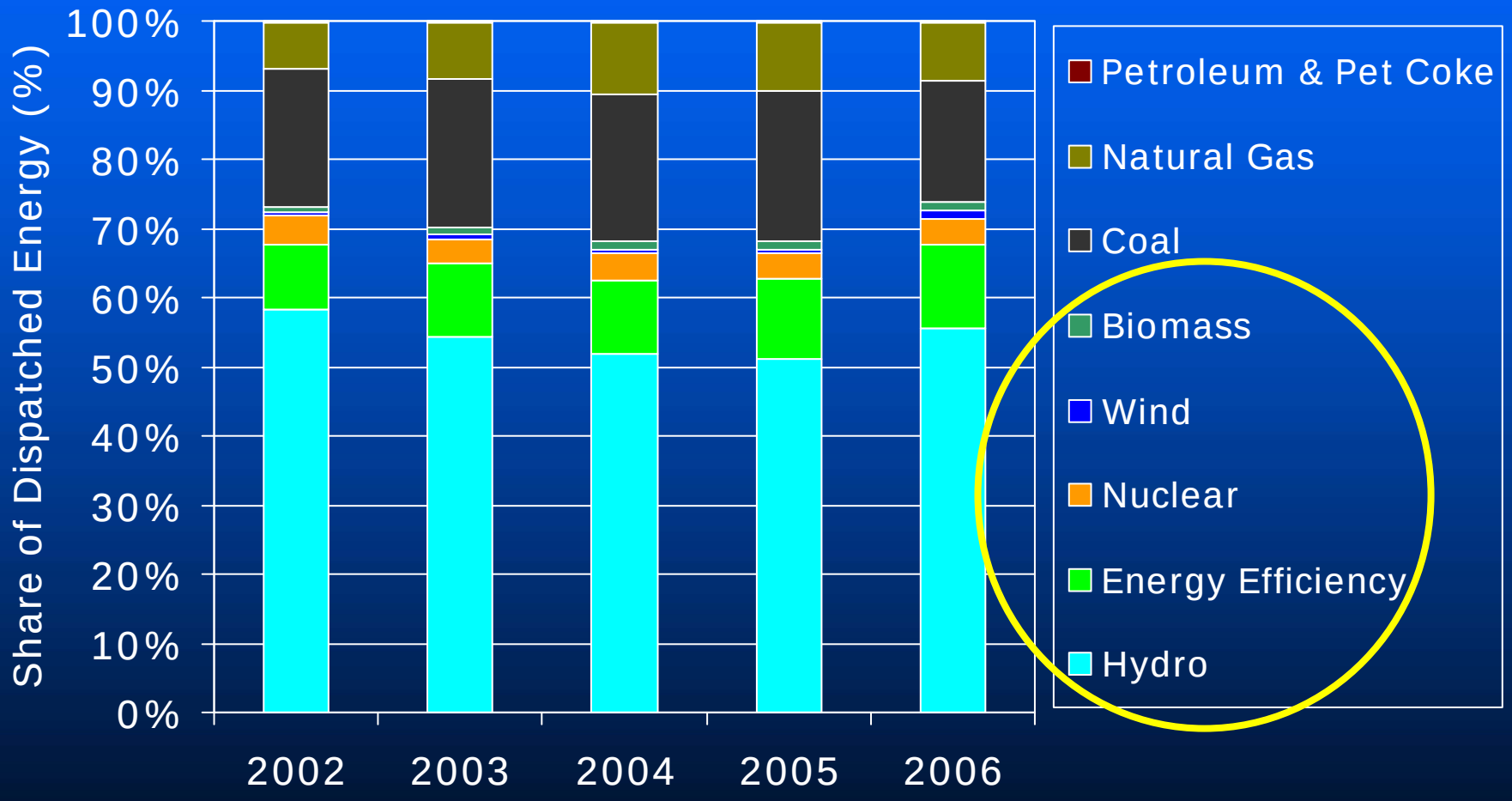
slide 24

Northwest Power and Conservation Council

Why Worry?

Slide 25

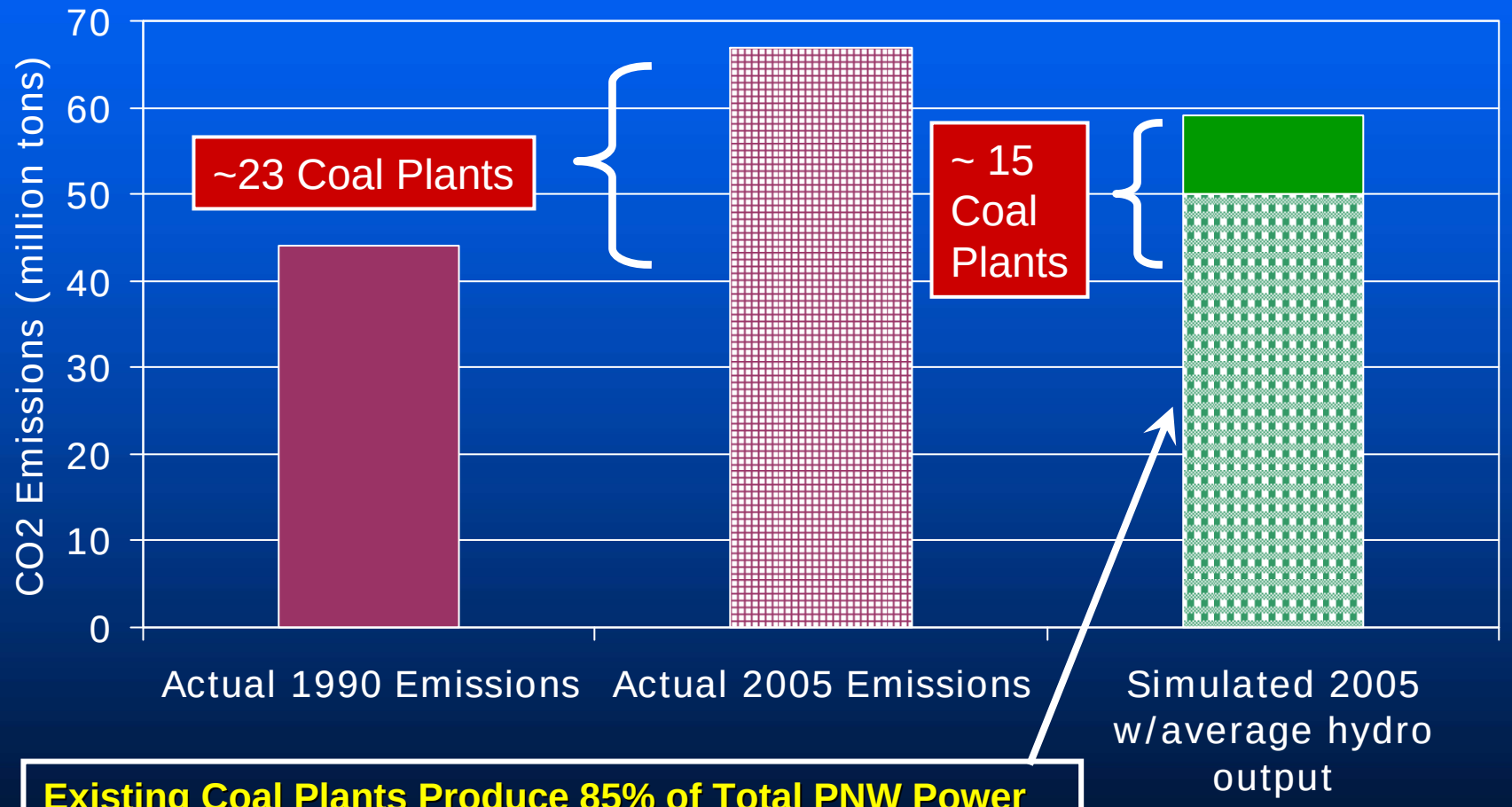
Existing Power System Resources Are Dominated by Non-CO_2 Emitting Resources



