Northwest Power and Conservation Council

July 2, 2008

MEMORANDUM

TO: Power Committee

FROM: Tom Eckman and Charles Grist

SUBJECT: Major Adjustments to 5th Plan's Assessment of Conservation Potential

The first step in preparing the Council's assessment of regional conservation potential is to update the "baseline" data to reflect program accomplishments, changes in codes and standards, technological evolution and the overall adoption of more energy efficient equipment and practices by the marketplace. Staff will present an overview of the anticipated adjustments to the 5th Plan's assessment of regional conservation changes.

The 5th Plan identified over 4700 MWa of technically achievable regional conservation potential of which roughly 2700 MWa was found to be cost-effective to acquire by 2025. The 5th Plan called for the acquisition of 700 MWa of conservation during the 2005-2009 period covered by its Action Plan. Since the adoption of that plan, the region's utilities, system benefits charge administrators, Bonneville and the Northwest Energy Efficiency Alliance (NEEA) have acquired 475 MWa of conservation savings. Staff forecast that by the end of 2009 these entities' programs would achieve an additional 400 MWa of savings for a total savings of 875 MWa. Assuming no other changes, this would reduce the amount of cost-effective savings available to the region from 2600 MWa to 1825 MWa.

Since the 5th Plan was adopted, Congress enacted the "Energy Independence and Security Act of 2007" (EISA). This legislation revised several existing federal efficiency standards as well as establishing new standards. The most significant impact of the standards imposed by EISA is its requirement that "general service lighting" (e.g., 40 - 100 watt lamps) be at least 30 percent more efficient beginning in 2012 and 60 percent more efficient beginning in 2020. The 5th Plan estimated that the conversion of standard incandescent bulbs used in the residential sector to compact fluorescent lamps (CFLs) could save the region 625 MWa by 2025. While the EISA standard does not cover all incandescent lamps (e.g., lamps over 100 watts, 3-way lamps are exempt), it does cover 70-80 percent of the residential sector's applications. Consequently, 70-80 percent of the savings from CFLs is now accounted for by a lower load forecast.

In addition to the impact of the EISA lighting standards, the staff will be quantifying the impact of the ten other standards established by this legislation, as well as the fourteen other federal

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standards that are scheduled for revision before 2010. Staff will also quantify the impact of revisions to state energy codes for residential and commercial new construction. However, based on preliminary reviews, the improvements to state energy codes since 2005 are expected to result in minor reductions to future conservation potential.

The third significant change in the Council's assessment of regional conservation potential is the result of a NEEA project focused on improving the efficiency of utility distribution systems. Based on the results of a pilot program in six utilities across the region, it appears that reductions in line losses through better voltage regulation, equipment that is more efficient, and system configuration could result in savings between 1% - 3% of total regional sales -- or between 200 and 600 MWa.

The fourth major adjustment will result from a more in-depth analysis of the conservation potential in the industrial sector. In the 5th Plan, the industrial sector's potential was estimated to be five percent of 2025 sales, or 350 MWa. Recent research indicates that a more realistic review of conservation options in this sector could achieve savings of seven to fifteen percent of projected industrial sales. This could potentially increase the estimated amount of cost-effective conservation available from the industrial sector to 700 - 1300 MWa.

In addition to the major adjustments that the staff has already quantified, staff anticipates that technological advances coupled with higher forecast of market prices for electricity and natural gas could significantly increase the amount of conservation that is cost-effective to include in the 6th Plan's resource portfolio. For example, recent advances in solid state lighting (LEDs and OLEDs) and the arrival in the US market of ductless heat pumps that may be cost-effective to use in homes with electric baseboard or ceiling radiant heating system, both may offer significant opportunities for savings.

In summary, the staff estimates that known adjustments to the 5th Plan's estimate of achievable conservation could result in a potential reduction in 2030 loads of between 2000 - 3000 MWa. Staff will provide specific assessments of each sectors conservation potential for review at future Council meetings.

