NORTHWEST ENERGY EFFICIENCY TASKFORCE
DEC. 31, 2008 DRAFT REPORT

APPENDICES

APPENDIX A-1
WORK GROUP 1: SUMMARY OF FINDINGS

Measuring What Matters: Looking Ahead, What Data Must we Have for Energy Efficiency to Succeed as a Reliable Resource in the Region?

Executive Summary

Key observations

A wide variety of types and sources of EE data are necessary to understand the energy savings (kWh and therms) and the demand impacts (kW) of EE resources. In addition to metered and sub-metered information, data needed includes the technical performance of measures (equipment and actions) which use energy, customer needs and behaviors, market information and readiness, and market motivators.

There is a great deal of EE data existing in the region, and also outside the region. **Dedicated resources are needed to "coordinate" data** from both primary (in region) and secondary sources, to develop common metrics, help interpret and disseminate EE information derived from the data, support the best applications for program delivery, and to help inform strategic decisions on EE that utilities and regulators are facing.

A "regional approach" for developing and using EE data in program delivery and in assessing the effectiveness of EE has contributed to PNW's demonstrated track record for excellence in acquiring EE resources. In collaboration with the region's utilities existing regional entities – notably BPA, the Council, RTF (as established by the Council), and NEEA have played important roles.

Data associated with EE measure performance and evaluation of EE program performance is **essential to local utilities.** A regional approach provide some opportunities for utilities to reduce costs of collecting and understanding not only current EE, but also the increasing amounts of new data and the changing market conditions for energy efficiency.

There is a need for greater understanding and access to **data about EE involving other fuels, notably natural gas**, to maximize the region's ability to best serve the region's customers.

State government has an important role in acquiring EE resources for the region by setting energy codes, adopting energy efficient appliance standards, using tax incentives as appropriate, and accessing additional funding sources.

Summary Recommendations

1. **A regional approach** supporting EE data needs is recommended. This includes data coordination, distillation and dissemination, as well as selected projects to collect EE data and evaluate EE performance.

2. **The RTF's regional role** should be expanded to a) coordinates regional data collection work supporting customer energy use surveys, b) reviews technical measure cost and savings performance and cost-effectiveness analyses, c) conducts scheduled topics for regional research and d) conducts directed regional evaluations and coordinates NEEA and utility evaluation efforts for measure and verify EE impacts. In the process of expanding the RTF, some members of the workgroup, particularly local utilities, need **further opportunity to explore an expanded RTF's roles, structure, funding and governance.**

3. **NEEA's role** should be expanded to include supporting key data a) on building characteristics and consumer energy use, b) identifying new opportunities for EE and market barriers, c) providing understanding of market practices to support program designs.

4. Each of the four **NW states should be encouraged to use this regional data effort** and take advantage of regional synergies in the development of building codes, product standards and other incentives, and in efforts to monitor progress towards state's and broader western regional goals for climate protection. **States are encouraged to evaluate if they can provide access to additional funding sources** and funding allocation for these efforts.

Estimated Budget

These activities will require **funding on the order of $8-10 Million per year**. A large portion of this cost is already committed and does not represent new funding requirements. However, the degree to which these existing funds can be directed for NEET regional initiative needs to be determined. Based on a preliminary survey of regional utilities, we estimated that regional utilities currently spend around $5 million dollars annually for understanding building characteristics, market characteristics, program design, end-use load shape and consumer behavior research, excluding what is spent on program evaluation research. It is needless to say that the cost of not measuring what matters far exceeds the cost of proceeding with a regional effort in expanding the role of conservation resources and energy efficiency. A detailed budget is outlined in section IX.

These recommendations will take time to implement. The following phase-in approach is recommended. Phase one is a preparatory phase. Phase 2 is an implementation phase.

Phase 1: 2009

1. Evaluation of the governance for the expanded role for RTF
2. Determination more accurate funding levels for RTF and NEEA
3. Staffing up RTF
4. Development of common survey and data gathering instrument
5. Developing sampling criteria so regional surveys can be used at local level
6. Development of clearinghouse requirements
7. Developing the data gathering cycles for each sector/measure
8. Coordinating and planning the data gathering implementation plan for 2010-2015

Phase II: 2010 and beyond

9. Staffing up for clearinghouse
10. Creating catalog of existing regional
11. Implementing the 2010-2015 data collection plan

Measuring What Matters: Looking Ahead, What Data Must we Have for Energy Efficiency to Succeed as a Reliable Resource in the Region?

I. Introduction

The Northwest Energy Efficiency Taskforce (NEET) was established to determine what is needed and what opportunities exist to significantly advance the region's energy efficiency achievement through greater regional collaboration, broad-based commitment, customer involvement, and the pursuit of the most cost-efficient program strategies**.**

Workgroup #1—"Measuring What Matters" took on the assignment "Looking ahead, what data must we have to succeed?" Utilities and other EE providers must understand the impacts of EE measures in order to develop the most cost-efficient strategies and best support consumers in their decisions to maximize energy efficiency. **Knowing EE impacts is a requirement** to determining optimum utility investment decisions on supply-side generation and energy distribution systems. The work group included representatives of regional organizations, the region's electric and dual fuel utilities relying on EE resource portfolios, EE contractors/ service providers and research entities.

II. Data Required to Quantify Energy Efficiency Resources

The NW region – both utilities and states - have a major opportunity both to reduce future costs of energy to ratepayers (both electricity and natural gas), and to provide protection from climate change by significantly increasing the amount of energy efficiency (EE) acquired. At the same time, major energy industry advances in information technology mean that utilities and consumers will increasingly have access to more data and real time feedback on their energy use. To best support consumers in their decisions to maximize energy efficiency, utilities and other EE providers must understand the impacts of EE measures in order to develop the most cost-efficient strategies. Increasingly much of the same data regarding the impacts of EE will be use to optimize operation of the electric grid and "flatten peak loads" to potentially avoid construction of new generation facilities.

What ultimately matters most right now for utilities and the region with respect to EE is making the best investment in meeting customer demand for energy at the meter, while reducing the undisputed negative impacts of fossil-fuel based generation of electricity and of the consumer's end-use of both electricity and natural gas on climate change. EE data, including the types of data necessary to understand and forecast it's potential savings and costs, is critical to allowing utility systems to adequately and reliably supply and distribute energy.

Although often second priority when compared to the focus placed on day-to-day EE program operations, data collection and analysis is the foundation to successfully increasing the region's energy efficiency. Energy efficiency is built upon, driven by, and evaluated through data.

Historically, the region made significant investments in the 1980s and early 1990s to collect the data needed to support the energy efficiency efforts of the day. There have been less shared efforts to collect necessary data and conduct evaluations in a coordinated fashion since the mid-1990's except for various market assessments and baseline studies undertaken by NEEA. This is not sufficient as the region moves into a world of significantly ramped up energy-efficiency efforts. Without accurate data, the region stands to miss both the need for new resources and the potential of energy efficiency. Without accurate data, the region may miss market trends that drive new load growth. Without accurate data, large energy-efficiency programs may continue to spend resources in markets that no longer need additional support. Without accurate data, the promise of energy efficiency as the region's resource of choice will not reach its full potential.

III. Background on the Process for WorkGroup #1

Formation of Workgroup #1

Massoud Jourabchi (Northwest Power and Conservation Council), Mary Smith (Snohomish PUD), and John Kauffman (Oregon Department of Energy) were selected as the co-chairs of Workgroup #1. Under their leadership, a workgroup of 60 volunteers was formed, with about 20 significant and consistent contributors. With guidance from the NEET Executive Committee and explicit tasks assigned in the work plan, the chairs created a strategy to address the role of data in energy efficiency.

Work Plan

At the kickoff meeting on July 23, discussion focused on regional data needs, current availability and accessibility of data, identification of important gaps, and next steps on how to proceed. As a result, four subgroups were created to further the discussion and delve deeper into different categories of data. The subgroups identified and chairs assigned were:

1. Building Characteristics and Energy Consumption: Phil Degens (Energy Trust of Oregon)
2. Products and Services: Lauren Gage (Bonneville Power Administration)
3. Market Characterizations: Jeff Harris (Northwest Energy Efficiency Alliance)
4. Evaluation: Ken Keating

After creating issue papers identifying preliminary needs, priorities, and costs, the subgroup chairs presented their findings to the workgroup on September 9. Preliminary recommendations were formed from the subgroup evaluations and discussions from the workgroup. Smith and Jourabchi presented these to the Executive Committee on October 3. At the November 7 workgroup meeting, Tom Eckman (Northwest Power and Conservation Council) presented background information on the Regional Technical Forum (RTF). One of the tasks assigned to workgroup #1 was to evaluate the current role of the RTF and NEEA and explore whether additional support or roles could improve them. Feedback from the Executive Committee was discussed and a survey was launched to the entire NEET workgroup based on preliminary recommendations and data needs and priorities in the region. Based on the survey results and continued work by the subgroups, the workgroup recommendations were discussed and finalized on December 5.

IV. Context for the Development of Recommendations

The analysis of quality EE data is the region's "meter" for energy efficiency. This document is based on several key assumptions with relation to data requirements and collection efforts:

- **Regional and Local Data:** This document assumes that local data sets will be aggregated at the regional level in a way that allows for enhancing statistical validity at the local level. Regional coordination can greatly enhance common understanding of metrics for this purpose. At the same time, studies undertaken at the regional level (or even coordination at with national studies) can still allow for statistical validity at the local level, depending on the funds available and the need for granularity. Local utilities will still need to carry out research activities on their own to address issues that are unique to their customer base and their business. Significant value can be added with regional coordination by avoiding duplication, having more robust data sets, and jointly following a guiding strategy for spending limited dollars.

- **Data on End-Use Energy Use is not limited to Electric Energy Data.** Given the multi-fuel nature of the energy markets in the Northwest and the fuel choices end-use consumers make, it is not sufficient to collect data about electric end-uses. This document assumes that data will be collected on all end-use fuels appropriate to the questions at hand, including but not limited to natural gas. There is a growing need for end-use and EE performance data in the electric industry.

Data collected for energy efficiency will also support emerging data needs for demand response and load management activities.

- **Frequency of Data Collection.** This document also assumes that the data collection efforts described here are repeated on an on-going basis and at a frequency that will capture key market trends, identify EE opportunities, and insure reliable EE performance.

Prior to arriving at recommendations, the NEET Workgroup #1 reviewed the following:
Data are collected and used by multiple entities in the region: Individual utilities top the list for both resource planning and EE program design and operation. Programs are also implemented by ETO in Oregon, NEEA, "third-party" Energy Services Companies (ESCOs), contractors, and are evaluated using data by both internal and external, third party consultant evaluators. Regional planners supporting NEEA, BPA, the Council and RTF rely on quality data. Gas utilities, ESCO companies providing delivery of programs review data for program optimization. Other energy service providers, trade allies rely on EE data in many ways to optimize savings performance and to incorporate utility incentives into their business model. States, regulatory bodies and others also use EE data.

Job functions/roles that require data: EE data is used by resource planners at the individual utility IRP level and for regional planning. It is essential for EE program planning, implementation - the day to day operation of programs at the local as well as the regional level, for program evaluation and policy making. (Note for Workgroup 5: The region needs to plan resources and other incentives to retain available staff talent and train and attract new talent for this work.)

The purpose of energy efficiency data and the questions we need the data to answer include:

1) To identify **what measures currently exist to encourage energy efficiency**.
   - What are the current practices in the region?
   - What are the savings potentials (per unit and in aggregate) and costs of a measure?
   - How much should we pay for an incentive?
   - How much is left?
   - What measures will we go after as the most cost-effective, popular measures approach market saturation (e.g., weatherization and CFLs)?
   - What is the optimum level of investment in conservation?
   - What measure has the best bang for the buck for the limited utility or regional dollars?

2) To be sure the **savings will make a real impact** on the power system and the climate.
   - What is the savings per product produced?
   - What are the real world impacts of the measures and the programs that deliver them?
   - What is the impact on the environment/CO2 reductions?
   - Does the measure have to be installed in a certain way to get real savings?
   - What impact does it have on a customer's gas use? Electric use? Other fuels?

3) To identify the **best way of acquiring the savings**.
   - Are there characteristics, attitudes, and behaviors of specific customer market segments and trade allies that can be linked to energy and energy efficiency?
   - How many manufacturers/design firms/service providers are there in a given market, who are the top five, and what is their share of their respective markets?

4) To establish **reporting** protocols
   - What share of savings should be attributed to one entity or another in order to claim credit toward regional goals and to potentially claim future carbon credits?

5) To identify and develop **measures to encourage energy efficiency in the future**.

- What are the consumer/market trends?
- What are upcoming codes/standards?
- What are new technologies that would shift the consumer behavior?

6) To **forecast load**
   - How are changing demographics and economic conditions changing the load forecast?
   - How fast are new sectors growing?
   - What new technologies (e.g., electric vehicles and ICE equipment) might be adding significant load to the systems?
   - How fast is existing stock retiring?
   - How are saturation rates changing over time?
   - How is market share across fuels changing over time?
   - What is the hourly profile of consumption for different end-uses?

7) To determine the effects of **government policies**.
   - What could the impact of CFL legislation be?
   - What are the implications of carbon, fuel costs, and environmental regulations?
   - What are the implications national and state RPS and EERS?
   - What are the best opportunities for new or revised building codes and equipment standards?

There are a variety of **ways to acquire the needed data** that can be conducted on a one-time basis or repeated over time to track trends:

- Surveys (phone, written, web)
- Inspections of installations
- Panel data/following a statistically representative set of consumers over time.
- Field studies
- Demonstrations/field studies
- Billing analyses
- Advanced metering infrastructure /Energy management systems
- Cheaper and better metering technologies
- Private sector initiatives (e.g., chain stores monitoring their own use)
- Governments
- Web research, mystery shopping
- Survey market actors to develop incremental cost and savings estimates

Using the expertise in the region, and aware of the current state and future data requirements for planning, implementing and evaluating of efficiency resources, workgroup # 1 developed a preliminary set of recommendations which were presented to a wider regional audience at the October 3rd meeting.

V. Preliminary Recommendations Prepared for Presentation on October 3rd

1. **An entity (or entities) with dedicated funds to plan and coordinate data acquisition** for the region is needed. Governance of the responsible entity would be designed to ensure that the goals and objectives of the participating organizations are met. Funding for the organization would need to support multi-year commitments that are necessary due to the long-term nature of some studies. Roles would include:
   a. Develop and coordinate implementation of a regional research and data collection plan that identifies specific projects, schedules, and costs consistent with b – f below..
   b. Prioritize the need for data (e.g., Will it significantly impact a large current resource? Will it impact a large share of the dollars spent? Does it affect many utilities?)

c. Decide the most appropriate and cost-effective way to acquire data (e.g., studies, purchase of existing database).
d. Ensure statistical validity of studies both at the regional level and the local level as appropriate.
e. Leverage regional clout to get data that is unavailable to individuals (e.g., gas usage, load shapes)
f. Oversee the operation of the clearinghouse (see item 3 below)

2. **Coordinate research** so data sets from different time frames and utilities or states can be aggregated to the regional level and can be compared across utility, state, and region. Coordination should provide benefits to all parties in the form of economies of scale or extension to additional geography and should address the following:

a. Establishing a common set of definition for sectors/end-uses /measures/methodologies
b. Timing/periodicity of research
c. Questions
d. Sample design
e. Cost share principles
f. Common metrics (benchmark metrics)

3. **Create a dedicated clearinghouse** so that data are more readily available to a wide audience. This could include:

a. Survey forms, data definition, methodology approach
b. Current regional/state/utility economic forecasts
c. Current regional/state/utility load forecasts (electric/gas)
d. Current fuel price forecasts
e. Reports and databases from past studies
f. Ongoing baselines that are found in the market
g. Incremental costs as they change
h. Savings estimates for energy and non-energy benefits
i. Evaluated results and measure data from other parts of the country
j. Lessons learned from program delivery problems and successes
k. Data and reports need to be made available via the web and other electronic formats.

4. **Commit to funding, resources, and a regular routine of regional data collection** to minimize costs and maximize value. Following are examples and representative costs of what we think are sample activities and data that are needed.

a. Building characteristics studies: every 5 years, including characteristics, EUIs, and billing analysis (cost of each Residential $2M, Commercial $3M, Industrial $1M, Irrigation TBD, Infrastructure TBD, End Use load data TBD
b. Cost data
    1. Systematic cost reviews of existing measures should be conducted every 5 years at an approximate budget of $1 – $2 million.
    2. Annual cost assessments of new/emerging technologies at an approximate cost of $300,000/year.
c. Evaluation: All stakeholders in the region need to be committed to using quality evaluation and paying for it. Where appropriate local evaluation efforts will be coordinated. The funding of regional evaluations is estimated at $2 million a year.
d. Market characterizations: $2.5 million/year. (Allocate at least 1 percent of the regional efficiency spending--currently estimated at over $250 million--to conduct this type of market research on an ongoing basis to ensure that Northwest key markets are adequately characterized with up-to-date information in order to allow efficiency efforts to be targeted effectively.)
e. Develop a common set of questionnaires $100,000

5. Directly address **policy issues** that affect the cost and need for data
a. What level of precision is needed for each data type before you can move forward?

b. Regulatory and cost recovery mechanisms need to recognize the value of data collection efforts and allow for cost recovery.