Slide 26

Northwest Power and Conservation Council

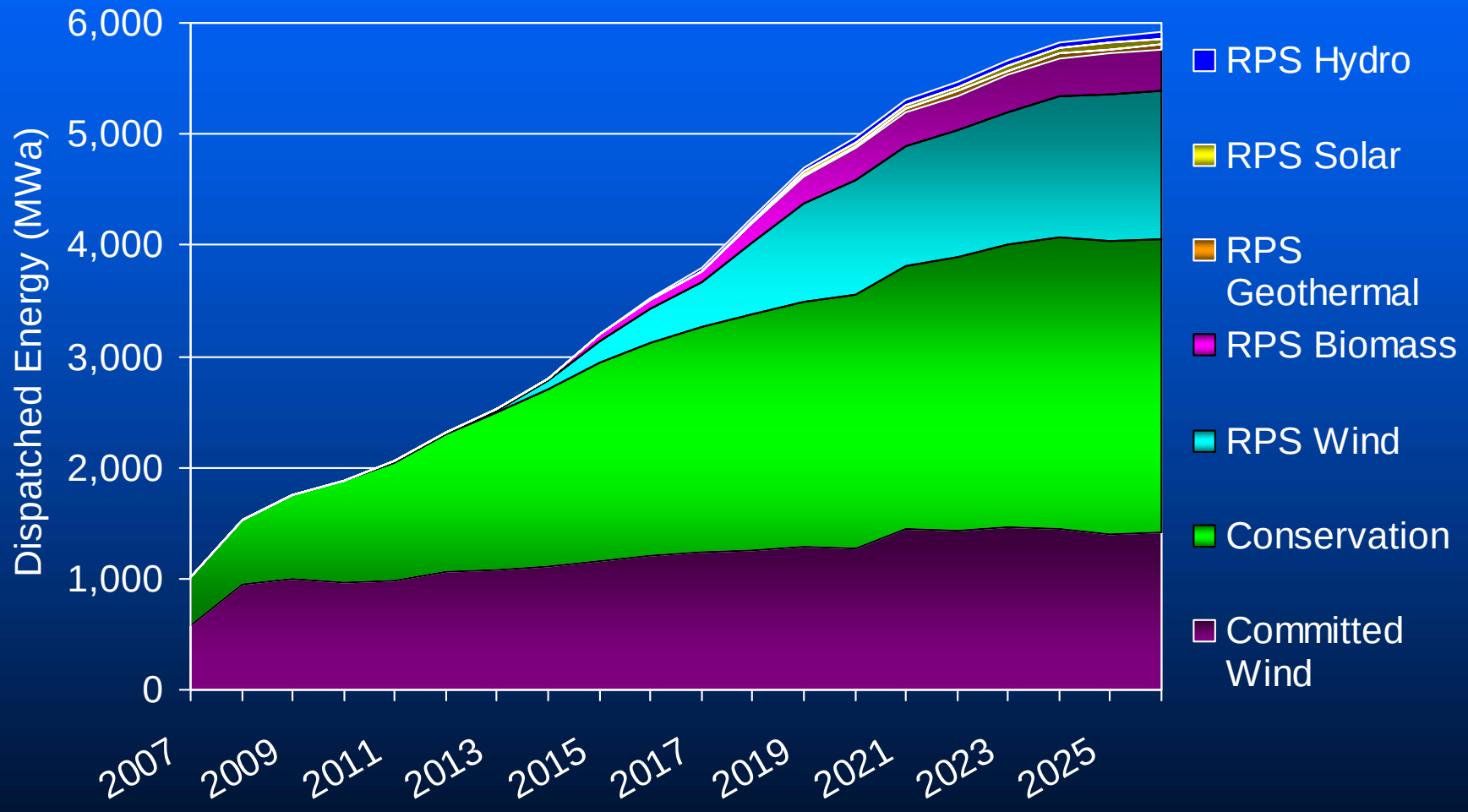
Total PNW Power System Carbon Emissions Have Grown Significantly Since 1990



Existing Coal Plants Produce 85% of Total PNW Power System CO_2 and Provide 20% of the Region's Power

Northwest Power and Conservation Council

The PNW Now Plans To Meet Nearly All Future Load Growth With Conservation and Renewable Resources



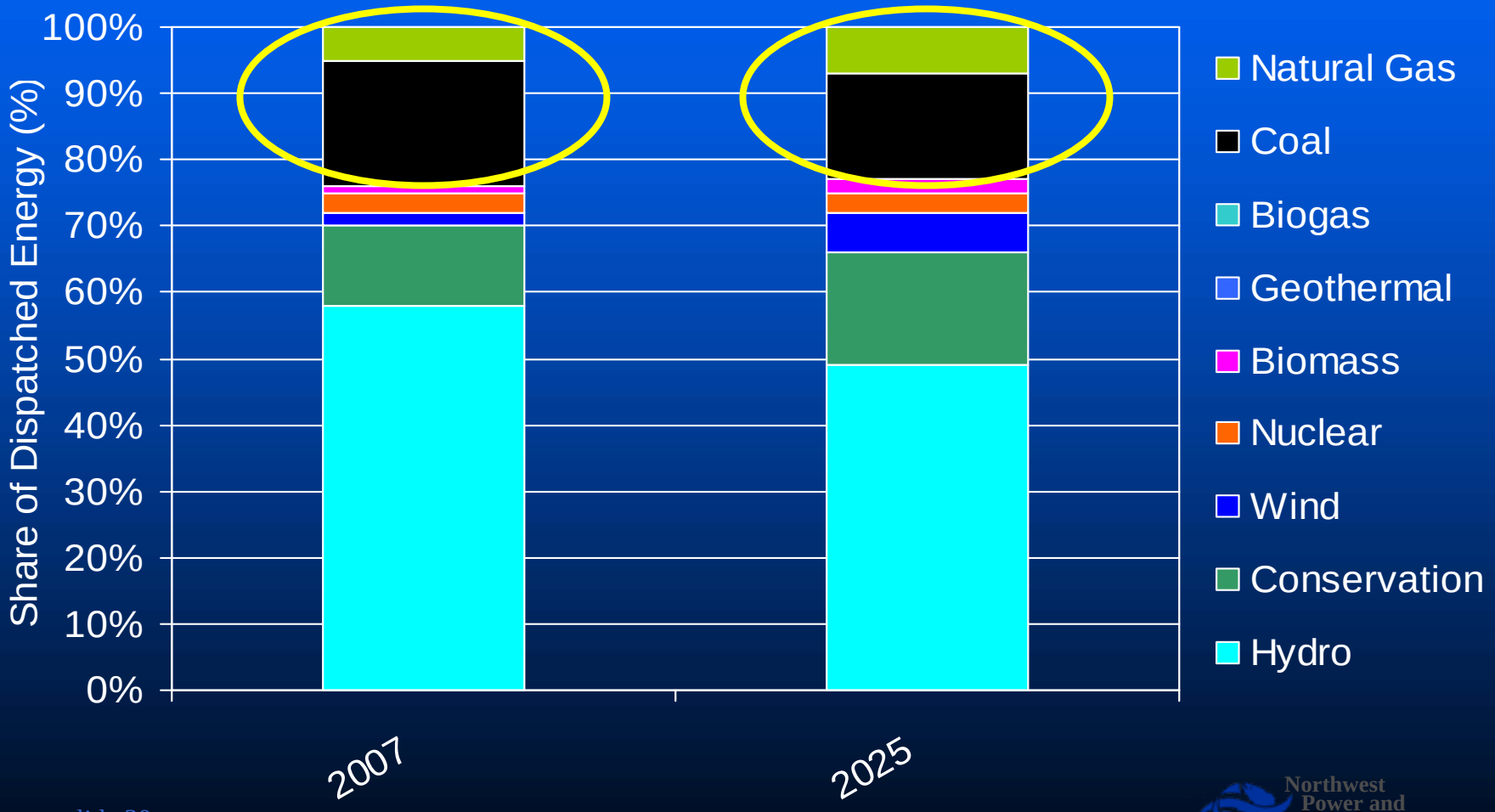
slide 28

Northwest Power and Conservation Council

How Will This Impact the Power System's Carbon Footprint?

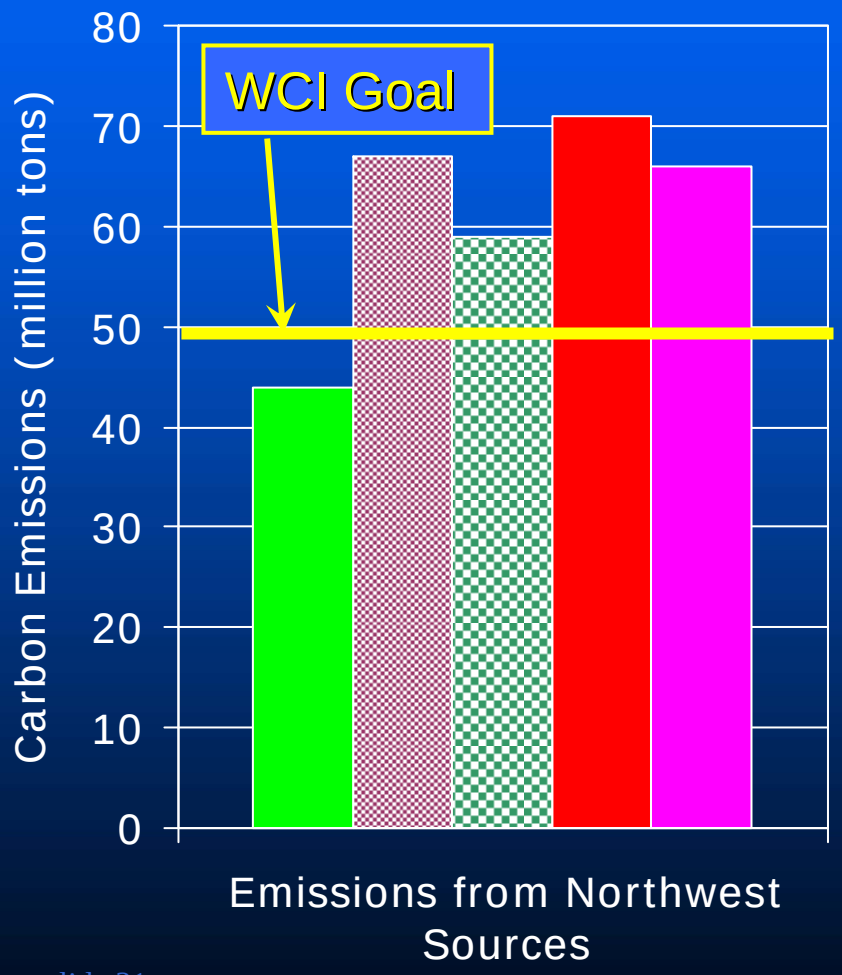
Slide 29

Even If We Meet All Load Growth With Energy Efficiency and Renewable Resources CO_2 Emissions from Existing Fossil Fueled Plants Remain Unchanged