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Major Adjustments to 5th Plan's Assessment of Conservation Potential

Accounting for Program Savings, Market Effects Codes and Standards and Technology Improvements

July 15, 2008

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Adjustments to 5th Plan's Conservation Resource Potential

- Quantified
  - Program Accomplishments
  - Changes in Scope
    - » Distribution System Efficiency Improvements
  - Changes in Law
    - » Federal Standards for general service lighting
- Yet To Be Quantified
  - Changes in Law
    - » State Codes
    - » Other Changes to Federal Standards (10 adopted, 21 under revision, and 12 with effective dates by 2014)
  - Changes in Markets
    - » Energy Star & other programs have improved "Current Practice"
  - Changes in Data
    - » Industrial Sector Potential
    - » New Measures (e.g. ductless heat pumps, solid state lighting)

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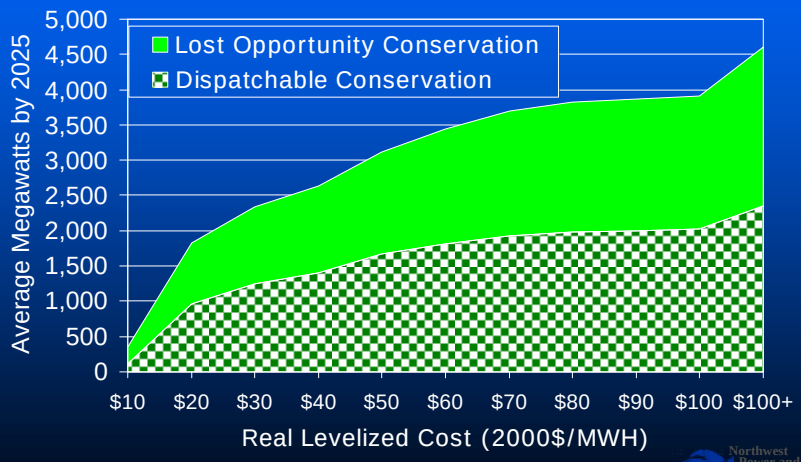
5th Plan Identified Nearly 4,600 MWa of "Technically Available" Conservation Potential



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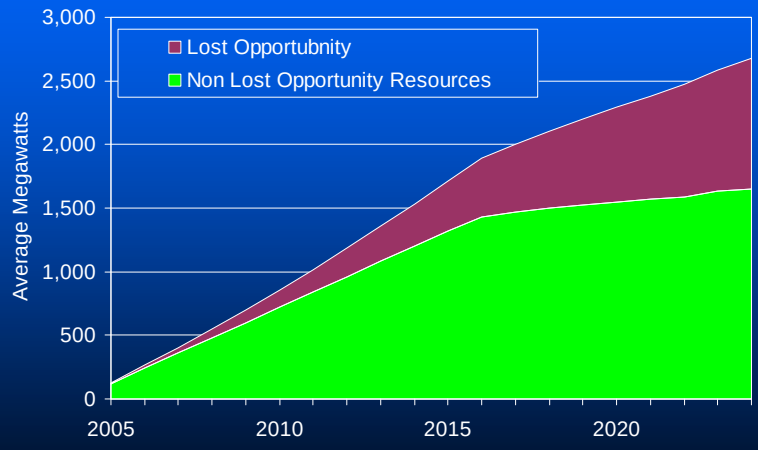
5th Plan Targeted 2700 MWa Over 20 Years



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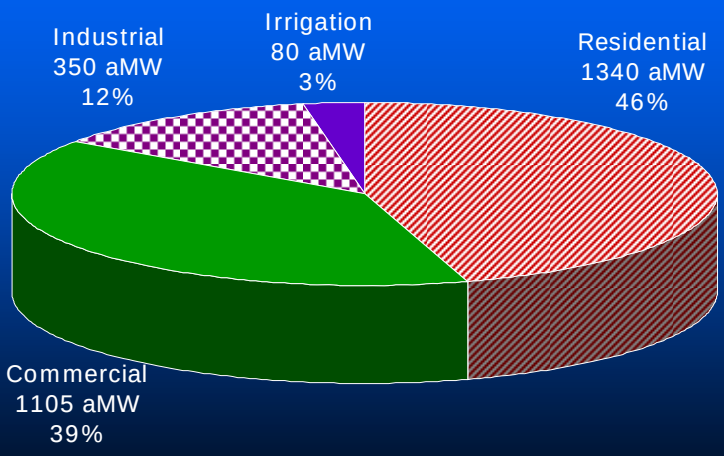
Cost-Effective Savings by Sector