After the Executive Committee meeting October 3rd, Workgroup #1 reviewed feedback of the Executive Committee, it continued with a work agenda to support this full report.

- Review draft recommendations across workgroups

WG 1 reviewed draft recommendations across other workgroups, especially since most of the other groups in one way or another are dealing with data needing support. In particular, WG 1 looked to compare recommendations with early drafts from WG 2 since much of the work being proposed there will lead to data which should be accessible through a regional clearinghouse.

VI. Survey

As part of its review, WG#1 conducted a survey of NEET members dealing with the draft recommendations. Twenty-seven organizations responded, including good response from utilities. All of the IOU's in the region, the major publics and several small public utilities responded; those responding represent 75% of the electricity sales in the region. Other respondents include ETO, NEEA, BPA and Council staff. A complete set of survey responses and notable findings are included in appendix f.

Among respondents, the highest priority data needs to accelerate energy efficiency are:

- Customer baseline data
- Measure data – cost and impacts of currently available and emerging technologies
- Effective program designs
- Market adoption information
- Consistent funding
- Policy support

VII. States Role in Accelerating Energy Efficiency

- Explore the role of state programs. See appendix C for more information.

According to the Database of State Incentives for Renewable and Efficiency (DSIRE), the following categories of programs are available in the region:

State	Appliance/equipment standards	Energy standards for public buildings	Building energy Codes	Public Benefits Funds
Idaho		State	State	
Montana			State	State
Oregon	State	State and local	State	State
Washington	State	State and local	State	

In addition there are other financial incentives such as personal and corporate tax breaks, rebates, grants, loans and bonds available that help promote energy efficiency. Following sets of State-sponsored EE programs are available in the region.

State	Personal tax	Corporate tax	Rebates	Grants	Loans	Bonds
Idaho	State				State	

Montana	State	State			State	State
Oregon	State	State	State		State	
Washington				State		

Appliance efficiency standards are typically set at the national level. In the past decade year federal standards have been slow in advancing the minimum efficiency requirements and often market conditions have forced efficiency level to surpass the minimum standards. To remedy this problem, in the Northwest states of Washington and Oregon enacted minimum appliance efficiency standards in 2005 which covered a number of appliances including Automatic Commercial Ice Makers, Commercial Refrigerators and Freezers, Metal Halide Lamp Fixtures, Single-Voltage External Power Supplies, Incandescent Reflector Lamps, Unit Heaters. In the regional about 733 MWa of savings can be attributed to federal standards.

All states currently have residential and commercial building code in-place. Code enforcement and code compliance are interwoven issues. Typically an effective building code (set above current practice) would result in lower initial compliance, and as construction practices change to new code, level of compliance increases. A recent evaluation report by NEEA found that overall regional compliance rating (defined as falling within 10% of code) for residential buildings is about 85%. Compliance was found to be higher in Oregon and Washington and higher in single family versus multi-family. Idaho multifamily homes in Idaho had a lower, 37% code compliance rate. Another recent of commercial baseline study, conducted for NEEA, founds increase in energy code compliance levels since late 1990s. Code compliance in lighting standards was found to be about in the 80%-90% range. Estimates of building code savings are available from Northwest Power and Conservation Council (NWPCC). According to NWPPC by 2007 cumulative regional savings from state codes reached 700 MWa.

VIII. Key Observations on Energy Efficiency Data

The final two meetings of WG #1 involved further discussions leading to recommendations on the requirements, functionality, and governance, budget (cost estimates both full and incremental), and specific roles of existing regional organizations i.e. RTF, NEEA.

Some key observations about EE data needs as well as how EE information is –and can best be - disseminated and used throughout the region were discussed. The work group included representatives of regional organizations, the region's electric and dual fuel utilities relying on EE resource portfolios, EE contractors/ service providers and research entities.

A wide variety of types and sources of EE data – not just metered data -- are necessary to understand the energy savings (kWh and therms) and the demand impacts (kW) of EE resources. Knowing these impacts is needed to determine optimum utility investment decisions on supply-side generation and energy distribution systems. – Understanding energy efficiency performance depends on gathering and understanding data not only on the technical performance of measures which use energy, but also customer needs and behaviors, market information and readiness, and market motivators; much more than data which can directly measured with a "meter" is required.

There is a great deal of EE data existing in the region, and also outside the region. Dedicated resources can be used to "coordinate" data from both primary (in region) and secondary sources, develop common metrics, help interpret and disseminate EE information derived from the data, support the best applications for program delivery, and help inform strategic decisions on EE that utilities and regulators are facing. : The region has been involved with Energy Efficiency for nearly 30 years; there is a lot of data and understanding of EE effectiveness in the PNW from past activity and .EE data continues to be created, generated and collected continuously throughout the region by: a wide variety of current utility and other EE programs and activities, in the purchase decisions being made by consumers and businesses, by the code/standards being adopted and/or enforced, etc.. Relevant data impacting EE

decisions is also available and being developed outside of the region, some of it applicable to the day to day decisions involved in EE "operation and procurement" here in the NW.

A "regional approach" for developing and using EE data in program delivery and in assessing the effectiveness of EE has contributed to PNW's demonstrated track record for excellence in acquiring EE resources. The regional approaches employed for the past 30 year have helped support the development and disseminate knowledge about state-of the-industry EE resources. There is good reason to enhance the current regional approach to advancing "state-of-the–art" conservation, coordination of "lessons learned", leveraging the EE research and standards development going on at the national level - especially by policy makers, national labs, and by product manufacturers. At the same time, individual utilities (for some as represented by BPA) are best positioned to understand and assess best programs and practices of utility counterparts across the country. Similarly, regulators have national networks and forums to track regulatory developments.

Existing regional entities – notably BPA, the Council, RTF (as established by the Council), and NEEA, all in collaboration with the region's utilities, have played important roles in advancing the collection and understanding of EE data used throughout the region to forecast future needs.

Data associated with EE measure performance and evaluation of EE program performance is essential to local utilities. A regional approach provides opportunities for utilities to reduce costs of collecting and understanding the increasing amounts of new data and the changing market conditions for energy efficiency. This function is likely best handled using existing regional entities, NEEA and the RTF in particular. NEEA has spent the past year reviewing it's strategy for the future, and currently has draft business plans under review; it's role with respect to data and information may need to increase. It is recognized that the RTF has an important role with respect to handling and developing useful data for the region, but the RTF is not adequately staffed and has extremely limited funding. Utilities who will rely heavily on the data, will require clear representation in the governance of regional activities to insure that local, and more "sub-regional" needs and differences are adequately addressed. It is becoming essential to analyze EE resources and their cost-effectiveness at the local level. At the same time, the need to address climate protection means these local determinations will need to reflect full cost and benefit impacts of EE to the region. (Further discussion of cost-effectiveness is included in the section of this report provided by workgroup #6.)

There is a need for greater understanding and access to data about energy efficiency involving other fuels, notably natural gas, to maximize the region's ability to best serve the region's customers.

Recommendations from NEET Workgroup #1 are a result of five group meetings held in Portland. Work products included a series of work documents of four groupings of EE data, as determined by team members. The WG chairs circulated a survey to look for trends and areas of support throughout the region. In addition there have been discussions/interactions/review with experts throughout the region and members of other workgroups in the NEET process.

IX. Final Recommendations

1. **A regional approach** supporting EE data needs is recommended. This includes data coordination, distillation and dissemination, as well as selected projects to collect EE data and evaluate EE performance. These activities will require **funding on the order of $8-10 Million per year**, and the workgroup proposal is to have this work shared among RTF and NEEA.

2. **The RTF's regional role** should be expanded to a) coordinate regional data collection work supporting customer energy use surveys, b) review technical measure cost and savings performance and cost-effectiveness analyses, s) conduct scheduled topics for regional research and d) conduct directed regional

evaluations and coordinate NEEA and utility evaluation efforts for measures and verify EE impacts. To take this on, funding for the RTF should initially be around **$3 Million per year**, **including full-time staff of 2-4 people**. Part of the RTF role should be to maintain a primarily web-based data clearinghouse to insure utilities, states and others in the region have broad, easy and timely access to EE information. This clearinghouse is expected to require an additional, up-front cost of $1M to create and develop. In the process of expanding the RTF, some members of the workgroup, particularly local utilities, need **further opportunity to explore an expanded RTF's roles, structure, funding and governance.**

3. **NEEA's role** should be expanded to include supporting key data a) on building characteristics and consumer energy use, b) identifying new opportunities for EE and market barriers, c) providing understanding of market practices to support program designs. The funding for these activities is expected to be **$5-7 Million per year**. Funding amounts need to be assessed to determine amounts incremental to activities being proposed in the new business plan NEEA recently drafted and currently has under review..

4. Each of the four **NW states should be encouraged to use this regional data effort** and take advantage of regional synergies in the development of building codes, product standards and other incentives, and in efforts to monitor progress towards state's and broader western regional goals for climate protection. **States are encouraged to evaluate if they can provide access to additional funding sources** and funding allocation for these efforts.

These recommendations will take time to implement. The following phase-in approach is recommended. Phase one is a preparatory phase. Phase 2 an implementation phase.

Phase 1: 2009

12. Evaluation of the governance for the expanded role for RTF
13. Determination more accurate funding levels for RTF and NEEA
14. Staffing up RTF
15. Development of common survey and data gathering instrument
16. Developing sampling criteria so regional surveys can be used at local level
17. Development of clearinghouse requirements
18. Developing the data gathering cycles for each sector/measure
19. Coordinating and planning the data gathering implementation plan for 2010-2015

Phase II: 2010 and beyond

20. Staffing up for clearinghouse
21. Creating catalog of existing regional
22. Implementing the 2010-2015 data collection plan

Note that these four recommendations include ballpark figures in the table below. This budget incorporates all recommendations, and includes existing budgets. However, the degree to which these existing funds can be directed for NEET regional initiative needs to be determined.

Although the attached table lays out some steady-state budgets as well as start-up costs, regional sponsors should not expect that growth in expenditures can happen instantly, even when using existing organizations. It takes time to ramp up, plan properly, and get the work started. Budgets will not need to be at the maximum for the first few years, but the commitment will need to be clear for the out-years.

Recommendation	Estimated Annual Cost	Benefits to the Region	Best Entity
Dedicated Regional Entity plus Governance Structure	$300k-$500k (FTE plus small contracts and admin)	Provides focal point, coordination, and accountability for data collection; enables economies of scale and regional access to information	RTF
a. Coordinate Regional Data Collection	$100-$200k	Lowers cost of data collection through economies of scale, increases value of data by increasing sample size through common data collection protocols, firms up resource estimation through better larger sample sizes.	RTF
b. Dedicated Clearinghouse/Web Archive for data evaluation and reports	$300k-$500k maintenance, $1 upfront investment to set up Web interface and database structures	Provides utility resource and program planners with direct access to data to support EE and resource planning	RTF
Sub total	**$700k-$1.2 million**		
Periodic Regional Data Collection Analysis			
a. Building Characteristics	$1-$2 million/year ($5-$6 million every five years)	Supports key data on actual building and consumer energy use	NEEA
b. Market Characterization	$2.5 million	Identifies market barriers and new opportunities for EE; provides market segmentation data to support program design	NEEA
c. Residential Customer Survey	$100k-$2 million		NEEA
d. Cost Data; Savings Data	$1.5-$2 million/year	Provides support for program cost-effectiveness analysis; allows updates of cost effectiveness	RTF
e. Evaluations	$2 million/year	Measures and verifies actual EE impacts; includes evaluation of NEEA; coordination of utility efforts, and directed regional evaluations	RTF/NEEA
Sub total	**$7-$9 million***	*Note: We estimate $5 million annual spending currently in the region (based on our survey); $7-9 million is not in addition to current spending, it includes the estimated $5 million	
Program and behavioral issues	$300k/year	Central coordination on program information and behavioral research results	NEEA
Sub total	**$300k**		
Policy Support	n/a	Explicit recognition of need for and value of data as foundation to EE resource by regulators and other policy makers including cost-recovery	NEEA Sponsors
Sub total	**$0**		
Total estimated budget for workgroup 1 recommendations	**$8-$10 million/year**		

Finally, Workgroup #1 encourages that

- NEET sponsors clearly convey to regulators and policy makers throughout the region the value of funding data as foundation to developing and insuring acquisition of cost-effective EE resources.

- Workgroup activity continues in some forum. Much of the value of the NEET/Workgroup process of the past six months is in the dialogue that has inspired a new opportunity to focus on issues that matter. Members of workgroup 1 appreciate the opportunity to participate in this dialogue, and recommend that continuing the work initiated to put the EE data-related functions in place using a regional approach is a high priority to best advance success in the region's energy efficiency acquisition.

X. Appendix A: Issue Papers from Workgroup #1 Subgroups

1. Building Characteristics and Energy Consumption

Recommendations. The focus of data collection in this area should be in the commercial and industrial sectors. In five-year intervals, commercial and industrial studies should be conducted with a focus on statistical significance at the regional and market sector level. For residential, the region should develop a common survey instrument and sample design to increase efficiencies for individual utilities and enable regional amalgamation. For all sectors, a focus should be placed on integrating consumption histories for all fuels (i.e., billing records for electricity and natural gas) to end-use information to develop end-use intensities (EUIs).

One option may be to track on an ongoing basis a regionally representative sample of residential and commercial sites to track the changing pattern of equipment and energy consumption and demand.

For the irrigation and infrastructure sectors, initial resource assessment and market potential studies should be funded. These studies will provide information on the sector characteristics, energy consumption patterns and trends, as well mapping out the potential energy savings. These studies will provide the framework for any future data collection efforts in these sectors.

Efforts should be made to gather regional (and national) end-use metered and whole building load data. More of this data is becoming available through automatic meter reading technology (AMI) and the increase use of energy management systems. Additionally, individual studies often meter the specific technologies. The current RTF study will provide the availability of this data and direction to any regional collaboration in this area.

Priority Rating.

- Residential – **Medium**
- Commercial – **HIGH**
- Industrial – **HIGH**
- Irrigation – **Medium**
- Infrastructure – **Medium**
- End-use and load data – **Medium**

Budget and Timing.

Residential. Development of common questionnaire - $100,000 (one-time), conducting full regional RASS with EUIs - $2 million (every five years).

Commercial. $3 million every five years.

Industrial. $1 million every five years.

Irrigation. Initial resource potential study to characterize the market. This study will generate recommendations for future data gathering activities.

Infrastructure. Initial resource potential study to characterize the market. This study will generate recommendations for future data gathering activities.

End-use and load data. The current RTF study is will result in an assessment of available data and generate recommendations on future research directions and collaborative data collection efforts.

2. Products and Services

ENERGY EFFICIENCY SAVINGS

Need for Additional Data. Although there are several sources for estimates of savings for existing measures in the Northwest, during the past 15 years there has been a significant lack of research, demonstrations, and evaluations to provide information on the cost and energy savings for currently available products and services. Because the RTF has a limited pool of resources, this lack of new data has led to a situation where it is very difficult for the RTF or other regional organizations to determine robust estimates of savings for new measures or programs. This is a significant barrier to the inclusion of new and emerging technologies and practices into program offerings in the Northwest. In addition, there is a need to collect consistent data from utility programs that collect and assess savings for programs.

Recommendations. Increase the funding for, and improve, regional coordination of products/services savings research, demonstrations, and impact evaluations. This includes evaluations spanning regional utility programs in similar technologies, as well as more focused technology assessments of pilot-type offerings. There may be an opportunity to develop a regional clearinghouse for utility program data.

Priority Rating.

- Residential – **MEDIUM**
- Commercial Products/Services – **HIGH**

Scale. Climate-zone level for weather-sensitive products/services; regional for other.

Budget and Timing. It is estimated that ____ per year would allow for the region to assess savings across multiple products/services. This should be an ongoing effort, with dedicated staff resources.

ENERGY EFFICIENCY COSTS

Need for Additional Data. The region needs a systematic look at incremental costs, prioritized by those products/services that represent a large potential resource. The lack of data in this area is a significant barrier to assessing the cost-effectiveness of products/services.

Recommendations. First, a process should be developed to collect consistent program costs of products and services from regional utilities and system benefits charge program administrators across all sectors. For commercial, residential, and industrial **retrofit** products, the utility-program data should be supplemented with market analyses of costs (Web-research, surveying suppliers, mystery shopping). Industrial measures should be included for any commodity-type products (i.e., motors, air compression). For commercial and residential **new construction** products/services it is necessary to conduct studies that would pay builders and developers to develop bids for energy efficient and baseline new buildings. It is unlikely that industrial new construction or complex process efficiency improvements can be assessed on other than a case-by-case basis.