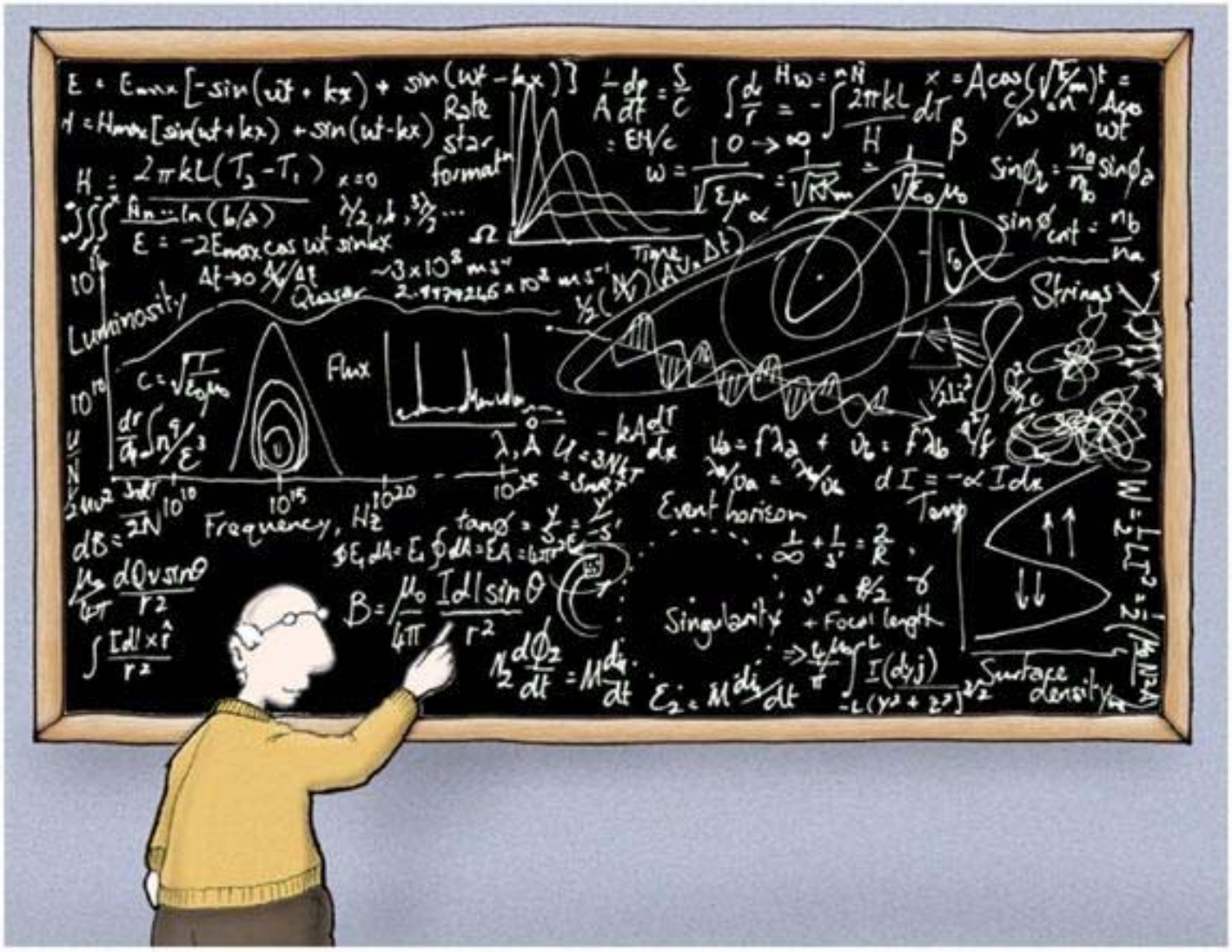


slide 30

Meeting the 5th Plan's Conservation Goals AND State Renewable Portfolio Standards Will Not Meet WCI CO_2 Emissions Targets

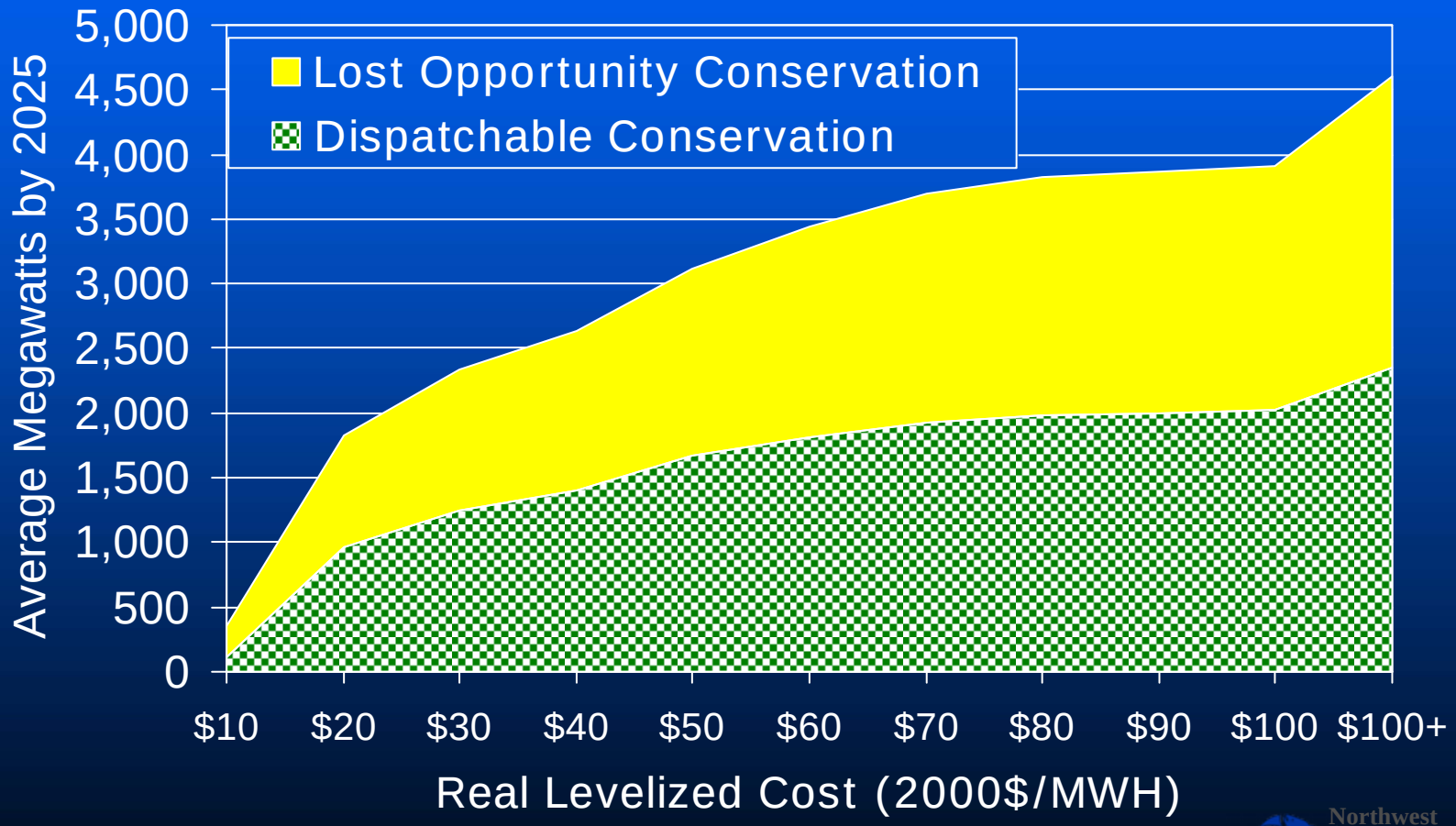


- Actual 1990 Emissions
- Actual 2005 Emissions
- Simulated 2005 w/average hydro output
- Forecast 5th Plan Resource 2025 Portfolio Emissions
- Forecast 2025 Emissions w/RPS Renewables



OK, So What's The Answer?

5th Plan Identified Nearly 4,600 MWa of "Technically Available" Conservation Potential



slide 33

Northwest Power and Conservation Council

Adjustments to 5th Plan's Conservation Resource Potential

- Reductions in Available Potential
  - Program Accomplishments
  - Changes in Law
    - » Federal Standards for general service lighting
    - » State Building Codes
  - Changes in Markets
    - » Improved "Current Practice" due to Energy Star, LEED, Programs, Market Transformation
    - » Other Changes to Federal Standards (10 adopted, 21 under revision, and 12 with effective dates by 2014)
  - Changes in Forecast
    - » Less new commercial floor area
    - » Lower industrial forecast