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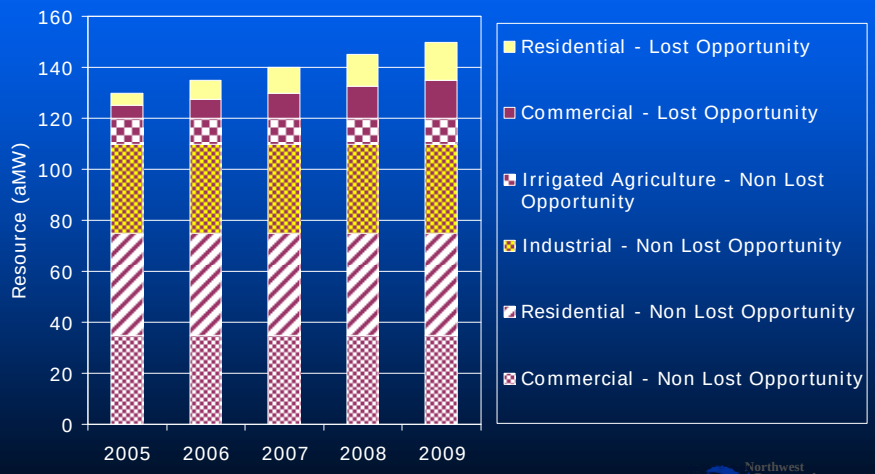
5th Plan's Five Year Target Is 700 MWa



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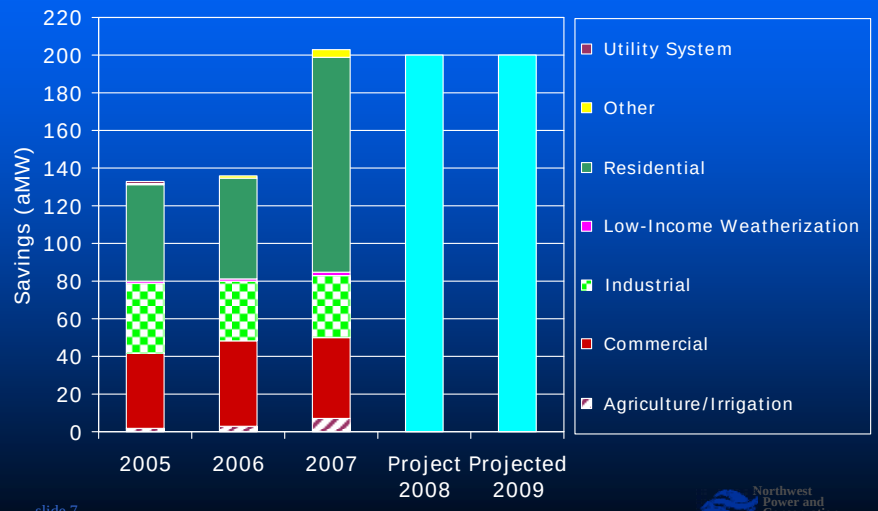
Adjustment 1
Utility Conservation Achievements –
475 MWa To Date + 400 MWa Projected



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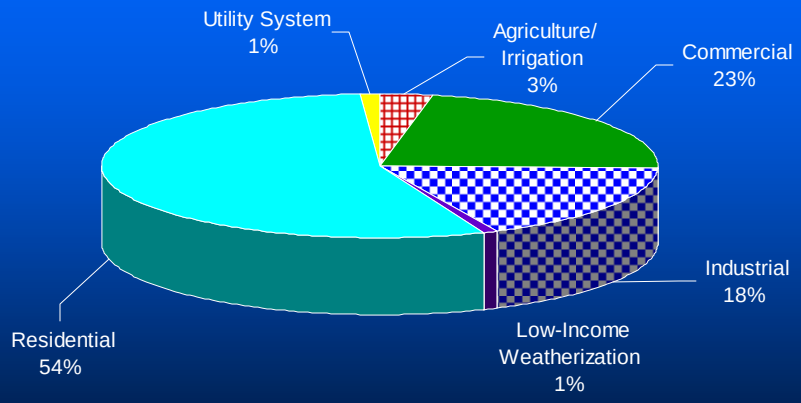
Assumed Distribution of 2008 & 2009 Savings Across Sectors with NEEA