Scale. Regional with consideration for sub-regional differences

Priority Ratings.

- Program Cost Data Collection – **MEDIUM**
- Retrofit (Commercial and Residential) – **MEDIUM**
- New Construction (Commercial and Residential) – **HIGH**

Budget and Timing. Systematic cost reviews of existing measures should be conducted every five years at an approximate budget of _____. In addition, budget should be set aside annually for cost assessments of new/emerging technologies at an approximate cost of $300,000/year.

ENERGY EFFICIENCY BASELINE EQUIPMENT INFORMATION

Need for Additional Data. The residential sector RASS surveys are currently useful for individual utilities, although combining them into a regional perspective is difficult. The commercial sector studies are insufficient in sample size to understand the various market sectors with any confidence. The lack of industrial data is extremely problematic in assessing the quantity of potential available and targeting program offerings. A relatively inexpensive source of data could be to purchase sales data from regional retailers.

Recommendations. The focus of data collection in this area should be in the commercial and industrial sectors. In five-year intervals commercial and industrial studies should be conducted with a focus on statistical significance at the regional and market sector level. For residential, the region should develop a common survey instrument and sample design to increase efficiencies for individual utilities and enable regional amalgamation. For all sectors, a focus should be placed on integrating consumption histories for all fuels (i.e., billing records for electricity and natural gas) to end-use information to develop end-use intensities (EUIs).

One option may be to track on an ongoing basis a regionally representative sample of residential and commercial sites to track the changing pattern of equipment and energy consumption and demand.

Priority Rating.

- Residential – **Medium**
- Commercial Medium – **HIGH**
- Industrial – **HIGH**

Budget and Timing.

Residential. Development of common questionnaire, $_____(one-time), conducting full regional RASS with EUIs, $_____ (every five years).

Commercial. $_____ every five years.

Industrial. $_____ every five years. In addition, $_____ dollars should be set aside annually to collect market sales data from regional retailers.

3. Market Characterization

Recommendations.

Establish a regional coordination group in order to identify needs and coordinate implementation of market characterization in order to avoid duplication and ensure that all regional players have access to data to support programs. This would include efforts to conduct research at a regional level where it makes sense, as well as coordinating multiple localized efforts where the coordination can result in economies of scale and the ability to extend the work to the entire region. Examples of the former would be the characterization of the commercial windows market. Examples of the latter would include the current market segmentation efforts in multiple utility service territories.

Likely candidates to take on this work include the RTF, NEEA, or a more formalized version of the NRG. Regardless of who is tapped to do the work, sufficient resources in the form of both funding and personnel will be needed in order realize the benefits of coordination.

Allocate at least 1 percent of the regional efficiency spending (currently estimated at over $250 million) to conducting this type of market research on an ongoing basis to ensure that Northwest key markets are adequately characterized with up-to-date information in order to allow efficiency efforts to be targeted effectively. This amount could be the coordination of individual budgets within utilities, but this will require more administrative effort than having a pre-funded pot of money dedicated to the effort.

Establish a "clearinghouse" for web-based distribution and access to market research reports and data for use by Northwest efficiency programs.

4. Evaluation

Background.

One of the prime sources of data for decision making and for planning is evaluation research. The quality, reliability, usefulness, and timeliness of evaluation results have been recognized by the NEET Executive Committee, but there are several open questions about how valuable this is and how policy is best served by evaluation research.

Robust knowledge of the savings (kWh saved per year per unit) to be acquired by energy efficiency products (equipment) and services is an imperative step of developing cost-effective energy efficiency programs or offerings. For the end-use consumer, knowledge of the expected reduction in energy consumption allows for rational assessments of payback and value. For utilities, thoroughly documented savings estimates allow for credibility in the analysis of the avoided loads and value of investing in cost-effective energy efficiency.

Yet kWh are not produced by measures, but by measures that are installed within programs, whose design, implementation, and quality control create the savings. This is one reason why it is so hard to "deem" savings based on engineering calculations. Assumptions don't account for the way programs interact with people. For this reason, the most reliable data for real world planning comes from evaluations of programs. Program planners often need behavioral research to support the effective program designs. This is also a neglected area.

There are many ways to characterize evaluation research. Four categories that are useful for this taskforce are:

Process evaluations observe actual programs and make recommendations for improvement/best practices. This 90% accomplished by the local utility on its own programs, but there are some opportunities to look for best practices across utilities.

Program impact evaluations measure the accomplishments of programs in terms of savings. This is about 60% accomplished at the local utility level, or sub-regional level (Puget Sound area), because the savings come from the way the program is operated in combination with the measures targeted by the program. Nevertheless, there are plenty of efficiencies to be gained by evaluating similar programs with similar delivery mechanisms across multiple utilities. Examples of the latter include Energy Star© homes, commercial lighting programs, market transformation initiatives like Energy Star© windows, and PTCS.

Technology assessments are strategic efforts to identify and isolate the savings that come from/or could come from a specific measure or technology. These are almost always done as regional joint efforts, because the results are valuable to everyone, but expensive for an individual utility to do. Examples include, economizer research, heat-pump research, retrofit packages for vending machines, and non-ducted mini heat pumps.

Verification is a minimal level of impact evaluation that leverages the results from other research. Through repeated, high-quality evaluations and technology assessments, some savings are reliable enough that they can be "deemed" if the measure is found to be in place and operating appropriately. This is usually a local utility effort, but the credibility of the savings values often depends on regional consensus. Simple verification is an extremely important way to reduce the cost of evaluation, while providing assurances of savings to the region. It only works well if the quality control is present. The RTF publishes a large list of measures whose savings values (at least on average) have been rigorously vetted and updated, such as CFLs, window upgrades, new manufactured housing, some irrigation measures, and many heat pumps in specified circumstances.

In general, where does the region stand now on evaluation research?

The most active evaluators are NEEA, the Energy Trust of Oregon, the RTF, and Puget Sound Energy. Others are intermittently active on their own, but more importantly, many of them have funding the joint evaluations of NEEA and the RTF. While these evaluations also represent some of the best M&V efforts in the US, none of these entities spend more than 3% on evaluation research.

California spends about 8% of its total energy efficiency budget on evaluation, measurement, and verification. New York State (NYSERDA) has recently raised its evaluation budget from 2% to 5%. Illinois has allocated a mere 0.5% for its first effort at evaluation, but quickly increased it to 3%.

Sources of Evaluation Data.

Regional Technical Forum (RTF): Over the last 7 years the RTF has reviewed and incorporated the findings of technology assessments and impact evaluations in support of the cost-effective measure list that serves as the basis for many regional programs, especially the BPA Conservation Rate Credit program. Some results are produced directly through limited research budget of the RTF, but most depends on following the results of evaluations. A key strength is that the measures and results almost always are directly applicable to the region and its climate. Two weaknesses are the lack of process evaluation input and a backlog of needed updating of measure costs and savings due to under-funding.

Local Utilities: BPA, NEEA and the Energy Trust post their impact and process evaluations on their websites. Other utilities such as Puget Sound Energy, SCL, and Tacoma Power willingly share most research results with the RTF. Among these entities, over the last 20 years, there are in excess of 350 evaluation studies, many outdated and only available in hard copy. Much of what has been produced has been used, but there is no common way to access the information and to stay current with what is going on. It would also benefit the region to know what is being planned so that minor changes could be suggested to make the work more generally useful. Many parts of the region do not have sufficient infrastructure and resources to accomplish a lot of needed evaluation research on their own, and could benefit from working with a cost-share on regional issues.

The Consortium for Energy Efficiency (CEE): This national Market Transformation organization maintains a searchable database of evaluation reports www.CEE1.org that are voluntarily provided by its member utilities. Where the cross-references to a single organization are very numerous, e.g. NEEA, they provide a link. The strengths are that it covers all parts of the country and is easily searchable. Weaknesses include the lack of quality control over what is provided and that many full reports are not directly available to the reader – for example only short abstracts are available for the proceedings of the International Energy Program Evaluation Conference.

The International Energy Program Evaluation Conference (IEPEC): This non-profit has been holding bi-annual conferences for over twenty five years (scheduled for Portland in 2009). It features peer reviewed papers (50 -90 per conference) on impact, process and planning evaluations. All proceedings since 1997 are available on CDs which are searchable within the CD www.iepec.org. The strength of IEPEC is that there is good quality control. The weaknesses are that the papers can only be about 10 pages long and the proceedings must be purchased or obtained from attendees.

The California Measurement Advisory Council (CALMAC)[1]: CALMAC provides a searchable database of evaluation research in California going back to 1990 www.CALMAC.org., with downloadable evaluations since 1994. It has new evaluations added almost weekly. The evaluations are generally of very high quality and quite detailed, because for 8 of the years they were the basis of IOU shareholder earnings claims. The strengths of the CALMAC are the quality, the completeness of the reports, and the public availability. The weaknesses are the California-centric focus, including a heavy emphasis on free-ridership, and the size of the

[1] Some might suggest that the eebestpractices website would be a good source of evaluation data, but it really focuses on programs, and while good evaluation is a "best practice" criterion, the evaluation information is quite limited www.eebestpractices.com.

reports. In addition, the evaluations, while complete, tend to be too untimely for decision support. In recent years, the documents have been broken into two parts – an Executive Summary and the whole report, both in Adobe.

The California Database of Energy Efficiency Resources (DEER): This is a searchable database that attempts to assign an ex ante value as a starting point for savings by measure. It is California's version of the RTF measure list, but with less requirement for field data to back it up. It must deal with 13 climate zones for all weather sensitive measures, and involves estimates of incremental measure cost, and peak savings by measure. It is the starting point for about 60% of the savings projected in California IOU planning. It regularly gets updated, but it is a massive undertaking. Its weaknesses include outdated incremental measure cost data, lack of measure/program interactions, and values that are not always trusted by the IOUs who substitute their own values. It is often not applicable to the PNW climates, and is very cumbersome to use. www.eega.cpuc.ca.gov/deer/.

Current California EM&V: With $400 million dollars in IOU shareholder incentives riding on the outcome of evaluations of programs in 2006-08, current evaluation efforts are approaching $80 million. Although the evaluation research is expected to cover all programs, there is a focus on the performance of measures across programs. Much of this evolving information will be of interest for the PNW. A draft list of the major measures of interest is very detailed (1.73 MB zipped), but is available.

The needs of the region to cooperate at the a level viewed as important to NEET requires some real time coordination and a clearinghouse function to provide the best decision making information about the performance of the measures, programs, and services available in the region. Support of this effort can provide the type of cost-efficiencies that come from a well-established track record, so that redundant evaluations can be avoided, freeing up resources for R&D, market characterizations, and focused program efforts.

Current levels of coordination and joint strategic planning are not working for the region. While the cost of organizing and strategically guiding regional and sub-regional efforts may be substantial, the cost of not getting our planning estimates and our "accomplishments" correct can be even higher as the region attempts to accelerate energy efficiency. "Ready, fire, aim" may get people started, but it is no way to build a power plant. Large and small parties need to be able to tap into the region's collective knowledge.

Recommendations.

1. All stakeholders in the region need to be committed to using quality evaluation and paying for it.

2. Better information would come from evaluations within the region, and cost efficiencies would be tremendous if a central group with dedicated funding could guide it strategically – not taking away the ability of individual utilities to evaluate their own programs, but to be able to work on cross-program evaluations and technology assessments, rather than beg and borrow every time an opportunity or need arises.

3. There are a lot of extra-regional resources for evaluation, but it is time-consuming to review what is available and what can be useful on a real time basis. If the Region wants to track what is happening inside and outside the region some dedicated resources will be needed to create a clearinghouse. This includes information on
    a. baselines that are found in the market;
    b. incremental costs as they change;
    c. savings estimates; and
    d. lessons learned from program delivery problems and successes.

4. Given the 1996 (?) Congressional appropriations language that recommended the RTF be formed to serve, among other purposes, as a quality control organization for evaluations and as a repository of the evaluation information, it would be logical to regionally fund on an ongoing basis the RTF to handle recommendations 2 and 3 above. Firm, longer term commitments will supply the staff and budgets needed to derive value where it exists elsewhere and strategically plan how to fill remaining regional needs.

Post-Script.

In terms of implementation on a regional basis the recommendation is to assign responsibility and resources to the RTF for items 3a, 3b, and 3c for purposes of understanding impacts and costs of measures, and to assign the responsibilities and resources for 3d, basically market assessments, consumer behavioral research, and process evaluations to NEEA.

Appendix B: Table of Data Needs

Following is a summary table of tasks, priority over the next five years, periodicity, and costs.

Users of the data gathered through the processes identified here are utility and regional load forecasters, conservation planners, evaluators, state planners, consultants. Note that cost figures presented below are not incremental or new costs**. A large portion of these costs are in existing budgets** from NWPCC, NEEA, RTF, and other utilities**.** One of the post-NEET tasks is to identify those costs that are already budgeted, and identify incremental costs.

*- 5 year if no major cost shift occurs, otherwise sooner

Sector/Entities	Tasks	Next 5 years Priority scale (1= highest, 10 = lowest)	Periodicity in years	Approximate Annual Cost ($000)
Residential	Common questionnaire, definition, methodology	1	5	20
	Building characteristics, EUIs, load shapes, etc	4	5	400
	Measure Savings and Costs	4	5	200
	Emerging trends/sectors/ technologies	4	1	200
	Market Characterization	4	1	1,000
	Panel data	4	1	1,000
Commercial/Small Industrial	Common questionnaire, definition, methodology	1	5	20
	Building characteristics, EUIs, Hours of operation, load shapes, etc	3	5	600
	Measure Savings and Costs	3	5	200
	Emerging trends/sectors/technologies	3	1	200
	Market Characterization	3	1	1,000
	Panel	3	1	1,000
Industrial Large	Common questionnaire, definition, methodology	2	5	20
	Sector characteristics, EUIs, load shapes, etc	3	5	200
	Measure Savings and Costs	3	5	-
	Emerging trends/technologies	3	1	200
	Market Characterization	3	1	1,000
Agriculture	Common questionnaire, definition, methodology	1	5	20

Sector/Entities	Tasks	Next 5 years Priority scale (1= highest, 10 = lowest)	Periodicity in years	Approximate Annual Cost ($000)
	Sector characteristics, EUIs, load shapes, etc	4	5	20
	Measure Savings and Costs	4	5	200
	Emerging trends/technologies	4	1	200
	Market Characterization	4	1	300
Infustructure	Common questionnaire, definition, methodology	2	5	20
	Sector characteristics, EUIs, load shapes, etc	5	5	200
	Measure Savings and Costs	5	5	200
	Emerging trends/technologies	6	1	200
	Market Characterization	6	1	300
Transportation	Common questionnaire, definition, methodology	4	5	4
	Sector characteristics, EUIs, load shapes, etc	8	5	20
	Measure Savings and Costs	8	5	20
	Emerging trends/technologies	6	1	100
	Market Characterization	8	1	100
Total				**9,164**

Appendix C: Data Needs from a State Perspective

The table below provides a summary of the energy efficiency standards in each of the four states in the northwest.

	Idaho	Montana	Oregon	Washington
Appliance/Equipment Standards			**X**	**X**
Energy Standards for Public Buildings	**X**		**X**	**X**
Building Energy Codes	**X**	**X**	**X**	**X**
Public Benefit Funds		**X**	**X**	
Personal Tax Incentives	**X**	**X**	**X**	
Corporate Tax Incentives		**X**	**X**	
Loans	**X**	**X**	**X**	

Appliance/Equipment Efficiency Standards
The federal government has established energy efficiency standards for a wide range of consumer and commercial appliances and equipment. States may not pre-empt federal standards, but may adopt energy efficiency standards for product categories that are not federally-regulated. California has had the authority to adopt higher standards for many years, and the Appliance Standards Awareness Project (ASAP), a consortium of states, utilities and energy advocacy groups, has developed model standards to assist states that want to adopt higher standards and to provide state-to-state consistency for manufacturers.

Beginning in 2005 the legislatures of Oregon and Washington, along with about a dozen other states, have enacted minimum appliance efficiency standards covering a number of appliances. This includes Automatic Commercial Ice Makers, Commercial Refrigerators and Freezers, Commercial Hot Food Holding Cabinets, Compact Audio Products, DVD Players and Recorders, Portable Electric Spas, Bottle-type Water Dispensers, and Unit Heaters. In addition, Oregon and Washington adopted standards for several other categories of equipment that have subsequently been pre-empted by federal standards. Oregon has authority to adopt standards administratively.

There are several categories of equipment for which Oregon and Washington have not adopted standards. For example, California is currently considering standards for televisions and battery chargers, and accelerated effective dates for federal standards for general purpose incandescent lighting adopted by Congress in 2007.

ASAP maintains estimates of savings for each category of equipment, based on estimated national sales and adjusted for population. ASAP maintains a registry of approved products on behalf of participating states, including Oregon and Washington, but the states do not actively track sales or verify compliance.