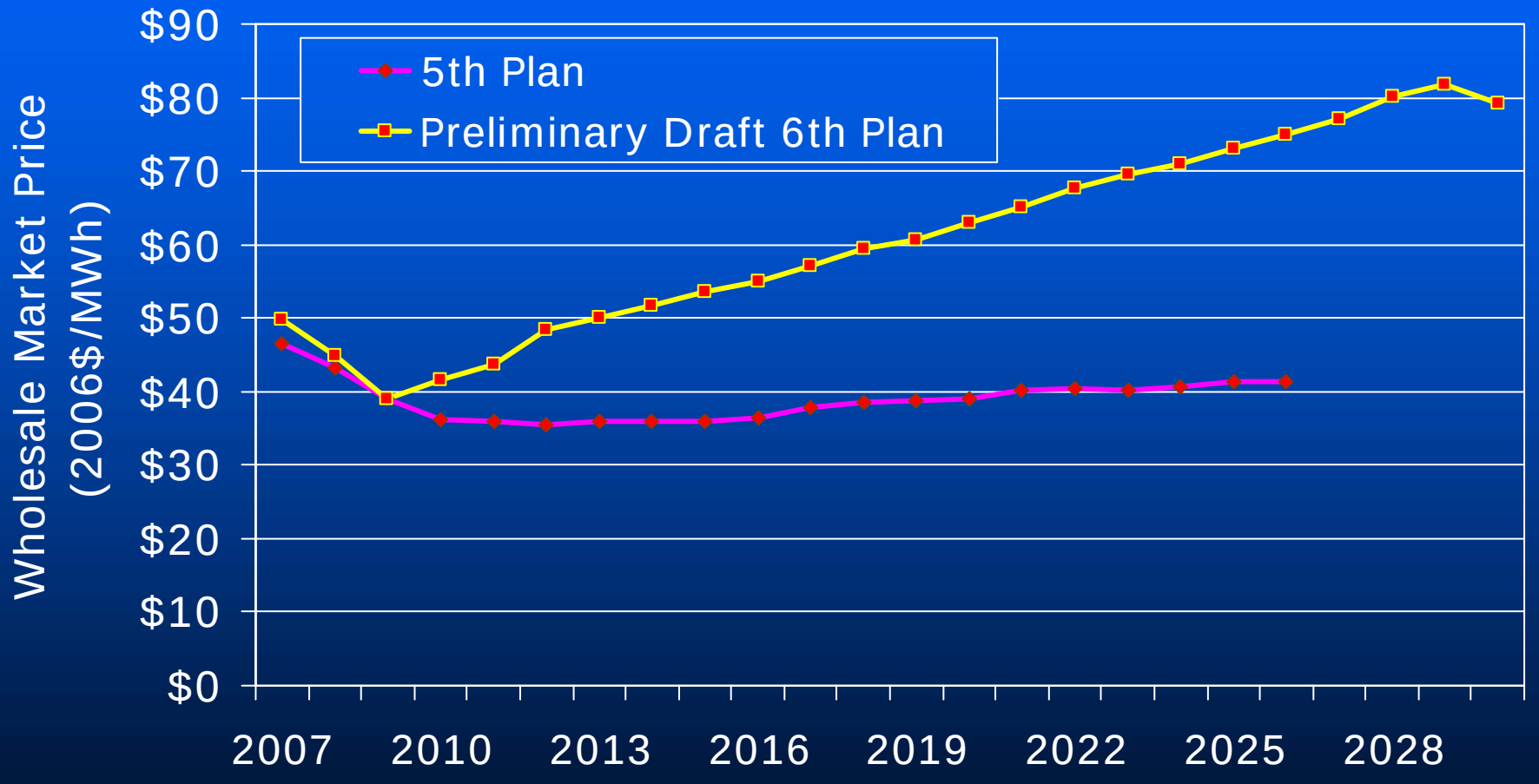
slide 34

Adjustments to 5th Plan's Conservation Resource Potential

- Increases in Available Potential
  - Changes in Scope
    - » Distribution System Efficiency Improvements
    - » Consumer electronics (TV's, set top boxes)
    - » Irrigation Water Management and Dairy Farm
  - Changes in Data and Technology
    - » Detailed Industrial Sector Potential
    - » New Measures (e.g. ductless heat pumps, solid state lighting, 2 gpm Showerheads)

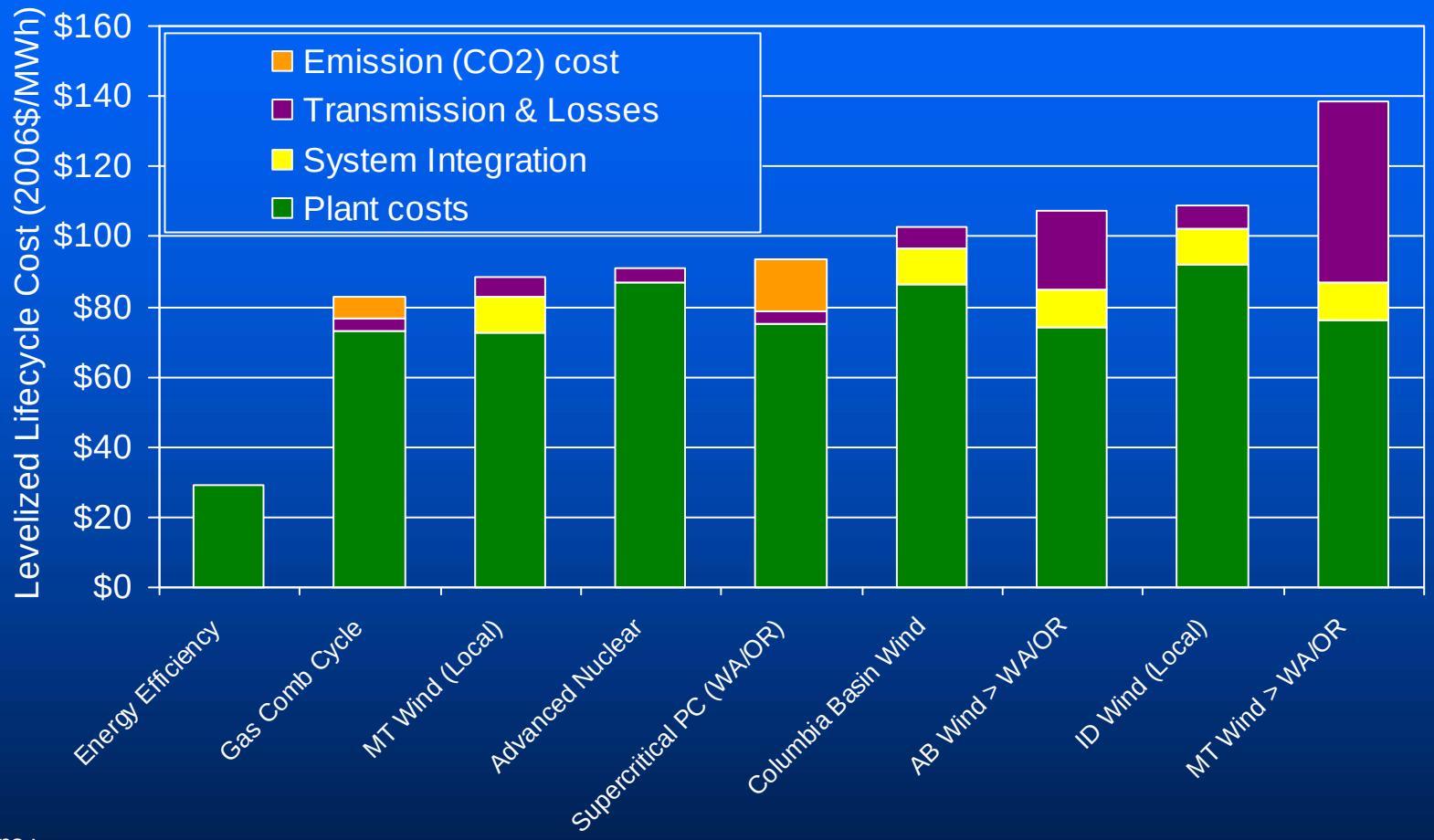
slide 35

Avoided Costs Are Forecast to Be Significantly Higher



slide 36

Energy Efficiency is Still the Cheapest Option



Assumptions :

Efficiency Cost = Average Cost of All Conservation Targeted in 5th Power Plan

Transmission cost & losses to point of LSE wholesale delivery

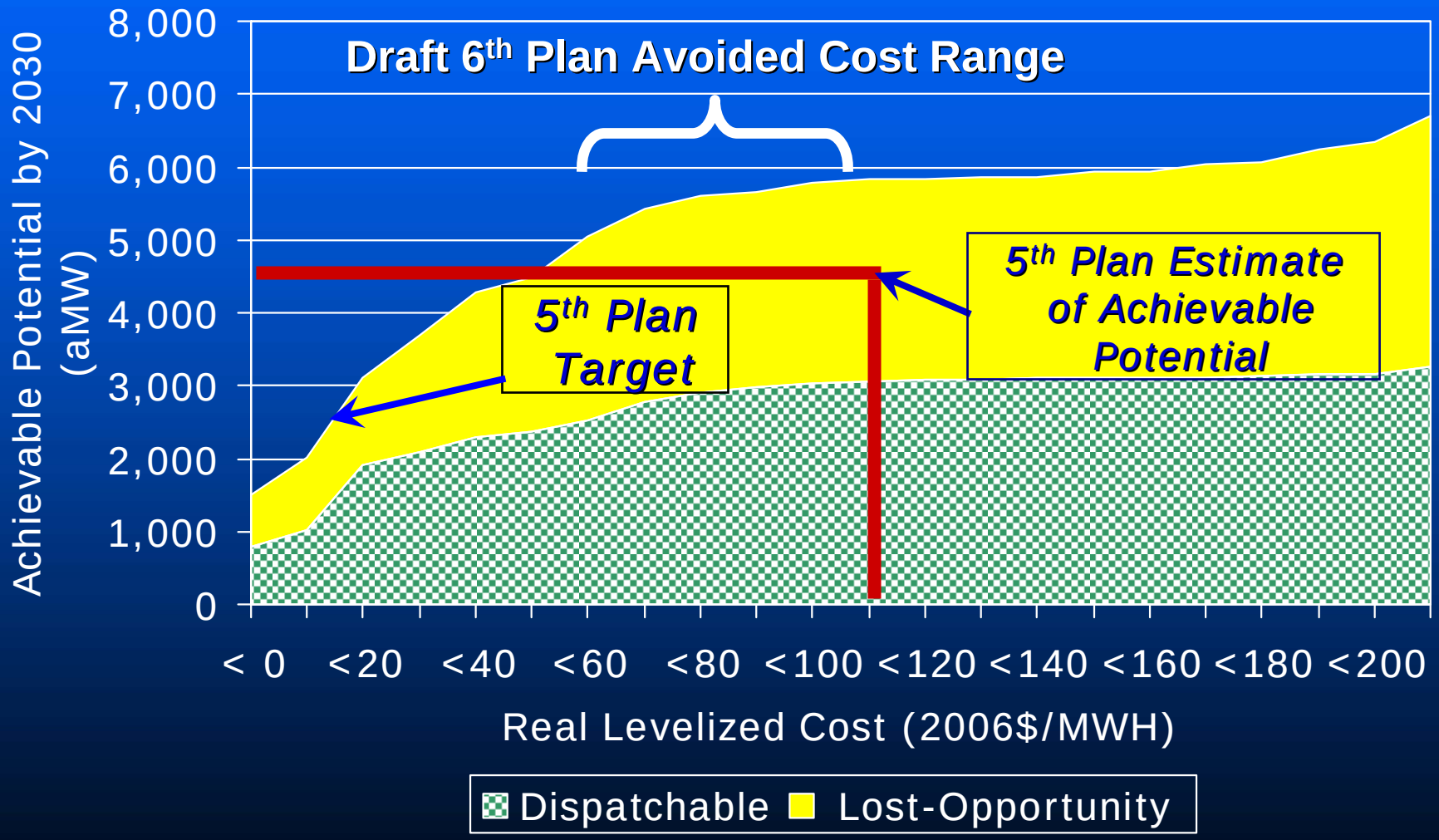
No federal investment or production tax credits