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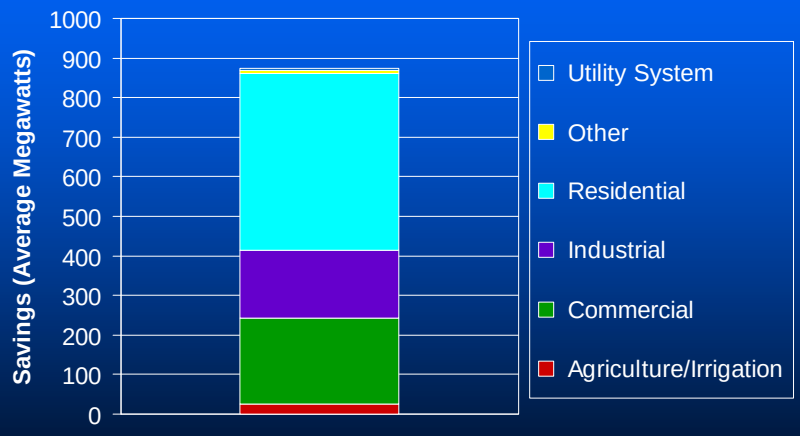
Adjustment 1 – Reduce 5th Plan Conservation Potential by 875 MWa for Expected Program Accomplishments



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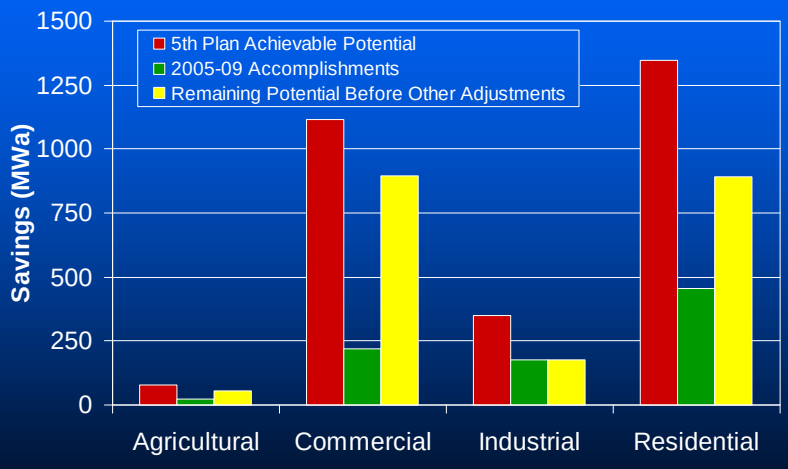
Remaining Potential Prior to Other Adjustments = 1825 MWa



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Adjustment 2 – State Codes

- Idaho – Adopted 2006 Edition of International Energy Conservation Code (IECC) effective on Jan 1, 2008
  - Residential & Commercial
- Montana – Adopted 2004 Edition of International Energy Conservation Code effective on Jan 1, 2006
  - Consider adopting 2006 IECC in Summer 2008
- Oregon – Adopted Revised Residential Code effective April 1, 2008
  - Improve residential efficiency approximately 15% over prior code
  - Slight revision in commercial
- Washington – Revised code became effective July 1, 2007
  - Improve residential efficiency approximately 10% over prior code
  - Significant improvements in commercial lighting & envelope
- Seattle - Improvements in commercial code for economizers in 2006