Public Buildings
Idaho, Oregon and Washington require new state buildings and major renovations to meet energy efficiency standards beyond respective state building codes and/or ASHRAE standards. They also have voluntary standards for schools and other local government buildings, and Oregon requires that 1.5 percent of the budget for any new public facility be dedicated to solar energy.

Oregon and Washington provide various levels of review and assistance. Data from these facilities is being collected in Oregon and Washington, including some post-occupancy data collection; M&V, however, is not required. Biennial reports to the Legislature help ensure compliance with the requirements in Oregon and Washington. Energy Star Portfolio Manager may be a tool to help centralize data and ensure consistency.

Oregon also requires existing state facilities to reduce energy use by 20 percent or more compared to calendar year 2000. The Oregon Department of Energy collects the data and reports it to the Legislature, and works with agencies to improve energy efficiency if they fail to meet the target.

In addition, Idaho, Oregon and Washington encourage and assist public agencies to use Energy Savings Performance Contracts, and provide other tools and assistance. Oregon, for example, maintains lists of approved energy auditors, energy analysts (e.g., building modelers) and commissioning agents, provides model controls specifications, and case studies.

Building Energy Codes

The Northwest has a long history of encouraging and adopting some of the most advanced energy codes in the nation. Currently, Oregon and Washington have energy codes that are developed and maintained by state agencies. Idaho and Montana both have adopted the nationally developed International Energy Conservation Codes.

Oregon recently adopted a set of changes to their residential code that improve it to a level roughly 15% better than current national model codes and is currently developing a non-residential code targeting 20 to 30% improvement over current energy code requirements. Washington is considering improvements in both its residential and non-residential codes for 2009 adoption. Given the importance of the national codes, the four Northwest states have formed the Northwest Energy Codes group that has been successful in getting a number of NW-generated improvements adopted in the IECC. NEEA has provided support for both individual state energy code development as well as the NW Energy Code Group efforts.

Current status of the four states can be summarized as follows:

State	Residential Codes	Non-Residential
Oregon	2008 – 15% Better than 2006 IECC	2009 Code Development in Progress Targeting 20-30% improvement
Washington	2009 Code Development in Progress Targeting 20-30% improvement	2009 Code Development in Progress Targeting 20-30% improvement
Idaho	2006 IECC	2006 IECC
Montana	2003 IECC Currently considering 2009 IECC	2003 IECC Currently considering 2009 IECC

Code enforcement and code compliance are interwoven issues. Typically an effective building code would result in lower initial compliance, and as construction practices change to new code, the level of compliance increases. A recent evaluation by NEEA found that overall regional compliance rating (defined as falling within 10% of code) for residential buildings is about 85 percent. Compliance was found to be higher in Oregon and Washington and higher in single-family versus multi-family buildings. NEEA's commercial baseline study found an increase in energy code compliance levels since the 1990s. Code compliance in lighting standards was found to be in the range of 80-90 percent.

Estimates of building code savings are available from the Northwest Power and Conservation Council (NWPPC). According to the NWPPC, by 2007 cumulative regional savings from state codes reached 700 MWa.

Tax Incentives

All four northwest states provide incentives of some sort for either energy efficiency or distributed renewable energy systems, or both.

Idaho provides tax deductions for insulation and windows in residences built before 1976, and for renewable energy and energy-efficient heat pumps and wood stoves. Information on the number of deductions and total dollar amount claimed is available from the Tax Commission, but energy savings are not reported. In addition, the Idaho Office of Energy Resources also provides 4 percent loans of up to $100,000 for industrial, agricultural and commercial energy efficiency and renewable energy projects, and up to $15,000 for residential energy efficiency or renewable energy improvements.

Montana provides tax credits of up to $500 for residential energy efficiency improvements or non-fossil energy generation or heating, and $1,500 for a geothermal heating system. Montana also provides a 35 percent tax credit for commercial renewable energy investments. Taxpayers may deduct from corporate income up to $1,800 for residential energy conservation investments, and up to $3,600 commercial energy conservation investments. The programs are administered by the Dept. of Revenue. The Department of Natural Resources and Conservation also offers loans of up to $40,000 for alternative energy systems that generate energy for the building occupant's own use or for net metering; energy conservation measures may also be financed along with the alternative energy project.

Washington provides an exemption from the state sales tax for solar water heating systems and equipment used to generate electricity from wind, sun or landfill gas, and requires utilities to pay production incentives of $0.12 to $0.54 per kilowatt-hour (kWh), capped at $2,000 per year to individuals, businesses, and local governments that generate electricity from solar power, wind power or anaerobic digesters. The Department of Revenue must submit reports measuring the impact of this legislation. The Washington State University Extension Energy Office also provides $5,000-$10,000 grants to small and medium sized manufacturers in Washington state to pursue energy efficiency projects.

Oregon provides the largest incentives. Oregon's Residential Energy Tax Credit program (RETC) provides tax credits to homeowners for premium efficiency appliances, high efficiency heating and air conditioning systems, high efficiency water heating systems, premium efficiency duct systems, and renewable energy systems. Insulation, weatherization, and windows are not eligible for the tax credit. The Business Energy Tax Credit program (BETC) provides a tax credit equal to 35 percent of incremental costs taken over 5 years for businesses and rental dwellings that implement energy conservation projects and 50 percent for business that implement renewable energy projects. A Pass-through option allows a project owner with limited tax liability, such as public entities and non-profit organizations, to transfer the BETC project eligibility to a pass-through partner in exchange for a lump-sum payment. Oregon also provides low-interest, fixed-rate, long-term loans for energy conservation and renewable energy projects.

The Oregon Department of Energy administers these programs and reports results biennially. Oregon pre-certified $155 million in energy conservation project costs in 2006 and $170 million in 2007. Oregon pre-certified $155 million in renewable energy project costs in 2006 and $204 million in 2007; most of this was for large wind and large biomass generation projects. The Department estimates energy savings or energy production, as appropriate. However, the estimates are not calculated consistently with the RTF or other organizations in the region, and there is little or no post-installation review to verify the estimates.

State programs may be used in combination with other utility incentives. Thus estimated savings, to the extent they are available from the states, are not necessarily additive to savings from other utility or regional programs.

Net Metering
Oregon and Washington require all utilities to offer net metering to customers who install distributed renewable energy projects on their facilities. Montana requires its investor-owned utilities to offer net metering, and most electric cooperatives have adopted net metering as well. Idaho does not require net metering, but all three investor-owned utilities in the state have net metering tariffs approved by the Public Utility Commission. The states do not collect the data, but the number and total generating capacity of net-metered systems should be available through the utilities.

Public Benefits Funds
Montana requires all distribution utilities and cooperatives to collect a Universal System Benefits Charge (USBC), which is used for low-income assistance and weatherization, energy efficiency, renewable energy, and R&D programs. Utilities and cooperatives may manage their own USB program, or may pay into state funds that implement the USB program. The charge is set at a level that would generate 2.4 percent of each utility's 1995 retail sales revenue, with caps on large customers, amounting to about $10 million annually. Montana's Universal System Benefits Charge currently is slated to run through 2009.

Oregon's requires its two largest investor-owned utilities, Pacific Power and Portland General Electric (PGE), to collect a 3% public-purpose charge from their customers to support renewable energy and energy efficiency projects through 2025. Of the funds collected by the utilities, 63% must be allocated towards energy efficiency programs and 19% to renewable energy. The remaining funds support low-income housing energy assistance and K-12 school energy-conservation efforts, administered by the Oregon Housing and Community Services Department and the Oregon Department of Energy, respectively.

The Energy Trust of Oregon, an independent non-profit organization, was established to administer these programs under contract to the Oregon Public Utility Commission. In addition, the Energy Trust administers gas conservation programs for residential and commercial customers of Northwest Natural and Cascade Natural, and select programs for residential customers of Avista Corporation in Oregon. In 2007 the Energy Trust received about $52 million from the Pacificorp and PGE, and another $11 million from Oregon's natural gas utilities, and spent a total of about $56 million. Data on energy savings is reported in the Trust's Annual Report. Savings estimates may overlap the Oregon Department of Energy's tax credit programs. The Energy Trust and the Oregon Department of Energy coordinate marketing, criteria, and applications as much as possible.

Data Needs from a State Perspective

Purposes
Below are some of the key uses of data from a state's perspective.

- Whether a building code upgrade is justified
- Compliance levels with energy codes; opportunities to improve both codes and supporting infrastructure
- Whether state utility regulatory policies appropriately treat energy efficiency and renewable energy
- Whether state incentives are warranted, and at what level
- Whether state policy should be modified
- How effective program delivery is, and how it might be improved.

Issues
The state would like energy savings to be reported on a statewide basis, including savings from both utility and state programs. State programs affect all citizens, irrespective of utility territory or fuel type. In many cases both state and utility incentives are available to a consumer. It is difficult, if not impossible, to appropriately pro-rate the savings – it is impossible to tell whether one incentive or the other had more of an effect on a person's decision, and in many cases it is the synergistic effect that makes a project attractive. Further, utilities don't wish report lower savings for their programs by sharing credit with the state. But if both utility and state data are reported separately, savings are double-counted. This should be addressed.

Another need is that national data (or data from another region) on penetration rates be available for comparison purposes, to see whether our programs are incenting additional savings. This data can be difficult to obtain, especially when done in a sporadic, ad hoc manner. It would be helpful if someone were tasked with either collecting some national data or at least maintaining a central repository to which others contribute as they gather data.

Data Needs
Below is a list of some of the specific data that would be helpful from a state perspective. The list is not comprehensive, but captures some of the more important data needs. I don't think there's anything here that isn't included in one of the other subgroup reports.

Product data

- Measure savings
- Measure cost (total cost, marginal cost), including trends (historical costs)

Market Characteristics

- Size of potential market for each product/service, by state
- Size of potential market for each product/service, by sector and occupancy or SIC/NAIS

Building Characteristics

- Size by age, occupancy type, and state
- Energy use (electric and natural gas) by age, occupancy type, and state
- Compliance rates with current energy codes
- Utility rates

Program Evaluation

- Quantity sold/installed, by state
- Energy savings, by state
- GHG reductions, by utility and state (this can be calculated)
- Cost (utility and state incentives)
- Market penetration rate of technology, by state
- Market penetration rate of technology, by occupancy type
- Market penetration rate, national
- Consumer acceptance of product/service
- Consumer satisfaction with program delivery
- Perceived consumer barriers

Task 5
Provide background on the different types of state programs which, in conjunction with utility-funded efforts, promote energy efficiency.

1. Survey state energy efficiency incentives and results
2. Survey energy efficiency mandates and results
3. Survey state and local building codes regarding energy efficiency
4. Survey extent of building code enforcement
5. Survey state energy efficiency product standard.

Appendix D: Data Needs from a Regional Level

(Written by Massoud Jourabchi, Northwest Power and Conservation Council, July 2008)

Background
In the first phase of its work, workgroup #1 is tasked with an assessment of the current state of energy efficiency in the region including ongoing research, initiatives, data needs, funding, and operational experience. Using a group of experts from the region, a preliminary assessment is underway. Further assessment regarding additional information needs and required action steps will be provided as part of recommendations to the Executive Committee.

In order to identify and discuss short-term and long-term strategies, and timeline recommendations to increase energy efficiency development throughout the region, this report is being circulated for your review, comment, and additions. You are asked to reflect on the current and future data needs, wants, concerns and recommendations that best reflect your organization. Keep in mind that the goal of increasing regional acquisition of energy efficiency goes beyond electricity and beyond energy reduction; it include all fuels and demand response.

I will start with my own organization's data needs, wants, concerns, and recommendations.

Northwest Power and Conservation Council, Jourabchi perspective

Backdrop the way I see it:

- Region is moving toward reduced reliance on hydro to meet its peak load.
- Variability in resources is increasing as wind generation is increasing.
- Climate change is creating increases in the variability of load.
- Peak load management (DR) is becoming more important in the region.

Short-term Forecasting
For our short-term forecasting needs, mainly used in the Resource Adequacy analysis:
Need -Hourly load for the region
Want- Hourly loads for each utility
Concerns- Lack of a timely load data can lead to under forecast for regional energy and peak.
Recommendation- A regional body works with WECC to get the hourly loads data on a quarterly basis; synthesize the information into regional footprint, make it available publicly.

Long-term Forecasting
The Council uses an end-use model to forecast loads twenty years into the future and to assess conservation potential from each end-use. In this report I am focusing on forecasting needs; conservation planning, implementation, or evaluation, and needs stemming demand response planning, implementation, or evaluation will be identified under a separate cover.
Needs

- Update to hourly end-use load shapes for the newer end-uses or newer business sectors that are emerging in the region, (for example, growing demand from home entertainment equipment, computers, laptops, servers, plug-loads, or expanding load in data centers, retirement homes, and refrigerated warehouses)
- Update on energy use of existing and emerging end-uses
- Update on saturation rate of appliances in homes and businesses
- Update on industrial customers loads by NAICS
- Update on irrigation customers loads

Wants

- To follow on an ongoing basis a regionally representative sample of residential and commercial sites to track changing pattern of demand for energy
- Track shipment level and efficiency of major appliances to the region

Concerns

- Being in a reactive mode; not being able to properly reflect changing pattern of use and new applications and end-uses

Recommendation

- A bottom-up approach using a coordinated effort to follow hourly loads in a representative sample in existing and new residential and commercial buildings. This would be an on-going effort, a relatively stable number of households and commercial buildings would be tracked through time. Drops and increases in loads, and shifts in timing of consumption is investigated. This could act as an early warning system reflecting changing patterns.
- Work with National associations, regional retailer to track shipment of major appliances, and energy using devices to the region with the greatest level of geographic detail possible.

Appendix E: Cost of "Not Measuring What Matters" or Value of "Measuring What Matters"

In the past quarter of century, Northwest region utilities have done an excellent job of acquiring conservation in a cost-effective manner. The estimates for the cost of acquiring over 2400 MWa of conservation resources has been placed at over 2 billion dollars. In the recent years, the Northwest has been acquiring conservation resources at an average cost of about $1.5 million dollars MWa (first year cost). As the region embarks on the second quarter century of acquiring conservation resources, the need for better and more complete information is paramount. The need for going beyond the meter to consumers as the real source of energy conservation is greater. The road-map to this second journey into the conservation forest is sketchy at best, created from vintage maps, and more recent but limited scouting reports. The low hanging fruits on the out-skirts of the conservation forest may be picked clean and now the second generation of low hanging fruits need to be identified and picked deeper in the forest. Back of the envelope assessment of the cost for this second, more aggressive, conservation trip puts its cost at $8.4 billion dollars (constant 2006$) for the region over the next 22 years. This equates an average annual cost of $1.5 million dollars per MWa and an average acquisition target of 375 MWa, or about 1% of annual regional load.

An investment of this magnitude would require substantial investments in planning, coordination, engineering, implementation, and evaluation. Using a conservative five percent cost allocation to these matters would translate to about $450 million dollar investment in knowing what matters over the next quarter of century. This equates to about $20 million dollars a year, or about $750 dollars per MWa of conservation acquired.

This level of investment in conservation can be treated as an insurance policy and used as an instrument for acquisition cost reduction. Benefits derived from an informed planning, marketing and evaluation approach to conservation acquisition, and benefits from a regional acquisition strategy, would significantly outweigh the cost of measuring what matters.

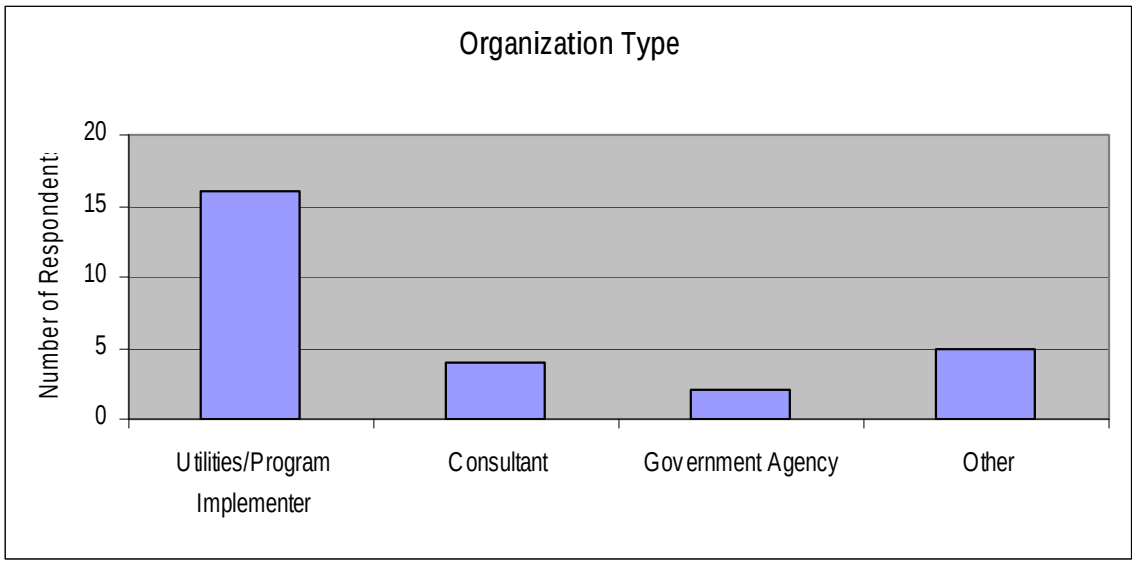
In summary, investment in "Measuring What Matters" would reduce the financial risk of conservation acquisition and is a cost-effective conservation investment by itself.