Baseload operation (CC - 85%CF, Nuclear 87.5% CF, SCPC 85%, Wind 32% CF)

Medium NG and coal price forecast (Proposed 6th Plan)

Bingaman/Specter safety valve CO2 cost

Draft 6th "Technically Achievable" Conservation Potential




OLIPHANT THE OREGONIAN © 2009 TRIBUNE MEDIA SERVICES 1/27
HERE'S THE NEW CONSERVATION ASSESSMENT
PNW Utilities
Tom
Chas

The Draft 6th Northwest Power and Conservation Plan

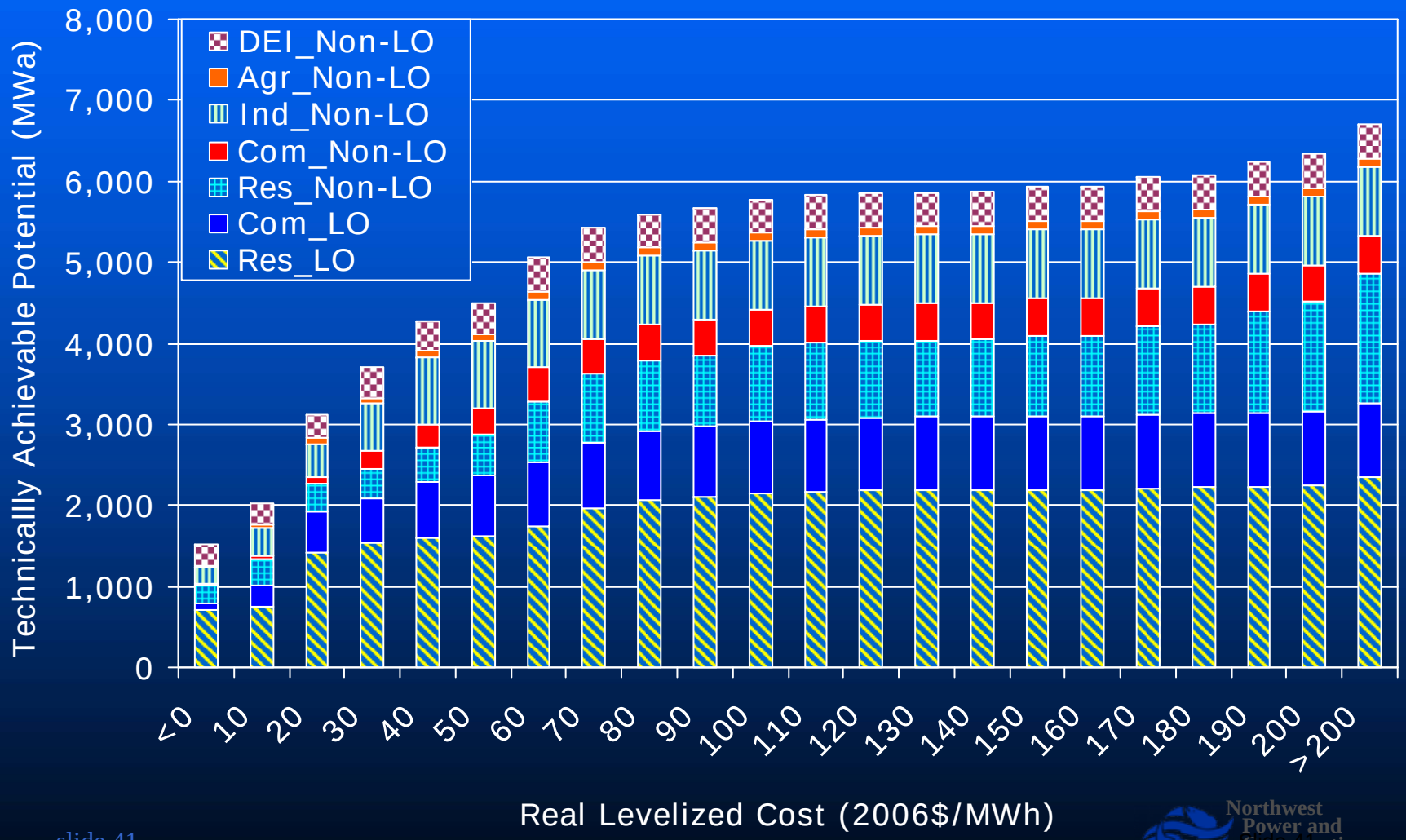
Spring 2009

Your Comments and Questions Welcomed

Slide 40

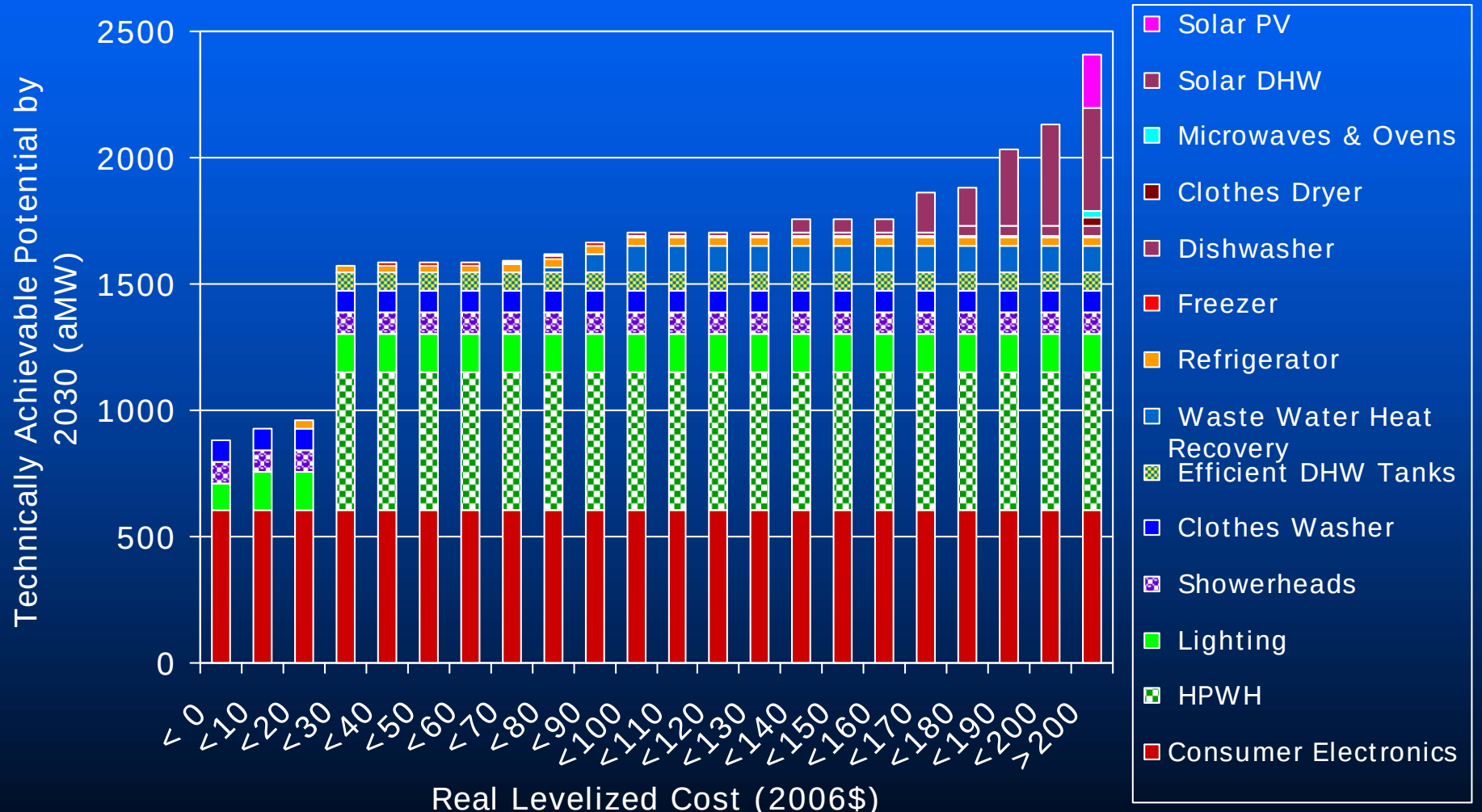
Northwest Power and Conservation Council

