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December 4, 2018

MEMORANDUM

TO: Power Committee Members

FROM: Charlie Grist (Council Staff)
Dave Clement (Northwest Energy Efficiency Alliance)

SUBJECT: End Use Load Research

BACKGROUND:

Presenter: Dave Clement, NEEA

Summary: A group of Northwest utilities and other regional organizations are supporting a long-term study of electricity use in homes and commercial facilities, known as the Home Energy metering Study (HEMS) and the Commercial Energy Metering Study (CEMS). These studies will meter power consumption at the circuit level to understand how and when electricity is being used at the major end uses (e.g. water heaters, heat pumps, air conditioners). This assessment will provide the region better information on how energy efficiency impacts hourly usage and can inform the outcomes from other demand-side management programs. The results can be used for system planning, resource planning, and rate making.

Relevance: Energy efficiency not only reduces annual energy demands, but also can reduce capacity needs. A better understanding of the hourly usage of customer equipment will improve accuracy of resource planning that relies on EE and other demand-side resources.

Workplan: C.1. Prepare for 8th Plan, Conservation.

Background: The last study of similar scope was the End-use Load and Consumer Assessment Program (ELCAP), undertaken from 1986 through 1989. The region still relies on the data collected in this study, particularly for the commercial sector. <https://elcap.nwcouncil.org/>
In the residential sector, a regional metering study was completed in 2011 (<https://neea.org/resources/2011-rbsa-metering-study>) that provides hourly data for some end uses.

More Information: The website for this work is here: <https://neea.org/get-involved/end-load-research>

December 11, 2018

Northwest End Use Load Research Project

Power Committee,
Northwest Power & Conservation Council





What Does NEEA Do?



Emerging Technologies



Market Development



Regional Studies



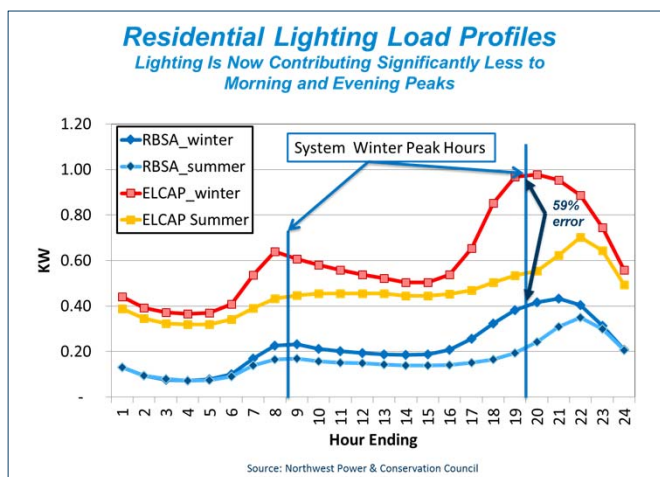
Research & Evaluation



Codes & Standards

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Late 1980s Data Leads to Systematic Overestimation of Peak Demand



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Research Value Streams Identified by the Study Working Group