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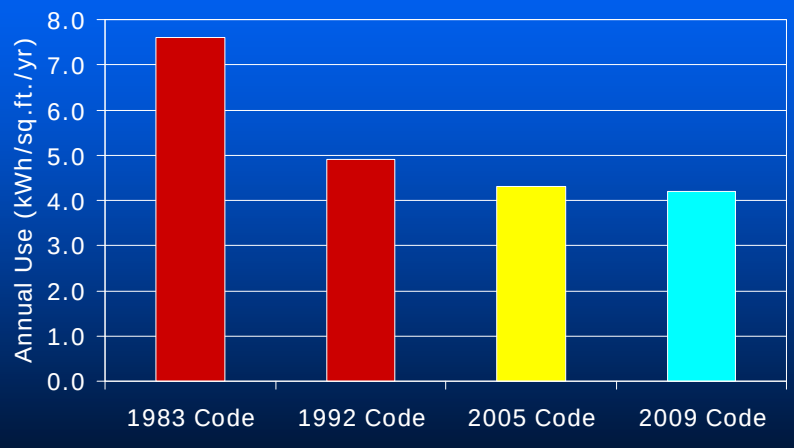
Adjustment 2 – State Code Example: Residential Codes



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Adjustment 3 – Federal Standards

- Energy Independence and Security Act (EISA) of 2007
  - Residential Lighting largest adjustment
    - 625 MWa in 5th Plan, 70% - 80% captured by new federal standards (and market momentum)
  - Additional Adjustments for New Standards
    - External power supplies
    - Commercial clothes washers
    - Commercial ice-makers
    - Electric Motors

Adjustment 3 – Federal Standards (cont)

- Additional Adjustments
  - Distribution Transformers (medium voltage, dry-type and liquid immersed)
  - Commercial heat pumps and air-conditioners
  - Commercial refrigerators
  - Single-Package Vertical Air Conditioners and Heat Pumps
  - Walk-In Coolers and Walk-In Freezers
  - Fluorescent Lamp Ballasts
  - Metal Halide Lamp Fixtures

Adjustment 3 – Federal Standards (cont)

- Additional Potential Adjustments Standards Under Revision
  - Battery chargers and external power supplies
  - Residential Clothes Dryers
  - Commercial and Residential Clothes Washers
  - Residential Dishwashers
  - Pool heaters
  - Residential Ranges, Ovens and Microwaves
  - Beverage Vending Machines
  - Residential Central Air Conditioners and Heat Pumps
  - Residential Furnace Fans
  - Commercial and Residential Refrigerators and Freezers
  - Room Air Conditioners
  - Walk-in Coolers and Freezers
  - Fluorescent lamps and ballasts
  - Residential Water Heaters

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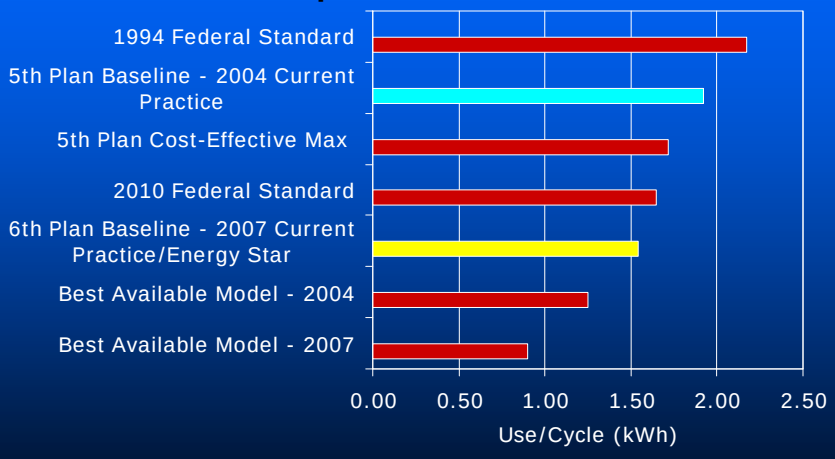
Adjustment 4 – Changes in "Current Practice" Example: Dishwasher