Where Is It?
Technically Achievable by Sector

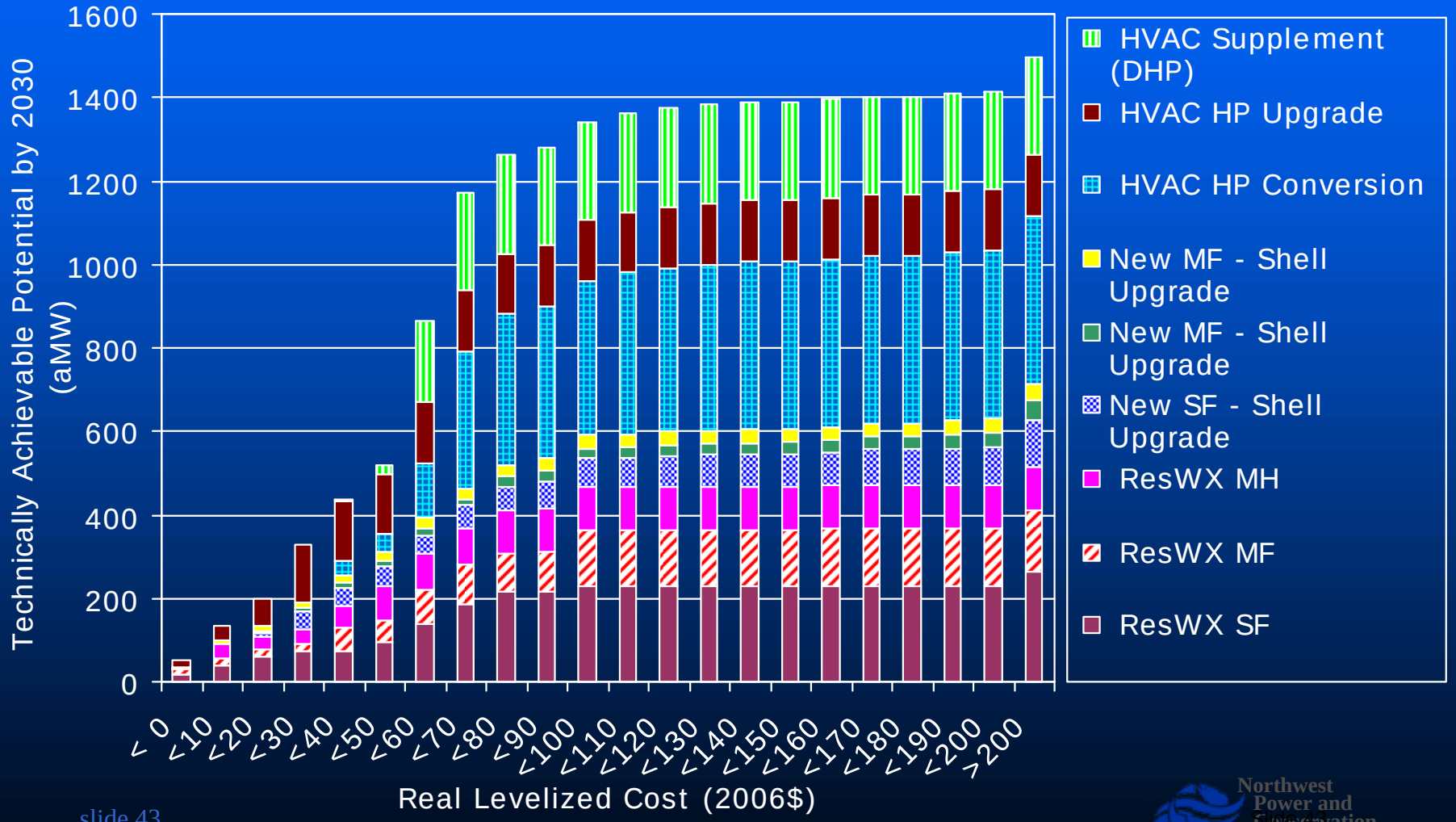


Northwest Power and Conservation Council

Residential Water Heating, Lighting, Appliance & Consumer Electronics Technically Achievable Potential



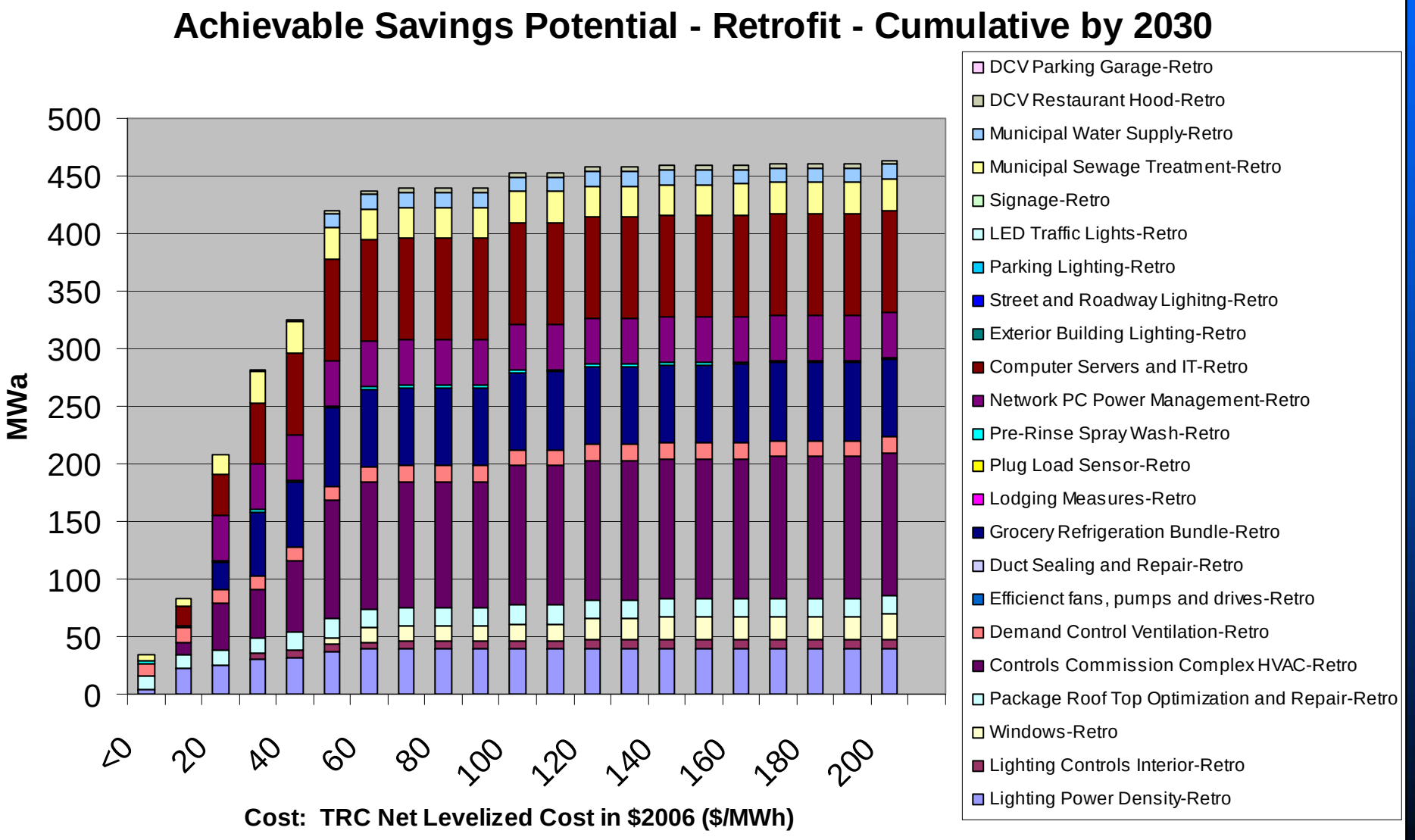
Residential Space Conditioning Technically Achievable Potential