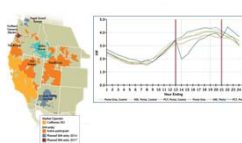
Energy Efficiency



\$350,000,000

Average annual utility spending on energy efficiency in the Pacific Northwest

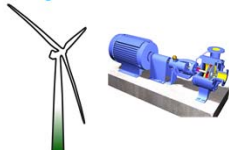
Demand Response



Load Forecasting



Integrated Resource Planning



Transmission and Distribution Planning

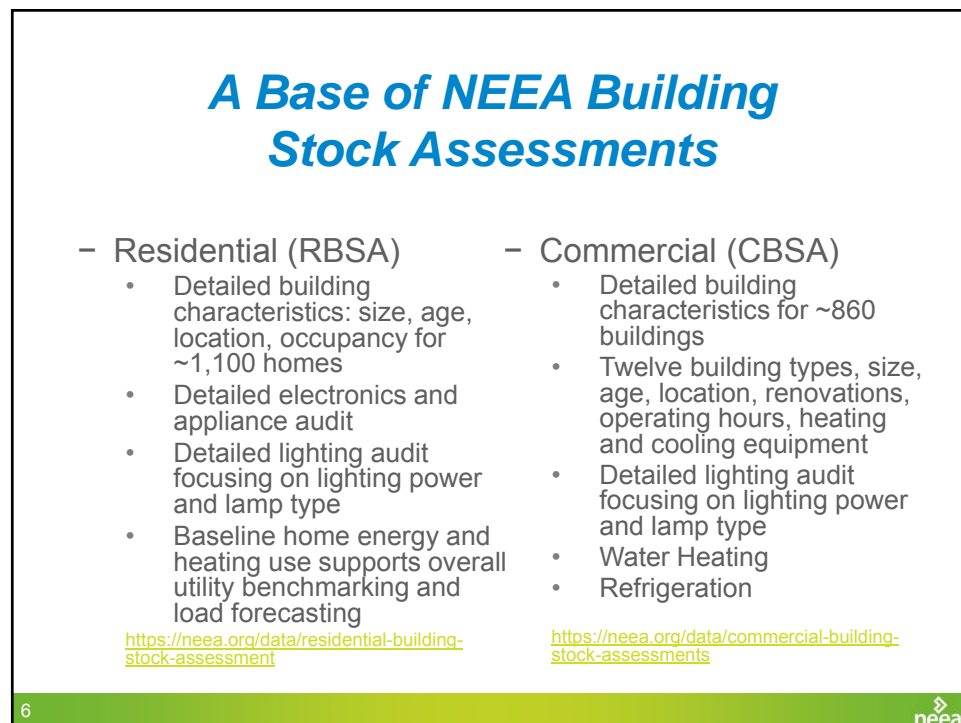


Financial Planning and Rate-making

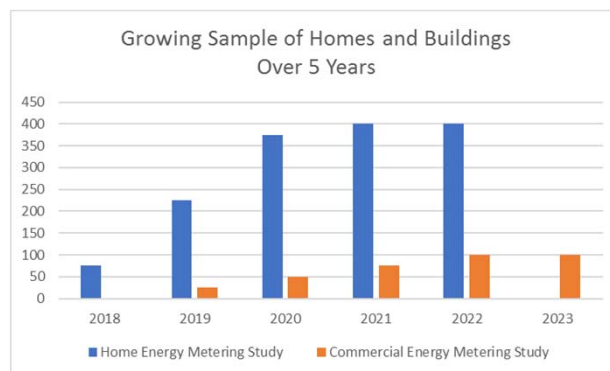


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Sample to Build Over 5 Years With Continuous Metering



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Home Energy Metering Study (HEMS) Sample

- Sample builds up to an estimated 400 homes over three years, then all 400 metered in years four and five
- Covers BPA's Northwest definition
- Combines Northwest Power & Conservation Council's zones 2 & 3
- Oversampling available
- High priority end uses targeted for higher confidence level
 - Ductless heat pumps, ducted heat pumps, heat pump water heaters, central air conditioning, forced air furnaces, baseboard heaters



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HEMS Characteristics

- Sampling
 - Expected to largely come from the 1,100 RBSA homes
 - Insight into interaction of building stock and occupants with loads
 - Use of RBSA provides higher recruitment response rates
- Metering
 - Targeted end uses at a 90 percent confidence interval
 - Metered at 1-minute intervals
 - Collects indoor and outdoor temperature
 - Meters secondary heating sources: woodstoves and natural gas fireplaces
 - Phased metering spreads costs over 5 years; collects wide range of weather and occupancy conditions
- Database
 - Accessible to funders with weekly data updates
 - Monthly reporting on progress and annual presentations of results
- Analysis
 - Primarily comparative analysis and descriptive statistics

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Other HEMS Components

- Opportunistic Metering
 - Water heaters, clothes washers, dryers, ranges, refrigerators
- Metering for BPA Transmission Services
 - Harmonic Distortion in Homes
 - Commercial Building Power Quality
- Water Flow Measurement for Limited Sample



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Commercial Energy Metering Study (CEMS)

- Higher commercial study costs leads to a smaller sample and more focused scope
 - Office and retail
 - » Roof-top units (RTUs)
 - » Heat pumps
 - » Electric resistance heating
- Sample builds up to an estimated 100 buildings over three years, then all 100 metered in years four and five
- Consultant team to be selected in December



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Questions?

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neea

Thank You

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TOGETHER We Are Transforming the Northwest