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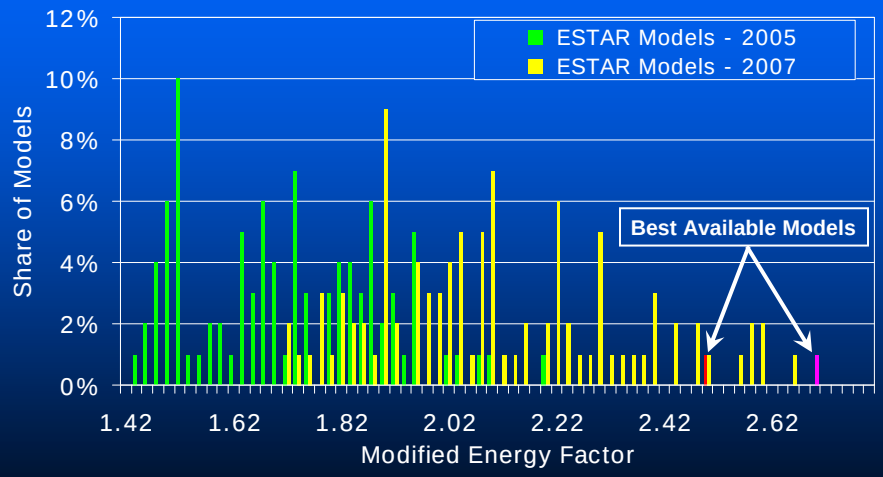
Adjustment 5 – Technology Improvements Example - Energy Star Washer Product Availability



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Higher Energy Efficiency

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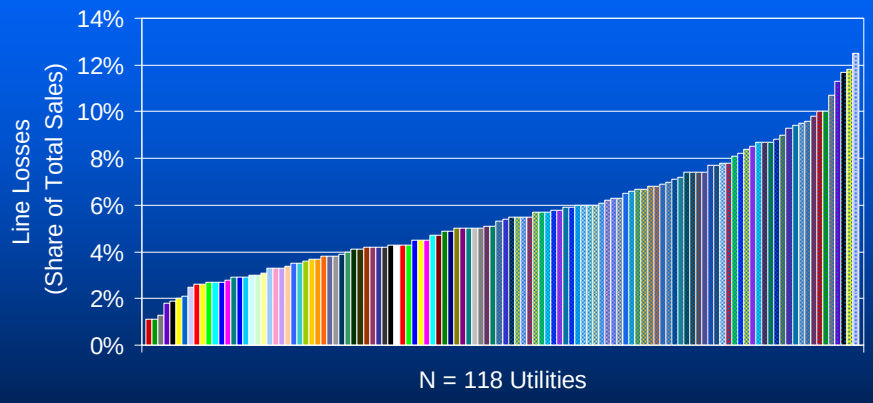
Average Annual Distribution Losses for PNW Retail Utilities



Sales Weighted Average = 4.7%
Median = 5.7%
Geometric Mean = 5.2%

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Adjustment 6 - New Resource Potential

- Act's Definition of Conservation includes improvements in the efficiency of production, *distribution* and use
- NEEA contracted with RW Beck to assess the potential savings from improved distribution system efficiency upgrades
- Study concluded that regional energy savings could be between 1%-3% of regional loads at at cost up to $70/MWH
  - Also concluded demand savings could be between 3% - 3.5% of system peak demand
- ***At current system loads, regional savings potential = 400 – 600 MWa***

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Adjustment 7 - Expanded Resource Potential – Industrial Sector

- 5th Plan Estimated Industrial Conservation Potential at 5% of 2025 Loads = 350 MWa
- Viewed as "conservative" assessments of industrial potential
  - Other regional & national studies = 10-30%
- Council, with Bonneville support, undertaking more thorough regional assessment
- ***Anticipate Industrial Sector potential could increase to 600 – 1300 MWa***
  (7% - 15% of sector sales)

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Summary

- Currently Quantified Major Adjustments to 5th Plan's Estimate of Achievable Conservation Potential
  - Reduced by 875 MWa for program accomplishments
  - Reduce by 450 – 500 MWa for impact of codes and standards
  - Increase by 400 – 600 MWa for Utility Distribution System Efficiency Improvements
  - Increase by 250 – 950 MWa for Industrial Sector Efficiency
- Change –
  - Decrease load forecast by 1335 – 1475 MWa
  - Increase achievable conservation potential by 650 – 1550 MWa
  - Net *potential* reduction in future loads = 1985 – 3025 MWa
- Staff will provide estimates for "yet to be quantified" adjustments when presenting forecast of sector specific conservation potential

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Questions?

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