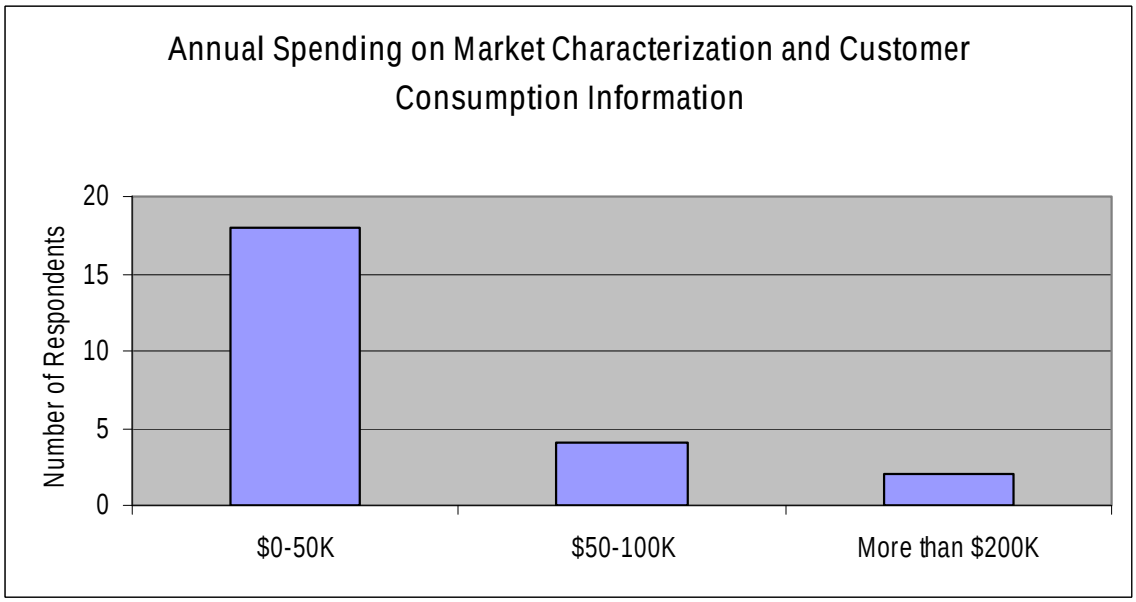
Appendix F: Survey Questions, Responses, and Findings

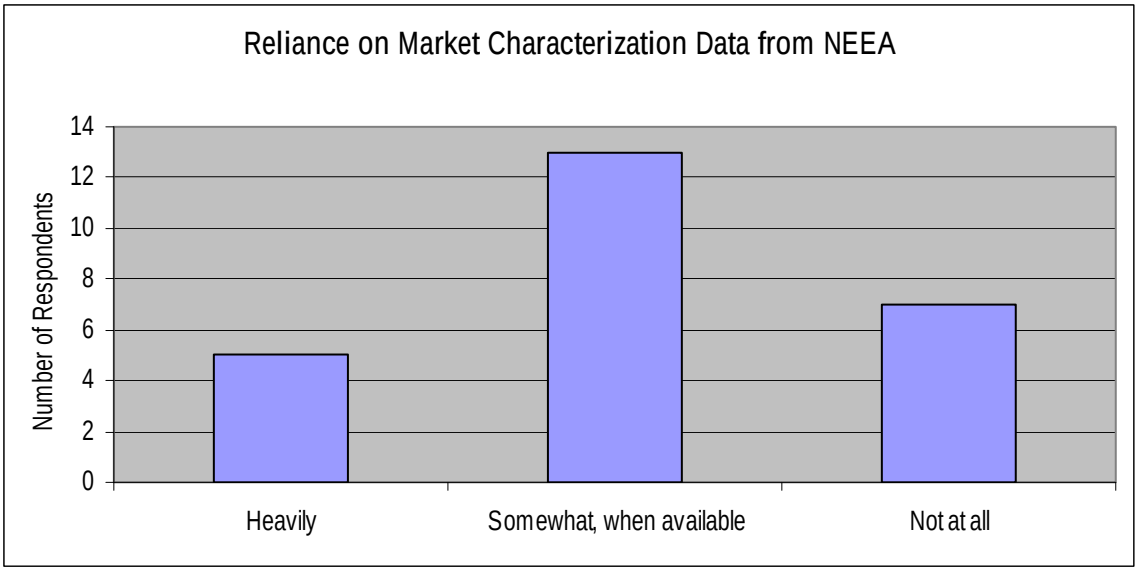
Workgroup #1 administered a survey to the entire NEET group in order to gage the preliminary recommendations, prioritize data needs in the region, and receive feedback from a wider audience that included private and public utilities, government entities, consultants, and non-profits. There were 28 respondents to the survey. The electric IOUs and public utilities that responded represent 75% of all electricity sales in 2008.

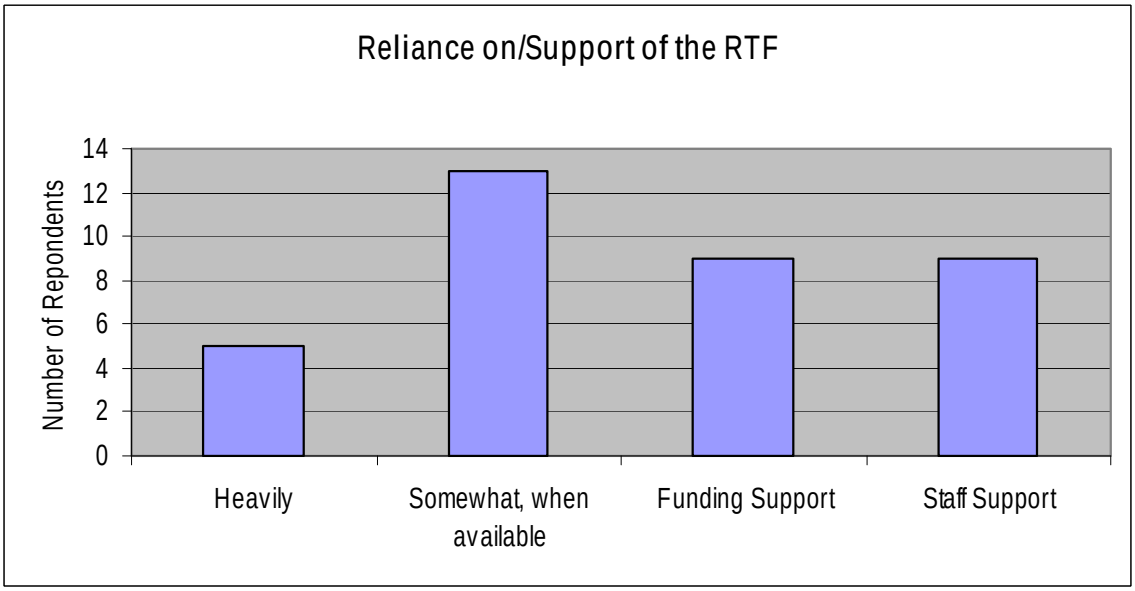
At the December 5th meeting, the workgroup reviewed the results of the survey. Attached is an excel spreadsheet that includes the survey questions and answers (with the names and organizations removed). Notable results are shown below.

Survey Results: Work Group 1 Survey.xls

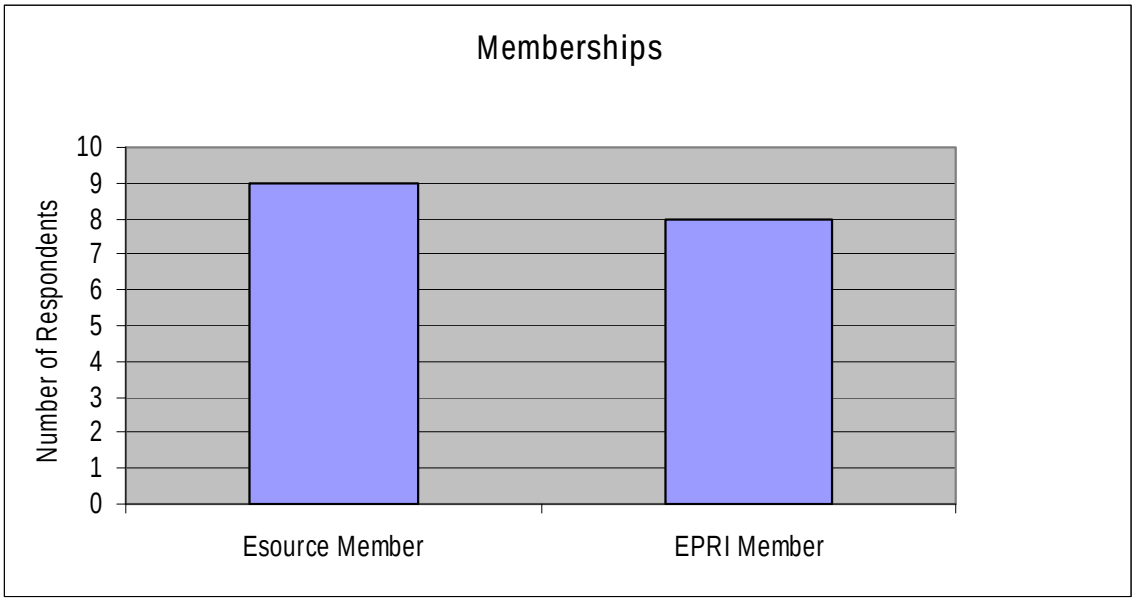




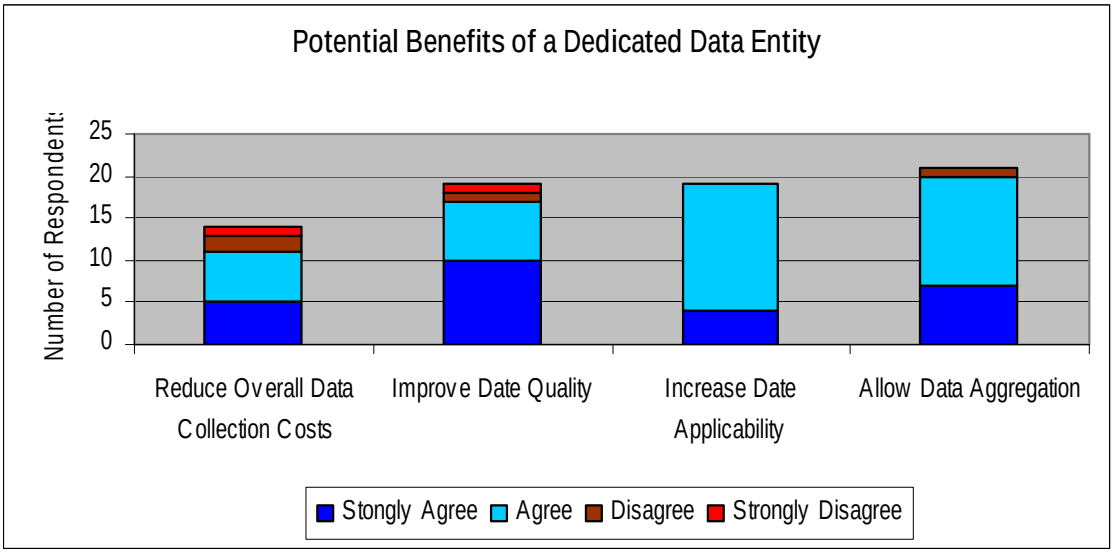




* Note: Five respondents rely on the RTF (somewhat, heavily) but do not support with funding



* 8 utilities (#IOUs and BPA) fund both, in addition to own internal efforts; Estimated in combination about $5 – 700,000 per year or more; Also asked about GRI (Gas Research Institute.)



* Cost Concerns- All proposals require incremental funding for activities which are not currently being undertaken or occur sporadically and non-systematically. Governance is needed to insure costs will bring additional benefits at a reasonable cost. There will be bias towards "actionable" data; Relevance- Regional data must be relevant to needs of local level implementation

Appendix G: Participants

Name	Organization & Title
Massoud Jourabchi -- Chair	Northwest Power and Conservation Council Economic Analysis Manager
Mary Smith -- Chair	Snohomish PUD
John Kaufmann -- Chair	Oregon Department of Energy Conservation Division Senior Policy Analyst
Gillian Charles	Northwest Power and Conservation Council
David Robison	Stellar Processes
Lou Moore	Montana DEQ Director of Energy and Pollution Prevention
Richard Beam	Providence Health and Services Director of Energy Management Services
Bill Hopkins	Puget Sound Energy
Glenn Atwood	Seattle City Light Planning, Research and Evaluation Manager
Jeff Harris	NEEA Senior Manager for Planning
Rick Weijo	PGE Manager, Customer Research & Analysis
Lauren Gage	BPA Public Utility Specialist
Phil Degens	Energy Trust of Oregon Director of Evaluation
Bill Drummond	Western Montana Generation and Transmission Cooperative Manager
Dan Elliott	Oregon Housing and Community Services
Joe Downs	Tacoma Public Utilities Account Executive
Mike Darrington	Idaho Power Company Energy Efficiency Evaluator
Jennifer Williamson	Ecos Consulting
Chad Gilless	Ecos Consulting
Jon Powell	Avista Partnership Solutions Manager
Pamela Lesh	PGE/NRDC
Ken Keating	
Karen Meadows	BPA
Jim White	Chelan County Public Utility District
Graham Parker	Pacific Northwest National Laboratory -- Senior Staff Engineer, Energy and Environment Directorate, Technology Planning and Deployment
Jim Abrahamson	Community Action Partnership of Oregon Oregon Energy Partnership Coordinator
Mike Porter	McKinstry
Brian Hedman	The Cadmus Group Energy Services Division, formerly Quantec LLC.

Name	Organization & Title
	Principal
David Tooze	City of Portland's Office of Sustainable Development Senior Energy Specialist
Tom O'Connor	Oregon Municipal Electric Utilities Association
Eugene Rosolie	PNGC Power
Martin Shain	BacGen Process Technologies BacGen Solar Group Polaris Renewable Energy President
Tom Eckhart	UCONS, LLC CEO
Mark Gosvener	UCONS, LLC
Jason Ping	Pacific Lamp Wholesale Sustainable Building Advisor
Todd Currier	Washington State University Energy Program
Tim Kensok	AirAdvice, Inc. Vice President of Market Development
Nancy Goddard	PacifiCorp
Sharon Noell	PGE
Ken Miller	Snake River Alliance Clean Energy Program Director
Kimberle Rollins	Oregon Coast Community Action
Bo Downen	Public Power Council Policy Analyst
Steve Lindstrom	Pacific Power Customer Support Services
Chuck Eberdt	The Energy Project Opportunity Council
Dulane Moran	Research Into Action Senior Project Analyst
Matthew M Walker	Siemens Building Technologies Performance Contracting Energy Sales
Ken Tiedemann	BC Hydro Power Smart
Jennifer Memhard	Formerly of Intel
Bill Koran	Quantum Energy Services and Technologies Senior Engineer
Guy Nelson	Utility Geothermal Working Group
Bettina Arrigoni	Global Energy Partners Senior Associate
Joshua Binus	Bonneville Power Administration Energy Efficiency, Program Analyst
Bill Dickens	Tacoma Power Senior Utilities Economist

APPENDIX B-1
WORK GROUP 2: DRAFT REPORT AND RECOMMENDATIONS

"How to keep the pipeline full of energy efficiency innovations for use in the Pacific Northwest."

Recommendation:

- There is a need for a regional body to "manage/coordinate" emerging efficiency technologies and solutions activities and portfolio.
- There must be dedicated funding of approximately $8 to $10 million/year and dedicated staff to focus on emerging energy efficiency technologies and solutions.
- There must be a long-term continued effort for this regional body to be fully effective.
- A regional fund must be governed by a regional board.
- The scope is fuel neutral, and the following definition is the focus of the effort: An emerging technology or solution, not in common use, that promises a quantifiable increase in efficiency of energy use, production, or distribution as seen by end-use customers in the Region.
- The Region must accept that efforts to develop emerging technologies and solutions need a long term view and commitment. The current measurement paradigm of pure cost effectiveness and benefit cost tests are barriers for this effort and should not be explicitly applied.
- This should be done with an eye to the PNW needs while in conjunction with and leveraging work in the region and beyond, such as in California, DOE and the national labs, and internationally.