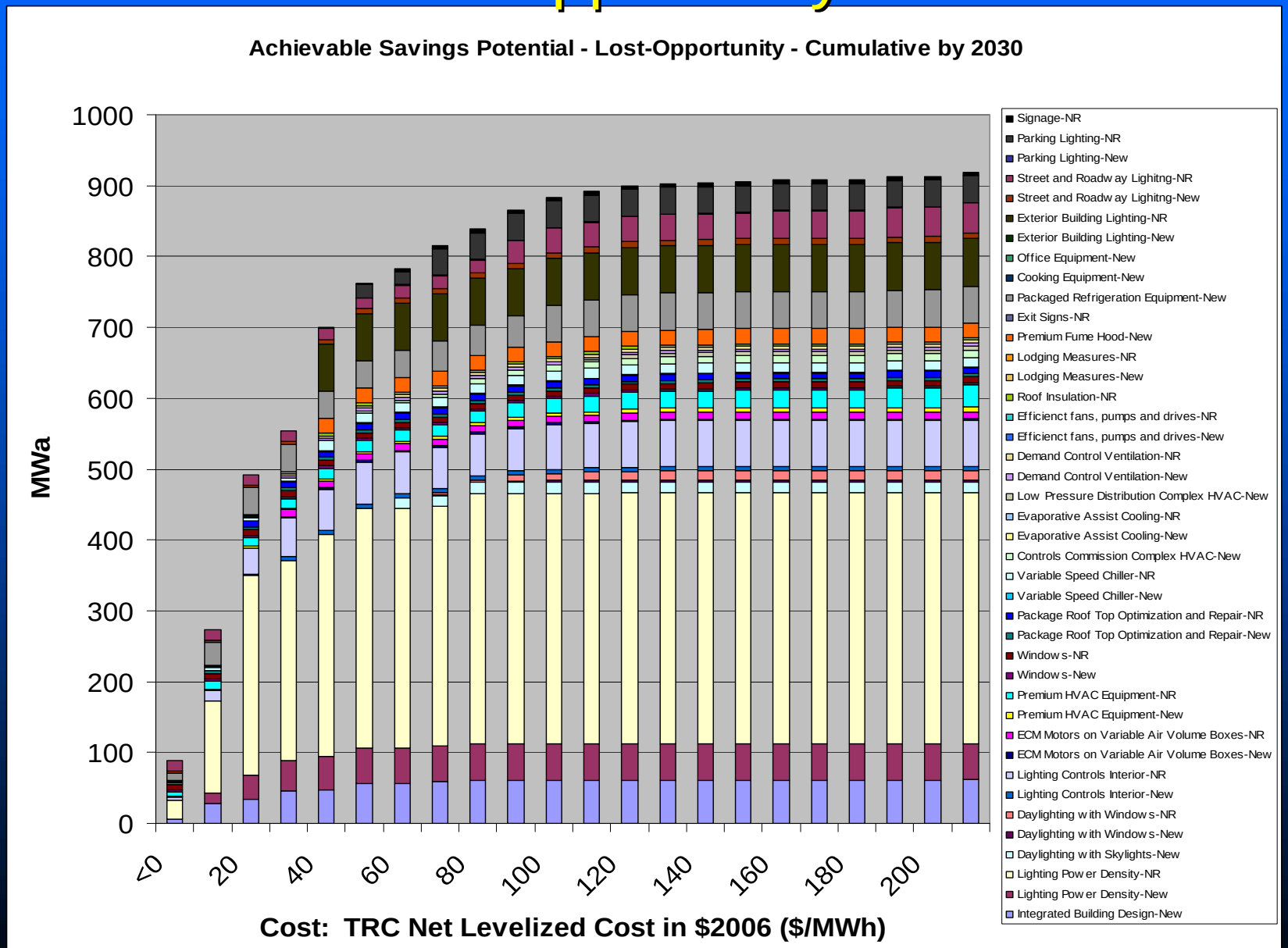
slide 43

Northwest Power and Conservation Council

Commercial Sector Technically Achievable Potential - Retrofits



Commercial Sector Technically Achievable Potential – Lost Opportunity

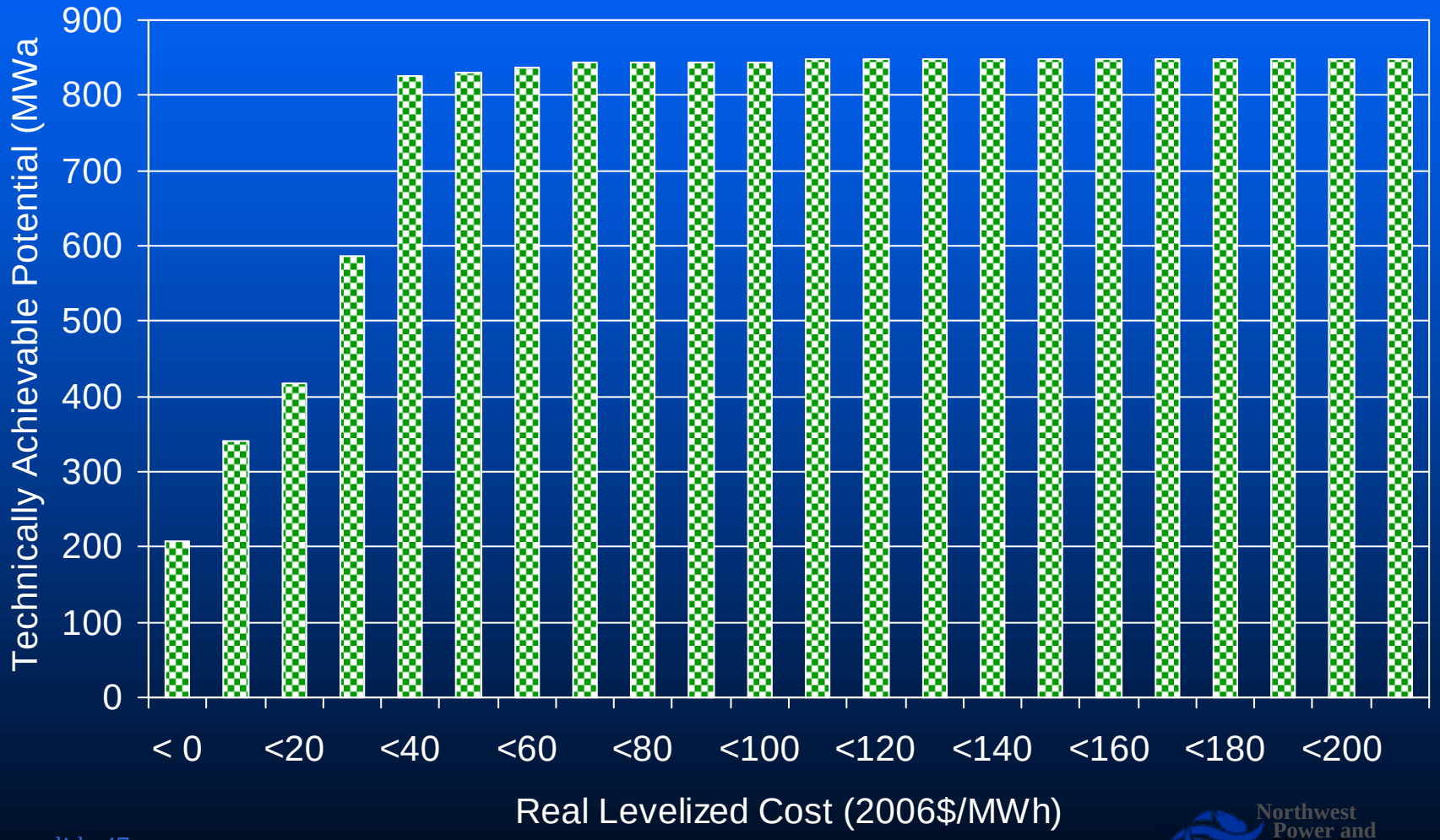


Industrial Energy Savings Potential

- High-Efficiency Equipment
  - Cross-industry systems (pumping or lighting)
  - Industry-specific (refiner plates in mechanical pulping)
- Systems Improvement
  - Optimization, demand management, sizing
- People
  - Operational & Business Practices