The workgroup was not able to reach a strong consensus on a recommendation of who the organization should be. It came down to two organizations for this role; Bonneville Power Administration (BPA) and the Northwest Energy Efficiency Alliance (NEEA). Both have expressed interest and have experience in advancing emerging technologies.

Problem Statement:

The region's collective energy efficiency goals depend on a continuous pipeline of commercially available new energy efficiency technologies, practices and solutions. The region has not made significant investments over the last 15 years in emerging technologies in favor of more near-term projects. The focus has been more on annual savings achievements that are cost effective. In addition, recent successes with CFLs, clothes washers, windows, and other technologies and practices that are still paying dividends have hidden the pipeline problem.

One of the guiding questions for the Northwest Energy Efficiency Taskforce was to examine what efficiencies/benefits could be gained by considering action at a regional level. The question the workgroup addressed is: would there be efficiencies/benefits for a coordinated

regional approach to keeping the pipeline full of energy efficiency innovations for use in the Pacific Northwest?

Rationale:

Conservation supply grows significantly when regionally coordinated resources are applied to latter stage Research and Development (see: Gordon, Eckman, Grist, and Garth, 2008, ACEEE). Examples include:

- Field testing and demonstration efforts in the 1980's and early 1990's led to current energy codes for residences.
- Efficiency R&D helped develop initial horizontal axis washer products, which led to the co-creation by the appliance and efficiency industries of a market for efficient washers and a series of increasingly efficient washer products.
- A recent pivotal regional product is leading to an improved dry bulb sensor for economizers for rooftop cooling. This is a major breakthrough for commercial cooling efficiency, but, because it was funded by "passing the hat" among efficiency organizations, it took three years to collect funds and initiate the research.
- Funding for the current field demonstration of ductless heat pumps in homes was a significant burden on regional relationships and staff time because of the lack of dedicated funding for this project and the lack of an established and orderly process for joint development of these projects.

An established Emerging Technologies fund with dedicated funding, staff and an established portfolio management system including a process for selecting projects will allow more technologies and solutions to commercialize at a faster pace with increased impact and enhanced customer satisfaction. Additional benefits of the region "pooling" funds includes; leveraging individual investment and spreading risk associated with longer-term emerging energy efficiency technologies and solutions.

Background:

The Process

62 regional participants[2] signed up for workgroup 2, with average attendance of 20 per meeting/conference call. Since late July, the workgroup has utilized a process whereby issues were analyzed/discussed in smaller subgroups with findings/recommendation brought forth to the full workgroup for review/finalization.

[2] A list of participants is available in the appendix.

The Work and Outcomes

In July, an on-line survey[3] was fielded to ~ 250 individuals in order to get a snapshot of the current state of RD&D. 82 respondents participated, representing 63 organizations throughout the Northwest region. Key finding's included:

- There was not a commonly held definition of what RD&D/emerging technology is.
- There appeared to be more activity on early commercialization activities such as demonstration projects, versus early research and development activities.
- There is belief that there is a role for regional R D & D, and that it should be a multifunction, multijurisdictional effort, with a strong emphasis on regional coordination/collaboration.

Following are the definitions developed for: 1) an emerging technology; and 2) the stages of RD&D.

> The innovation is an emerging technology or solution that promises a quantifiable increase in efficiency of energy use, production, or distribution as seen by end-use customers in the Region. (This encompasses both gas and electric efficiency.)

RD&D Stage	Description	Expected Regional Role
Research	Fundamental sciences, lab work	No Direct Role
Concept	Define technical concept and market need	Provide ideas - market assessments, research, evaluation
Product Design and Development	Turn concept into product.	No Direct Role
Initial Bench Test	Test product functionality, refine as needed	No Direct Role
Prototype applications test and Business Plan	Demonstrate Market and Technical Feasibility in field conditions	Fund/coordinate testing of prototypes, work under a range of conditions with detailed monitoring.
Beta unit and Revised Business Plan	Product finalization	Fund/coordinate testing of prototypes in representative population with detailed monitoring.
Demonstration	Demonstrate performance and market acceptance	Identify and co-fund pilots. Assess end user reaction. Evaluate energy savings
Commercialization	Post R&D	Handoff and disseminate results

[3] The survey results are available in the appendix.

WG2 recommends that a central entity is held accountable for the Region's emerging energy efficiency technologies portfolio. The basic elements of the entity's scope include[4]:

Scanning;
- Screening/Prioritizing;
- Selection[5];
- Oversight and Coordination/Implementation of Projects;
- Manage portfolio;
- Evaluation;
- Handoff and dissemination of results.

The group agreed that the central entity would not "implement" all of these aspects, but rather contract out with individuals/organizations with specific expertise as well as leverage any existing efforts either in region or beyond.

The entity should have permanent dedicated staff and budget, and a volunteer technical and marketing oversight board that would provide advice on selections and coordination. Dedicated funding of ~$8 to $10 million/year is recommended in order to develop and maintain a diversified and balanced portfolio. Since this would be a regional fund it must be governed by a regional board.

Finally, WG2 discussed possible entities to fulfill this role[6], including the Northwest Energy Efficiency Alliance (NEEA), the Regional Technical Forum (RTF), and Bonneville Power Administration (BPA). Pros and cons of each were discussed.

On Nov. 26, during a conference call of the NEET WG2, a vote was taken to attempt to identify positions and if a majority opinion exists as to who should be on point for the region regarding emerging technology identification, process, information dissemination and program development.

Of the 12 people on the phone call:
- 6 voted that they could not make a recommendation and thought that the NEET Executive Committee should struggle with this issue;
- 3 voted for the Northwest Energy Efficiency Alliance;
- 3 abstained either having direct or perceived conflict; and
- 0 voted for BPA as the entity.

There was general consensus that if a central entity was selected that individual utilities, regional program administrators or others may develop emerging technology programs or continue individual programs for their own business interests. It was felt that this would be a good thing for the region and most thought that one of the functions of any new regional entity would be regional coordination of these types of interactions. Looking for "creative collaborations" was stated as a key competency of this central entity.

[4] More detail is available in the Organizational and Funding Approach Report in the appendix.
[5] Basic selection criteria and a more comprehensive list of potential criteria can be found in the appendix.
[6] More detail is available in the Organizational and Funding Approach Report in the appendix.

Executive Committee Questions

1. **Calls to integrate Smart Grid into Work Group 2 platform (received multiple comments from Executive Board members). Issues raised in relation to distributed generation, the advent of Smart Grid appliances, etc.**
   WG2 had numerous and thorough discussions about the inclusion of SmartGrid. There was strong consensus that while SmartGrid is an important area that deserves attention, it should be treated as a separate R&D activity and fund. The primary rationale for this is the concern over diluting the focus on emerging energy efficiency technologies. Areas where end-use efficiency and Smart Grid overlap, such as connected home energy monitors, would be a fitting focus emerging technologies development.

2. **Need to find any links between Smart Grid and Work Group #6 Subgroup on Smart Grid/Load Management.**
   Workgroup #6 Recommendation: Regional Load Management/Smart Grid (LM/SG) Cooperation/Coordination: Form a group of interested persons from the region's utilities, governance, and non-profit sectors to 1) share information and experience about emerging technology and practices in the areas of load management and smart grid, 2) lead regional efforts on analysis and research value of capacity, reliability, and energy efficiency associated with LM/SG, 3) assess and monitor the state of applicable LM/SG regulations and legislations, and 4) assemble and share information of the impacts that (LM/SG) technologies and applications will have on low and limited-income households.

3. **Glaring need to look at opportunities for demonstration projects in the region (large focus in the 1980s).**
   Strongly agree. Hence why a central entity with dedicated resources is recommended to ensure scanning and selection of the highest priority opportunities and effective management/coordination of demonstration projects.

4. **Need to focus on ways to keep the pipeline full with new technology.**
   Strongly agree. WG2 has identified the importance of a dedicated regional entity to best achieve this goal.

5. **Revisit focusing on top three to six leading technologies (might miss something that way).**
   WG2 focused on the who, how and what it will take to keep the pipeline full. The WG did not conduct an exhaustive scan for new technologies or select any specific technologies to focus on. A of technologies is in the appendix with the intent to forward to the entity as a starting point. This draft list was developed for the NWPPC 6th Power Plan and was shared with WG2. It is only a start and not meant to be exhaustive.

6. **Would like to see support for lots of small efforts that will allow for us develop a robust list of emerging technologies to feed the pipeline.**

The group did not want to predetermine the number of efforts. Rather, through the establishment of a portfolio management system and applying a screening process to emerging opportunities, those with the most potential value are the ones to be pursued. Further, the group agreed that it is essential that a diverse portfolio is maintained as a way to manage risk, and one of the attributes of diversification could be size of effort.

7. **Consider California's model for emerging technology.**
   California's model as well as others, including Connecticut have been considered.

8. **Keep an eye on what's being done internationally.**
   Agree. Key part of the scanning process.

9. **Look at what's being done across the region and see how R&D is being coordinated. How does what's being done in the Northwest fit in with the rest of the county? Should we look at integrating or going alone? Options to integrate regionally, nationally, internationally.**
   WG2 discussed and evaluated the regions particular situation in light activities in the rest of the country. A great deal is being done in emerging technologies in other areas, so borrowing and collaborating will be important for the Northwest. This collaboration is a benefit that a dedicated Northwest regional-scale entity can bring as an improvement over the current ad-hoc collaborations with others.

10. **Need periodic assessment of new emerging solutions and technologies with special focus on EPRI, DOE, National Labs and California – identifying those with potential benefit to the Northwest and how they can feed into market transformation.**
    Agree. It is envisioned that a central entity would work in collaboration with these and other organizations and through an on-going scanning and screening process assess new emerging technologies and solutions.

NEET Process

WG2 discussed our experience with the "NEET Process", and following are some of the observations/lessons learned about the process and our experience:

- Camaraderie and willingness to participate has been great. Really enjoyed getting together as a group and would like to continue. It has been a high functioning "group of volunteers". It is easy to take for granted how well the NW collaborates versus other parts of the country.
- More structure/direction from NEET at the start could have improved the WG efficiency early on. Having clarity on what decision(s) the Executive Committee make versus the WG.

Other Recommendation

ADVOCACY AND POLICY ROLE NEEDS A HOME: Important work such as advocating for code/standard improvements and recommendations to legislatures, and identifying legislative proposals such as tax policies does not fit WG2 scope, and needs further direction. Potentially a legislative task force should be established.

Appendix

More detailed information is available in the attached documents. Meeting notes can be found on the NEET website.

1. Emerging Solutions and Technologies Research Development & Demonstration Survey Summary
2. Organizational and Funding Approach Report
3. Emerging Technology Selection Criteria Report
4. Decision Framework for Regional RD & D Report
5. RD&D Framework and Emerging technology inventory list
6. Workgroup 2 Participants

APPENDIX 1
NEET Work Group #2
Emerging Solutions and Technologies
Research Development & Demonstration Survey Summary
August 2008

Introduction

In July 2008, the Northwest Energy Efficiency Taskforce[7] (NEET) Work Group #2 -- Emerging Solutions and Technologies tasked with looking into *"how to keep the pipeline full of energy efficiency innovations for use in the Pacific Northwest,"* conducted an on-line survey to identify what organizations were currently involved with the Research, Development and Demonstration (RD& D) of energy efficient technologies -- including products, equipment, services, systems or innovative approaches to how people use energy. The survey results will feed the development of an RD& D inventory.

The survey was emailed to the full NEET participant list of all six work groups and the executive committee, reaching over 250 stakeholders. In addition, to requesting participation with the survey, participants were asked to forward the survey on to others, as appropriate. Participants had one week to complete the survey.

Key Findings

The 82 respondents who participated in the study represent 63 organizations throughout the Northwest region. Of those respondents, 33% work for a utility, 24% for a government agency, 22% for a consulting firm and 22% other. Organizations in other included: Davis, Hibbitts & Midghall, Inc., Energy Trust of Oregon, MicroPlanet, New Buildings Institute, NW Energy Coalition, NW Energy Efficiency Alliance, Northwest SEED, NW Center for Sustainability and Innovation, Providence health and services, and Wal-Mart Public Affairs

Organizations with a dedicated role in RD & D of energy efficient technologies, product, services or practices.

- The majority (65%) of the participants (50 responses representing 40 organizations) currently say they have a dedicated role. Of the 40 organizations, 10 are utilities, 9

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[7] **Background Information on the Northwest Energy Efficiency Taskforce**
The Northwest Energy Efficiency Taskforce (NEET) was recently created to identify and recommend promising opportunities for greater energy efficiency achievement in the Northwest. NEET is comprised of more 25 executives from across the region with a vision to "*Significantly advance the region's energy efficiency achievement through greater regional collaboration, commitment, customer involvement and pursuit of the most cost-efficient program strategies."*

from other organizations, 8 are government agencies, 7 from consulting firms, 5 from manufacturing/service provider firms, and 1 university.

- The expertise/role described by survey respondents was primarily centered on participation in demonstrations or pilot programs of technologies on the cusp of commercialization. Also, participation in market research, evaluation, advancing building code, and developing policy were widely cited. Six respondents indicated they had expertise/ a role in the earlier stages of RD & D, and three of which stated it was a very limited role due in part to limited funding.
- The majority (74%) of the participants (57 responses representing 46 organizations) currently say they do not have a dedicated budget to fund RD& D activities. Of the 46 organizations, 14 are utilities, 11 consulting firms, 9 from other organizations, 9 government agencies, and 3 from manufacturing/service provider firms.
- Of the 26% of the participants (20 responses representing 16 organizations[8]) currently say they have a dedicated budget to fund RD& D activities. Of the 16 organizations, 7 are utilities, 4 are manufacturing/service provider firms, 2 other organizations, 2 government agencies, and 1 consulting firm. Nine organizations provided annual budget information, ranging from $5,000/year to $40 million/year, and seven indicated their budgets would increase in the future. The work described by utilities and government agencies included a range of activities such as dues to EPRI, program planning and implementation, market research, and demonstrations of technologies. The work described by manufacturers was specific to their firm, such as Smart Grid, 3D Party Development, Database Modeling, Computer-based modeling of real time biochemical parameters in wastewater treatment, Hyper-Efficient mixing and aeration technologies, and aerial infrared and ground penetrating radar leak detection technologies, with filtering software, for municipal water systems.

Regional role for R D & D for energy efficiency, energy conservation and demand response.

- The majority (94%) of the respondents (46 responses representing 41 organizations) currently believe that there is a role for regional R D & D. Three respondents did not believe that there is a role for regional R D & D, and were from three investor owned utilities, of which two, had conflicting responses. Of the 41 organizations, 14 are utilities, 9 from other organizations, 7 are government agencies, 6 from consulting firms, and 5 from manufacturing/service provider firms.
- 43 respondents provided feedback on who should take the lead on coordination of this effort, of which 17 specifically mentioned it should be a multifunction/jurisdiction effort/organization, with a greater degree of regional coordination/collaboration than currently exists. Two organizations were called out most frequently by respondents to take the lead: 17 respondents mentioned the Northwest Energy Efficiency Alliance (NEEA) and ten respondents mentioned the Bonneville Power Administration (BPA).

National organizations funding R D & D for energy efficiency, energy conservation and demand response.

- Commonly identified organizations included the Federal Government, Department of Energy, National Labs, and EPRI.

[8] Four of these organizations also had participants respond that they did not have a dedicated budget.

Conclusion and Recommendations

Conclusions

- There is not a commonly held definition of what RD & D is among respondents. The manufacturers/service providers were the only group that had a common theme. Among the remaining types of organizations, there were a similar number of responses that focused their input around the development of new technologies and/or practices, versus a focus on energy efficiency program planning and/or implementation type activities.

- From the survey responses, there appears to be more activity on early commercialization activities such as demonstration projects, versus early research and development activities. This leaves a question about what is really in the pipeline. A cautionary note though – this could be due to the nature of the survey participants, or from a private sector point of view one of sensitive information.

- There is belief that there is a role for regional R D & D, and that it should be a multifunction, multijurisdictional effort, with a strong emphasis on regional coordination/collaboration. The questions that remain, what exactly that role would be, for what benefit, and who would take the lead.

Recommendations

- The energy efficiency community needs to have a common definition of what RD&D and its phases are (aka pipeline). This is the first foundational piece in order to begin any discussions on such items as roles.
- Need to engage a wider audience, such as DOE, the California PIER Project, and the private sector to begin to develop a better sense of what is in the pipeline and at what stage.

APPENDIX 2
NEET Work Group #2
Emerging Solutions and Technologies
Organizational and Funding Approach Final Report
December 2008

Introduction and Problem Statement -- Conservation supply grows significantly when regionally coordinated resources are applied to latter stage R&D (see: Gordon, Eckman, Grist, and Garth, 2008, ACEEE). Some examples:

- Field testing and demonstration efforts in the 1980's and early 1990's led to current energy codes for residences.
- Efficiency R&D helped develop initial horizontal axis washer products, which led to the co-creation by the appliance and efficiency industries of a market for efficient washers and a series of increasingly efficient washer products.
- A recent pivotal regional product is leading to an improved dry bulb sensor for economizers for rooftop cooling. This is a major breakthrough for commercial cooling efficiency, but, because it was funded by "passing the hat" among efficiency organizations, it took three years to collect funds and initiate the research.
- Funding for the current field demonstration of ductless heat pumps in homes was a significant burden on regional relationships and staff time because of the lack of dedicated funding for this project and the lack of an established and orderly process for joint development of these projects.

An established Emerging Technologies fund with dedicated funding, staff and an established portfolio management system including a process for selecting projects will allow more projects to commercialize at a faster pace with increased impact and enhanced customer satisfaction.

I. Task. The overall task has three responsibilities:

(1) Bring to the NW technologies and strategies that are in a late stage of emerging or have been proven elsewhere but have not been deployed in the region, with the understanding that they might need to be modified for NW applications;
(2) Initiate research on specific technologies, products, strategies, and markets;
(3) Co-fund existing projects in cases where that additional funding can make or break a project.

II. Scope. The outer "boundary" for this effort is to bring an emerging technology to the completion of the market-demonstration, or pilot, stage. Full deployment is outside the scope of this entity. However, it is suggested that adequate interaction be established with end users and utilities to get their input and buy-in, increasing that chances of successful hand-off to and implementation by those charged with market penetration.

III. Selection of Projects

a. Scan industry for best practices—both technologies and technology assessment and development.
b. Interview regional end-users, utilities, program implementers, vendors, etc., to identify needs and gaps.
c. Work with oversight committee to develop project selection criteria that increases speed to market and chances of success. These criteria should enable development of a portfolio of innovations. Maintain a mix of long-term and short-term projects, balanced for risk.
d. Review initial general tracking done by organizations such as E Source, ETCC, SMUD, DOE, the WSU Energy Program, and ACEEE, to determine the scope of each organization's efforts and how this entity can partner with / leverage them to maximize the impact of this entity's efforts.
e. Identify potential partnership roles with other organizations for future implementation.
f. Screen innovations identified in a. and b., (e.g., 9-step matrix and criteria for success), leveraging others' work to focus on compiling, clarifying, and preliminary prioritizing of ideas for implementation in the region. BPA has developed road mapping tools and procedures to facilitate this process.
g. Prioritize and select specific opportunities.
h. Select projects (ranging from technology development to demonstration to deployment) based upon criteria set by technical oversight committee.
i. Select projects, host sites, and implementation teams for funding through competitive solicitations or other means.
j. Execute, hand off, publicize, and evaluate projects.
k. Repeat.

The entity will screen for the best overseas emerging technology innovations, for those with the biggest impact and are most easily transplanted to the Northwest.

The Emerging Technology fund organization will, however, advocate with established US manufacturers directly and through national organizations to develop products meeting Northwest needs, at times pointing to overseas success.

The organization will, as part of its screening process, review potential co-funding opportunities with California, USDOE, and other major funders (including those in the private sector) to identify those where Northwest funding will have the greatest impact on project success. The organization will also identify projects from those funders where funding is NOT needed or only needed at a later stage, but dissemination of results is important to the Northwest. The organization will look for opportunities to coordinate on project identification and prioritization with California and other state, provincial, national and regional research organizations where projects of high mutual interest are identified. This will necessarily be a very selective process, so that coordination does not overwhelm work.

IV. Oversight and Coordination/Implementation of Projects. In general this function is that of a contract administrator/project manager.

a. Ratepayer funds should be leveraged by seeking project co-funding with other entities.
b. Participate in projects as an active contributor, but leave execution to others.
c. Assure that projects stay on track; the buck stops here.
d. Help identify (and motivate) customer participants for pilots.
e. Facilitate participation of member funders (utilities, ETO, BPA) and other regional players in the project, including an oversight board.
f. Ensure that emerging technology projects are designed to produce results that will enable the Regional Technical Forum (RTF) to make decisions on energy savings and cost effectiveness. The objective is to make information that the RTF can use to form determinations, without assuming a specific role for the RTF in running the group at this time. Some measures are developed and commercialized but are best dealt with through custom analysis. In that case the role of the RTF is not as clear-cut. So other processes for approving measures for use by ratepayer-funded programs may be needed.
g. Develop and maintain procedure to mitigate risk of legal action from manufacturers and vendors of products that receive a negative assessment

VI. Handoff and dissemination of results

a. Share full results with project funders and participants and key regional organizations, including the Regional Technical Forum. This includes going through the RTF's "acceptance" process.
b. Share a summarized version with organizations around the country with a shared interest in efficiency technology assessment
c. Hand off successful projects to utilities, NEEA, ETO, etc., including follow-through to assist them in bridging to broad deployment

Issue for NEET Executive Committee that does not fit within this subgroup's "sandbox": Potential legislative task force *that would identify code/standard improvements and other legislative proposals such as tax policies and make recommendations to regional entities/legislatures for changes.*

V. Evaluation

a. Evaluate results
b. Use lessons learned to improve process

VII. Organization and Funding Needs

a. A regional fund must be governed by a regional board, acting as a board to oversee strategic direction, hire lead manager, provide fiscal due diligence, etc.

b. The must be a multi-year effort to realize the full benefit of this approach. Greater returns may only be realized with sustained efforts in excess of 5-years.

c. The staff size and budget needed depends upon the scope and tasks. The subcommittee recommendation is for a small, highly qualified and very focused staff of 4-5 FTE, including administration and contract support, that manages the planning, budgeting, portfolio management and contracting with a several-million dollar budget. The budget is recommended to be approximately about $8 to $10 million per year to develop and maintain a diversified and balanced portfolio. It is expected that a ramp up to this annual budget would take a couple of years. These funds should be managed separately from the organization's other funds. If smart grid/demand management technologies are added to the scope, it would require additional staffing and funding.
d. Small permanent staff to develop solicitations, perform proposal evaluations, manage the process and portfolio and administer projects. Some need for financial accounting and for legal work to do contracting and liability mitigation. Some tasks can be out-sourced to other organizations as needed, but there is a need for a central entity. Roles and responsibilities for dedicated staff vs. outsourced support organizations should be defined at the outset.
e. Dedicated funding rather than project-specific "passing the hat." Two separate funds for electric and gas efficiency are recommended to minimize cross-subsidy issue. Both would contribute to projects with multi-fuel savings. The regional governing board should either define or ratify staff recommendations on how this will be done, to ensure consistent and fair handling of all situations.
f. Funding dedicated specifically to efficiency technologies, and if desired, a separate fund for demand management and/or smart grid. There are other needs (programs, demand management) that may overwhelm, due to the need for short-term benefits and direct utility benefits, if emerging efficiency technologies focus is kept in a blended fund.
g. A volunteer technical/marketing/new product oversight board (not all funders) including utility staff and outside experts to provide technical advice on project selection, marketing and coordination with utilities for demonstrations. A budget for consulting experts is recommended.
h. A web based information and communication platform is needed to connect with the large group of interested parties in the region. Even more, it is need to keep pace with the increasingly rapid pace of innovation.

VIII. Entities that could be expanded to fulfill this role.

There were at least three entities that were considered to play the role described above. Each has pros and cons, but NEEA and BPA seem to be the primary contenders. They are both committed to invest heavily in emerging technology assessment and have some experience in this area. Both have support for expanding their role in emerging technologies at the highest management level. It's not clear which would be best or how they could collaborate, but both need to support the regional process for it to be successful. It could be that a successful partnership could be established involving the two organizations, taking advantages of the strengths of both. The selection of an organization will determine how tens of millions of

dollars of regional funding are invested in next few years and it would be problematic to relocate the management function to a different organization during that time.

***Recommendation*:** *For all these reasons, the work group does not have strong consensus for selecting a single organization, but rather suggests that management from BPA and NEEA discuss the issues identified in this document further with NEET representatives.*

Northwest Energy Efficiency Alliance

Pro – NEEA has an established governance structure and history of doing this work. They are currently operating and successful, this task is generally in its mission, they have some historic success in this area, and recently emerging technology became more of a focus of funding and support (potentially $5-6M/yr for next 5 year business plan). Good track record, wide buy-in and representation. The existing NEEA board could serve as the regional governing board, and the current organizational structure could absorb these tasks without much modification. The timing is right to include this wider scope and function, because of the current strategic and business planning process. NEEA has a good track record for sharing results widely. There is a balanced focus on technology and business aspects. They have done market assessments to identify technology needs (although none recently).

Con – Electric utility-centric, though including gas utilities are now being considered. Funding now directly tied to results, while this new role must accept dry holes, some ability to fund programs that may not have directly trackable results, and longer-term paybacks. Will have to create a new technical advisory group for emerging technology because Board provides policy/strategy support rather than operational project direction. BPA is reluctant to co-fund if not convinced that NEEA's road-mapping and emerging technology management capabilities are well suited to the task. This new work needs to fit in with other changes and growth opportunities (NEEA could be faced with more 'opportunities' than can be assimilated and managed); and the funding and technical oversight for this effort needs to remain somewhat separate, or fenced, from existing NEEA programs. We believe that this can fit under the NEEA board, however.

Bonneville Power Administration

Pro - Bonneville has a Technology Innovation office (managed by Terry Oliver) that addresses many of the tasks described in this paper, based on extensive research into emerging technology assessment programs best practices. This includes a mature road mapping and technology management process. Technical expertise and experience, including network of external experts. Good source of funding with history of using co-funding opportunities. All projects are based on a competitive procurement process and require co-funding. Good relationships with federal labs, regional universities, agencies and co-funding opportunities, and leverages R&D inside and outside of region. Annual BPA budget is ~$5M/year with a significant cost-share (up to 50%) brought by those proposing projects. Just in the past year BPA has become more fiscally transparent and is the process of developing a work plan for further enhancement of their efficiency technology assessment and

collaboration plans. Starting in 2009, BPA is starting a program with dedicated staff and funding for emerging energy efficiency technologies.

Con – BPA staff pre-define technology emphasis for a yearly solicitation. IOUs not currently represented, nor are the gas utilities. Federal entity with restrictive contracting processes (although the program manager states that BPA is now much more nimble and flexible than in the past). Current scope and selection process may need to be significantly revised to synch with the proposed scope envisioned here. May be impossible to have non-federal board providing direction, since ultimate responsibility stays with BPA Administrator, but Terry Oliver believes this could be finessed to everyone's satisfaction. Focuses more on transmission and grid management than energy efficiency/efficient technologies, but shifted last year, and they currently have about a dozen efficiency technology projects underway.

RTF

Pro – Respected, independent, accountable to NW Power Council (and therefore the states). *Possibly RTF or WSU could do compiling and screening function with another entity (like NEEA) doing implementation.*

Con – Currently has much narrower, technical focus, very limited staff, with much work done by volunteer board. According to Tom Eckman, this would be problematic for them to perform their current role and run the assessment program; best to have input into technologies to assess and criteria/protocol such that the outcomes will provide the information RTF needs to make decisions but remain at arm's length from the actual work.

New Entity?

Pro – Designed for task. Potentially can avoid regional constraints.

Con – New entity would compete with existing entities for staff, funding and time from participants. Mission would overlap with existing entities. The initial cost and time required to build a largely duplicative entity is hard to justify. Would need executive-level champions in all key funding organizations to succeed fully.

Appendix 3
NEET Work Group #2
Emerging Solutions and Technologies
Emerging Technology Selection Criteria
September 2008

Introduction

A sub-committee of NEET work group #2 was formed to develop selection criteria for identifying emerging technologies. The subcommittee developed two categories. The Basic Selection Criteria gives a short qualifying definition of emerging technologies/solutions ("innovations") and a summary level list of what the sub-committee selected as key selection criteria. The basic criteria are intended to be applied at a specific point in time; i.e. when the technology or solution is just emerging and is not yet in widespread use. At this emerging stage, many attributes such as cost and performance are in flux and ultimate market acceptance and cost-effectiveness are highly uncertain. Therefore the Basic Selection Criteria are broad and fundamental and meant to guide relative ranking for prioritized selection.

Following these Basic Criteria is a listing of Additional Prioritizing Criteria. These criteria were gathered from a number of sources and are presented as a more comprehensive list of potential criteria that may be useful to fill in details beyond the Basic Criteria. These criteria are intended to be taken as screening criteria, not disqualification criteria. By that, we mean that if two technologies float to the top, the criteria are used to further define the region's top priority. An example would be the detailed criteria Geographic Balance. If a certain technology or solution only served one geographic area, it would not necessarily be eliminated, if by serving that one area all areas in the region could benefit from downward rate pressure. However, an otherwise equal solution that could serve the entire region would be ranked higher.

Basic Selection Criteria

An emerging technology or solution, not in common use, that promises a quantifiable increase in efficiency of energy use, production, or distribution as seen by end-use customers in the Region. (Inclusion of demand, water, distributed generation, and direct application renewables are under consideration as additional benefits.)

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1. The innovation has ***technical promise***:

    - Energy efficiency attributes are expected to explainable and specifiable for implementation on a regional scale.
    - The magnitude, shape, and longevity of energy savings are expected to be identifiable, predictable, and quantifiable.

- Eventual regional-scale implementation could provide reliable, cost effective energy savings.

2. The innovation has ***Regional RD&D program promise***:

    - Timely regional adoption is primarily dependent on collaborative regional-scale development activities.
    - Meets an identifiable need or gap in a regionally developed emerging technology roadmap.
    - Expected adoption provides good geographic, customer class, and utility service area distribution.
    - Likely be able to save significant energy in the Northwest over the next 15 years or so given adequate market penetration.

3. The innovation has ***market promise***:

    - Meets a user need and provides a notable relative advantage for users.
    - Provides a marketable combination of energy and non-energy benefits.
    - May become a regulatory or other requirement that drives market adoption.
    - Provides trade ally profit potential.

Additional Prioritizing Criteria

1. An emerging technology (not in common use within the Pacific Northwest utility community) with little published information available to educate utility staff or consumers.
2. Be in advanced stages of development, ready for commercialization, newly commercialized, or fully commercialized -- perhaps in other regions -- but not yet in widespread use in the Northwest.
3. The ability of an innovation to reach the commercialization stage is important. Although long-term projects spanning multiple years are not excluded, their benefit relative to the time to commercialization will be considered.
4. *Long-term Market Impact.* Consumers' benefits must outweigh costs, so they will continue to buy the product or service without incentives in the future.
5. *Geographic Balance*. Products or services that are available to many businesses or consumers throughout the northwest region are preferred.
6. *Customer Class Reach*. Products or services that are available to many customer-types: agricultural, industrial, commercial, and residential are preferred.
7. *Have Private Sector Co-investment.* Projects that have private sector or other sources of co-investment, co-funding or cost-sharing are preferred. While co-investment is not essential, it demonstrates investor confidence and helps to reduce sponsors risk. (There is some Workgroup ambivalence about this one. On one extreme, a NW fund could throw money at projects that will do fine without us. However, there are

advantages to leveraging others' expertise. Some projects only proceed with multiple funding sources.)

8. Documented evidence must exist that the technology or practice improves energy efficiency or produces energy from renewable resources. Such evidence must include at least one of the following:
    - generally accepted engineering calculations,
    - independently reviewed evaluation reports or case studies,
    - prototype testing and/or evaluation, metering results; and/or,
    - peer-reviewed scientific research.

9. Magnitude and longevity of electricity savings, or net energy production in the case of renewable resources can be reliably determined through direct measurement, controlled experiment, or other generally accepted engineering calculations or evaluation protocols.

10. Improved Reliability/Power Quality includes but is not limited to:
    - Leveling loads, e.g.: preferentially reducing load during peak demand periods.
    - Facilitating efficient management of discretionary loads.
    - Improving the un-interruptability of the user's power at the distribution level or below.
    - Improving the power quality within a user's facility due to the interaction among the demand of loads.
    - Protecting power-quality sensitive equip. from voltage changes, harmonics, etc.

11. Cost effectiveness: It should have a Total Resource Cost (TRC) Benefit/Cost Ratio of 1.0 or better.

12. Provides load shifting for the economic benefit of the customer/sponsor.

13. Have little or no negative impacts on the service provided. The ideal technology would have additional non-energy benefits.

14. Performance-related features are readily identifiable and related to RD&D gaps.

15. Customer economic viability - Could its' estimated actual production and installation costs be paid off with its estimated savings prior to its life's end without outside incentives?

16. Right solution to the problem - Is there a lower cost alternative with higher efficacy that solves the same problem?

17. A single technology or solution - Is it a multiple solution disguised as a single new technology? i.e.; Black box power correction.