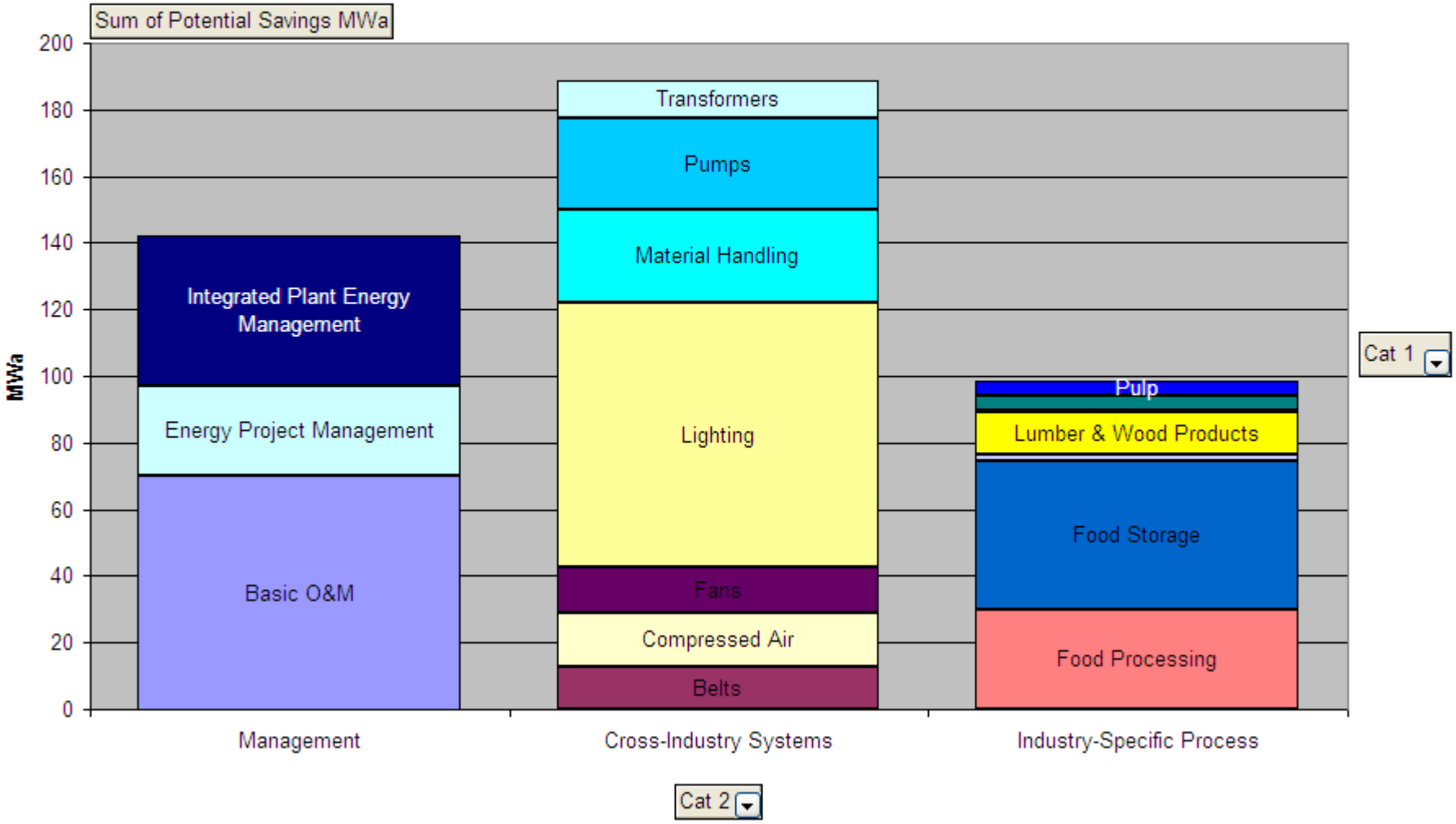
Slide 46

Industrial Sector Technically Achievable Potential



Drop Page Fields Here

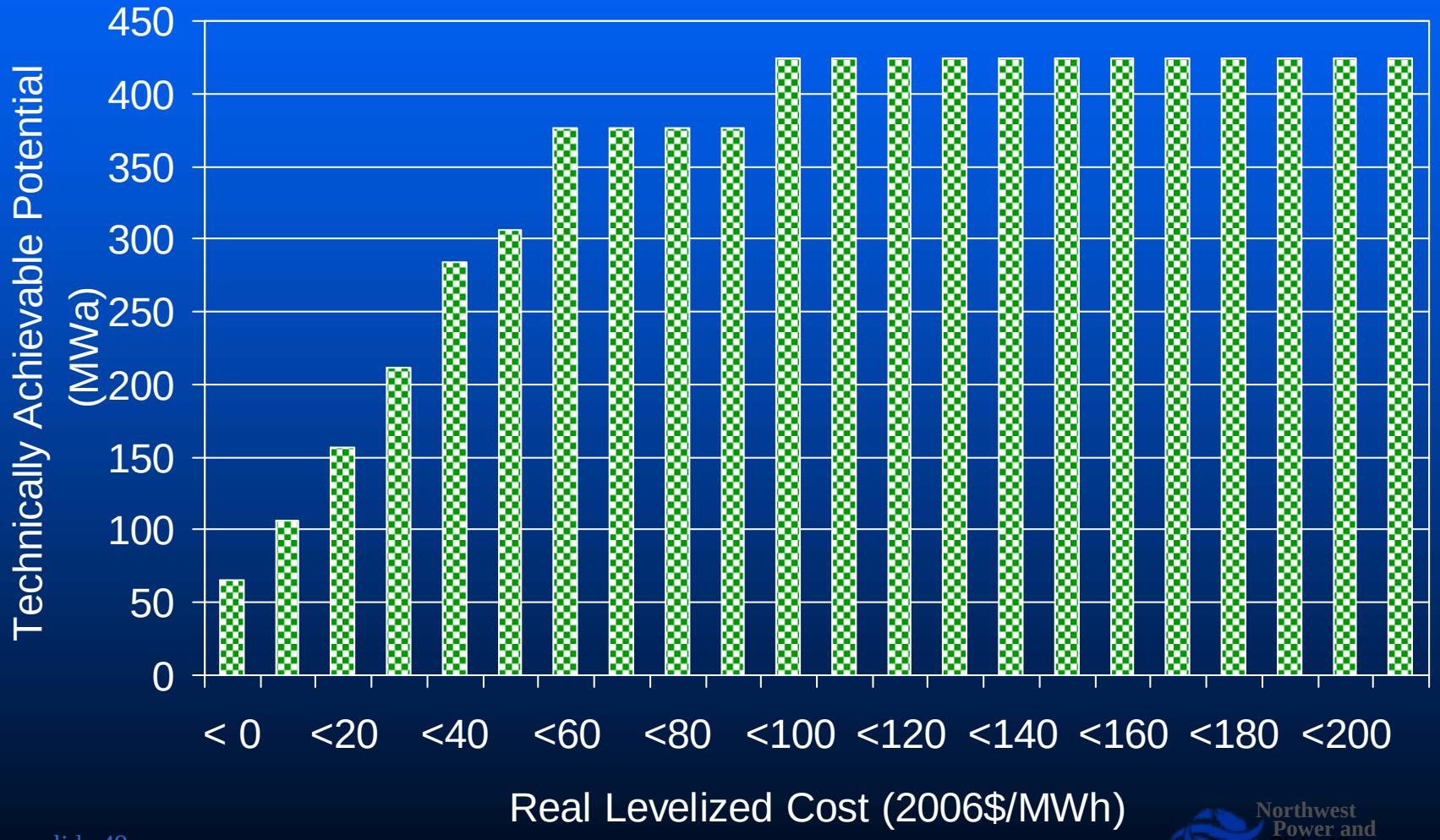
Achievable Savings Potential Bundles



Slide 48

Power and Conservation Council

Utility Distribution System Technically Achievable Potential

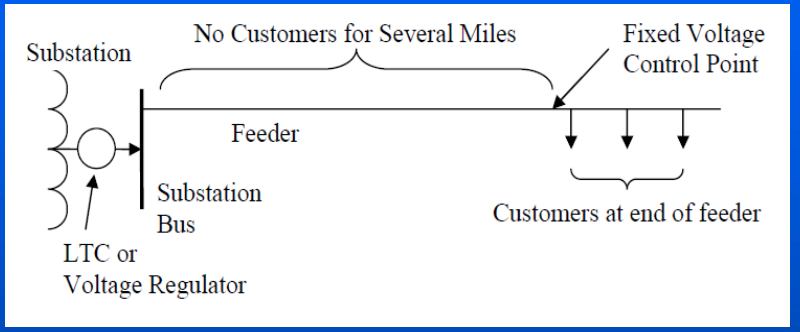


slide 49

Northwest Power and Conservation Council

Utility Distribution System Efficiency
What's Covered

- System Optimization



- Line Drop Compensation

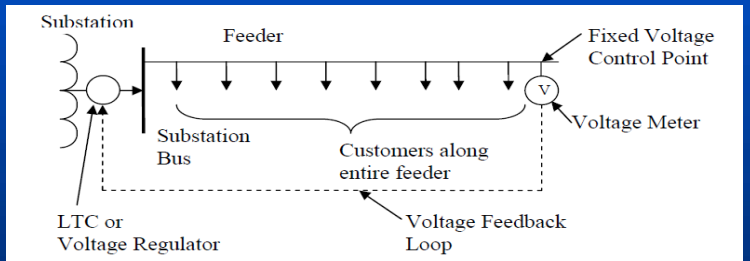
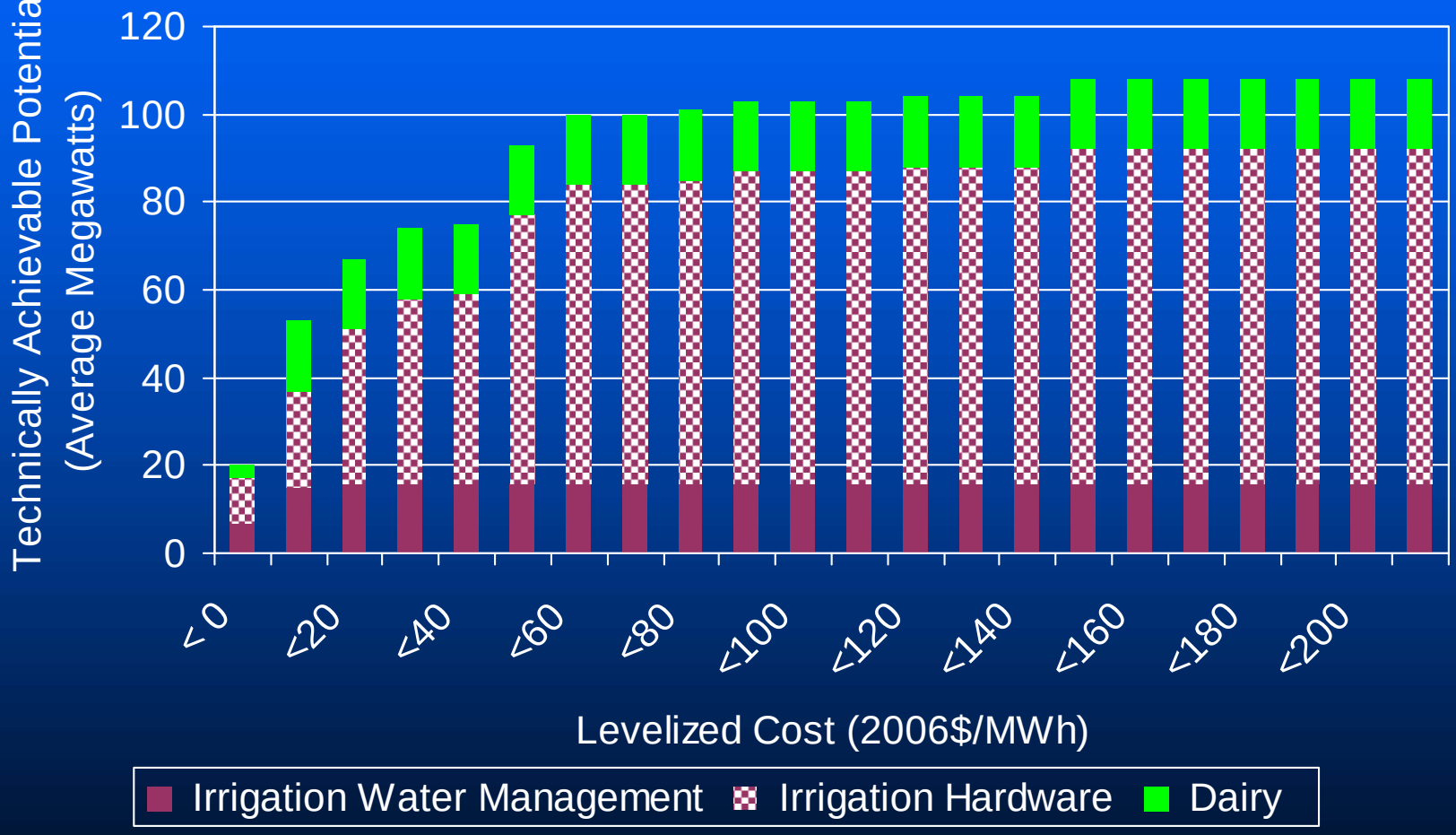


Figure 3-4: End-of-Line Voltage Feedback Control Diagram

- End of Line Voltage Feedback
- Home Voltage Regulation

slide 50

Agriculture Sector Conservation Potential



slide 51

Northwest Power and Conservation Council

Dairy Milk Production Conservation Potential

- "On farm" dairy milk production is the largest single use of electricity in agriculture sector after irrigation
- New Measure for 6th Plan
  - Current conservation programs are targeting savings from dairies, but no regional estimate of savings potential

Average dairy uses 800 – 1200 kWh/cow-yr

There are approximately 885,000 milking cows in PNW

Take This With You

- Meeting ALL Regional Load Growth With Conservation AND Renewable Resources Will Not Meet WCI CO_2 Emissions Targets
- Technically Achievable Conservation Potential Could Reduce Projected 2030 Loads By 4000 – 6000 MWa
  - *At the low end this would mean sustaining the current pace of regional conservation development*
- It Will Require A Much Larger (2x-3x) Investment In Cost-Effective Energy Efficiency and New Technology To Reduce Our Carbon Footprint To 1990 Levels

Slide 53