18. The percent of external co-funding that is cash.

19. Is additional RD&D activity likely to have an impact (or is sufficient research already being done)?

20. Would new management systems be needed?

21. Range of potential future cost/benefit. (A Connecticut fund used data on the applicable market and what little was known about pricing to come up with a range of simple scenarios. Without extensive detail or precision the scenarios were useful to discern whether a large proportion of the uncertainty band was in a cost-effective "zone".)
22. Environmental benefits are desirable, and refer to the extent which the proposed project has a positive impact on local air, water and noise pollution in all customer segments.
23. Research projects which are performed in Region will be given preference over projects performed out of Region. Development & Demonstration projects must show direct benefit to regional electric customer and must be performed within the Region.
24. The extent of market penetration is an important part of the cost evaluation. Projects which offer large electric energy efficiency benefit, whether from one single improvement or from a series of smaller ones are sought.
25. The potential for Regional RD&D to overcome common barriers to wide adoption of energy efficiency innovations, including:
    - Key energy performance attributes can be better identified and specified.
    - Unreliable energy efficiency performance can be improved.
    - Existing energy performance standards can be adapted for PNW conditions (climate, local codes, etc.)
    - Metrics and protocols for measuring energy savings can be developed.
    - Assumed or promoted energy performance is wrong.
    - Non-energy related performance fails in the marketplace.
    - Focused identification, specification, and measurement of efficiency attributes and energy performance are needed for success.
    - Identification of a baseline and quantification of an incremental difference is needed for success.
    - Metering infrastructure needed to measure energy efficiency performance.
26. Is regionally coordinated demonstration and testing of "as installed and operated" energy performance needed?
27. Is metering infrastructure needed to insure performance?
28. Does this measure have "fatal flaws"?
    - Assumed or promoted energy performance is wrong.
    - Undesirable non-energy features will cause an otherwise cost effective measure to fail in the marketplace.
    - Energy performance is dependent on proper operation and maintenance with no means to address this gap. (e.g., retro commissioning outside air economizers on packaged rooftop units).
29. Magnitude of technical uncertainties associated with achieving net benefits, includes:
    - Technical gap
    - Technical complexity
    - Use of in-house technology

- Demonstrated technical feasibility

30. The degree to which the innovation addresses an identified technology need or a gap in a Roadmap.
31. Have other RD&D organizations undertaken or are planning with these technologies? In addition to avoiding duplicating research, the idea is to identify potential partners for collaborative research.
32. The degree to which the proposal addresses sponsor's special focus areas.

Market Issues

1. Likelihood of success in the market.
2. Is there a market gap? In other words, are there other technologies or services which do what this device intends? If so, is this device or service uniquely positioned to serve the market better? Are there patents for a similar product?
3. An improvement to an existing technology that can be easily accepted by users.
4. The energy efficiency attributes can be differentiated from standard lower efficiency solutions.
5. Significant non-energy benefits for utility or consumer provide an avenue for overcoming market barriers.
6. Is the technology suitable for a simple large-scale incentive program?
7. Does the technology look appealing to consumers?

Developer issues

1. Assignment of intellectual property rights.
2. Is the developer in a position to take the technology all the way to market?
3. Developer history of completing projects. (This has been noted as a huge problem. Some firms were idea-rich but execution-poor. Others specialized in making money on grants and weren't that interested in the final product.)
4. The degree to which the innovation proposal is clearly written.

Sample Innovation Selection Matrix

Emerging Technology or Solution	**Technical Promise** ***1. Specifiable*** ***2. Quantifiable*** **3. *Cost effective***	**Regional RD&D Program Promise** ***1. Needs collaborative RD&D*** ***2. Meets Regional Identified Need*** ***3. Wide and diverse application*** **4. *Timely (2-15 years)***	**Market Promise** ***1. Provides strong relative advantage*** ***2. Right mix of energy/non-energy benefits*** 3. ***Profit potential***
Outdoor LED Lights	1. Specifications need much development, existing metrics N/A. 2. Energy use is quantifiable, but lighting performance metrics need work. 3. Uncertain, expensive now, but long term cost and performance has great promise. Score: 10	1. Probably needs national level collaboration, already driven by industry. 2. Not high need, mostly impacts off peak loads. 3. Very wide application. 4. Fast moving, big developments Score: 3	1. Great promise. 2. Great promise. 3. Great promise. Score: 10
Ductless Heat Pumps	1. Specifications exist and technology metrics are well defined. 2. The energy use of the heat pump is quantifiable, but it is unclear what fuel it will be replacing in the field. Electric or Wood? 3. Marginally cost effective if replacing resistance electric but could improve with lower implementation costs. Score: 7	1. High need for collaboration 2. Meets regional need to reduce resistive electric heat. 3. Shows more promise in colder climates than earlier air source heat pump technology. 4. Will move fast after contractors are educated on benefits Score: 10	1. Promises advantage for customers, installers, and utilities 2. Possibly a higher non-energy benefit from air quality improvements depending on the fuels replaced. 3. Potential for both profit and reduced customer gouging with education and competition. Score: 10

APPENDIX 4
NEET Work Group #2
Emerging Solutions and Technologies
Decision Framework for Regional R&D
Final Report
August 2008

The Northwest Energy Efficiency Taskforce (NEET) was established with the following purpose:

> *Significantly advance the region's energy efficiency achievement through greater regional collaboration, commitment, customer involvement, and pursuit of the most cost-efficient program strategies.*

Workgroup #2 "Emerging Technologies" was tasked with assessing the state of research, development and demonstration (RD&D) for energy efficiency. The first meeting of the workgroup established the following tasks for further development:

1. Survey: Conduct a survey to assess RD&D that is currently happening within and outside the region that can benefit the region, and explore potential future topics and potential infrastructure to coordinate and implement the RD&D.

2. Define RD&D: A subgroup was established to provide a definition of RD&D that will help scope a regional funding effort.

The following memo addresses item 2 above. The purpose is to provide potential RD&D funders ideas for what to fund. The proposal from this group will go to the NEET Executive Committee who will make decisions about funding solutions and organizations.

Three sections follow: Premises, RD&D Stages, and RD&D Scope.

PREMISES

- Ratepayer-funded organizations in the NW are the locus of interest.
- Ratepayer-funded organizations in the NW fund what they think is important that others are not doing, or not doing as well or fast as they want.
- Others may do the entire thing in some cases, and in others they may co-fund with the ratepayer-based organizations. This will be sorted out at a later date. This paper is about the types of things the ratepayer-based NW organizations might care about enough to fund.

STAGES

The table below describes the typical stages involved in RD&D, and outlines the type of involvement utility organizations have typically had in each stage.

RD&D Stages

Stage	Description	Expected Regional role
Research	Fundamental sciences, lab work	No Direct Role
Concept	Define technical concept and market need	Provide ideas - market assessments, research, evaluation
Product Design and Development	Turn concept into product.	No Direct Role
Initial Bench Test	Test product functionality, refine as needed	No Direct Role
Prototype applications test and Business Plan	Demonstrate Market and Technical Feasibility in field conditions	Fund/coordinate testing of prototypes, work under a range of conditions with detailed monitoring.
Beta unit and Revised Business Plan	Product finalization	Fund/coordinate testing of prototypes in representative population with detailed monitoring.
Product Introduction	Produce Initial Run	No Direct Role
Demonstration	Demonstrate performance and market acceptance	Identify and co-fund pilots. Assess end user reaction. Evaluate energy savings
Commercialization	Post R&D	Handoff and disseminate results

The range of products and services that the region is interested in is broad, and these RD&D stages vary in duration significantly depending on the nature of the product or service. The following table provides a view of types of products and their associated timeframe for RD&D.

R&D Types of Products and Timeframe

New Products/Service Category	Definition	Time to Market Launch
New to the World	New products/services that create a new market	up to 20-25 years
Revision/Modification	New products/services with improved performance and replace existing	up to 10-15 years
Repositioning	Existing products/services targeted to new markets	up to 5- 10 years

RD&D SCOPE

The success of energy efficiency measures depends on many factors, including the technology, installation, program delivery approach, consumer acceptance, and consumer interaction.

In addition, the scope of measures can be limited to energy savings, or may be broadened to include other issues as well (such as demand, renewables, combined heat and power, hybrid cars, etc). While all of these factors and measures are important, we are concerned that if the scope of

the effort becomes too broad, the sizable needs for the most basic energy efficiency research may be overshadowed.

The scope of this effort is to support technologies for resource acquisition programs, technologies for market transformation programs, and technologies that the market will take up on their own if they are proven.

We recommend the following focus for the scope of regional energy efficiency RD&D efforts:

- Electric and gas energy savings
  - Equipment performance
  - Building design
  - Controls
  - Installation
  - Operation (when tied to devices, not when just behavioral)
  - Maintenance
- Demand
- Water and other non-energy benefits

Measure Types

In considering which measures to support and how to support them, it is useful to recognize the difference between measures that are very "plug and play" versus those that require much more infrastructure support. Some definitions and examples are provided below.

Drop-in measures

These measures are relatively simple and predictable. As a retrofit or design alternative, they are virtually interchangeable in function with more energy-intensive alternatives. Examples include the following:

- Light bulb. Schedule and dimming behavior options exist, but are best handled under a "controls" measure concept for R&D purposes.
- Motor. Subject to selection and sizing and control issues, but the basic motor is a drop-in product.

Installation/Operation/Behavior-Dependent Measures

These measures require more judgment or skill to employ than drop-in measures. If retrofit or design is complicated, or the measure is dependent on operator behavior or skill of installation or maintenance staff, it may fit in this category. Examples include the following.

- Heat pump - highly dependent on technician installation and maintenance behavior and, separately, on operator behavior.
- Setback thermostat- highly dependent on occupant behavior.
- These are distinguished because R&D may extend to how the technology and its humans interact.

These measures may require that we split physical objects into two aspects for R&D purposes: 1) the basic box, and 2) how it's selected, installed and controlled. For example a motor has two aspects:

1. The motor in the box.
2. How it is selected, sized (program issues) and controlled (could be a separate R&D issue).

Behavior Assist Technologies

These measures depend more on operator behavior than on technology. These include measures that provide information to encourage and/or enable energy-saving behavior. Examples include the following:

- Home Energy Monitor
- AMI meter used with other equipment to provide home feedback to control energy and demand.
- "Whistling' furnace filters that make a noise when they're clogged.

For these, making sure the hardware works is important, but there may be extensive and diverse research needed on interaction with different populations in different program constructs. This is in the gray area between program and technology research, but the elements of technology features are considered R&D.

APPENDIX 5
NEET Work Group #2
Emerging Solutions and Technologies
RD&D Framework and Emerging Technology Inventory List

See Attached Excel Spreadsheet: "Work Group 2 RD&D Inventory"

APPENDIX 6
NEET Work Group #2
Emerging Solutions and Technologies
Workgroup Participants

Name	Organization & Title
Alane Gonzales	Oregon Coast Community Action
Bettina Arrigoni	Global Energy Partners
Bill Koran	Quantum Energy Services and Technologies
Bill Seaton	Inland Electric, Inc.
Bo Downen	Public Power Council
Bob Balzar – Chair	Seattle City Light
Bruce Lisanti	MicroPlanet
Carl A. Patenode	City of Drain
Chris Helmers	PacifiCorp
Danielle Gidding	Idaho Power
David Bangs	NW Energy Coalition
David Tooze	City of Portland's Office of Sustainable Development
Eric Miller	Benton REA
Eugene Rosolie	PNGC Power
Fred Gordon	Energy Trust of Oregon
Gary Curtis	Ecos Consulting
Gary L. Johnson	Tacoma Power
Gary Nystedt	City of Ellensburg, Wash.
Geoff Wickes	Ecos Consulting
Graham Parker	Pacific Northwest National Laboratory, Senior Staff Engineer
Guy Nelson	Utility Geothermal Working Group
Jack Callahan	BPA
Jack Zeiger	Washington State University
Jared J. Pitts	Comcast Arena
Jason Ping	Pacific Lamp Wholesale
Jennfier Memhard	Formerly of Intel
Jennifer Williamson	ECOS Consulting
Jeremy Litow	PECI
Jerry Jackson	Autodesk Inc.
Jessica Raker	Northwest SEED
Jill Steiner	Snohomish Public Utility District
Jim Cox	PGE
Jim White	Chelan County Public Utility District
Jonathan Livingston	ECOS Consulting
Jorge Marques	BC Hydro
Joshua Binus	Bonneville Power Administration
Joshua Dunnivant	EMP2, Inc.
Kathy L. Moore	Umatilla Electric Cooperative
Kyle Davis	Pacific Power
Larry Blaufus	Clark County PUD
Lawrence (Larry) Gallagher	U.S. Department of Housing and Urban Development

Name	Organization & Title
Mark Gosvener	UCONS, LLC
Martin Shain	BacGen Process Technologies
Mary Hajek	Oregon Coast Community Action
Matt Deppe	McMinnville Water & Light
Matthew M Walker	Siemens Building Technologies
Mike Porter	McKinstry
Peter Greenberg	Energy Wise Lighting
Randy Thorn	Idaho Power
Rob Penney	WSU Energy Program
Sergio Dias	Northwest Energy Efficiency Alliance (NEEA)
Steve Hoffman	NW Center for Sustainability and Innovation
Steve Weiss	Northwest Energy Coalition
Susan Hermenet -- Chair	Northwest Energy Efficiency Alliance (NEEA)
Suzanne Frew, P.E.	Snohomish PUD
Tami Hansen	FlowEnergy
Thor Skov	MicroPlanet, Inc.
Tim Kensok	AirAdvice, Inc.
Todd Currier	Washington State University Energy Program
Tom Eckhart	UCONS, LLC
Tom Lienhard	Avista Corp.
Tom O'Connor	Oregon Municipal Electric Utilities Association

APPENDIX B-2
BPA TECHNOLOGY INNOVATION ROADMAPPING INVITATION
DEC. 23, 2008

As the region works to explore refined options for coordinating energy efficiency research and development, the Bonneville Power Administration is inviting regional parties to join in creating a Pacific Northwest energy efficiency technology road map. This project has already been initiated as part of BPA's technology innovation effort.

Under BPA's existing Technology Innovation Program activities, one of the FY 2008 planned activities was to update and revise the Energy Efficiency technology roadmap. For each of the major technological areas in BPA's research and development portfolio, a technology roadmap is developed to clearly outline specific business challenges to be addressed, existing status of technologies that could be applied and to analyze and screen the most promising technology options that should be considered for future research efforts.

Under the current roadmap guidance, BPA is pursuing advanced commercial lighting controls with EPRI; distributed generation monitoring and communications system with the Oregon Department of Energy and Portland General Electric; grid-responsive demand-side control using Pacific Northwest National Laboratory's Grid Friendly™ Appliance technologies with PNNL and several regional utilities; developing a high efficiency low-lift vapor compression system for commercial HVAC application with U.S. Department of Energy, the Pacific Northwest National Laboratory and McQuay; and developing self-correcting building HVAC controls with PNNL. In addition, several existing smaller and nearer term projects (low-temperature heat pumps, ductless mini-split heat pumps) have been incorporated into an emerging technologies project that seeks to systematically identify near-term energy efficiency technologies and advance them for use in regional energy efficiency program offerings by documenting performance and standards required for Regional Technical Forum approval.

BPA's Energy Efficiency roadmap was originally developed three years ago, and revitalization of that roadmap has been initiated. BPA's technology roadmaps generally address specific BPA business challenges. For energy efficiency, BPA's technology roadmap addressed broader issues and engaged experts from the Northwest Power and Conservation Council and the Northwest Energy Efficiency Alliance. Expanding the update effort to a broader group and to the particular issues of emerging technologies would enhance the regional energy efficiency research and development agenda.

BPA is now ready to initiate work to update the Energy Efficiency roadmap as the Northwest Energy Efficiency Taskforce report goes to press. BPA is inviting all regional parties interested in Energy Efficiency research and development to join in this work effort. By making the BPA Energy Efficiency Technology Roadmap update a regional initiative, the completed work product will compliment, and, hopefully expedite, a broader discussion to be conducted through NEEA regarding how a more formal energy efficiency research and development effort should be chartered and structured.

APPENDIX C-1
WORK GROUP 3: DRAFT REPORT AND RECOMMENDATIONS

Charge: Identify initiatives to significantly accelerate the acquisition of conservation in the region in a one-year, five-year, and twenty-year time frame.

Framework: The workgroup offers recommendations to accelerate energy efficiency in the region through two paths: (a) Increasing energy efficiency through improved design and delivery of existing programs, primarily by focusing on long term relationship building in customer markets and (b) increasing energy efficiency by targeting new energy-saving opportunities or by implementing regionally coordinated programs.

The first two recommendations are overarching recommendations.

Draft Priority Recommendations:

1. ESTABLISH A REGIONAL ENERGY EFFICIENCY PROGRAM FORUM.

    a. Today, practitioners have no forum to discuss and coordinate utility-level programs. Further, the proposed regional energy efficiency program forum is a necessary step to develop and implement new regional programs.

    b. The purpose of the forum is three-fold: (1) Develop regional energy-efficiency initiatives and coordinate implementation; (2) Enhance practitioner discussions of utility-level program design and delivery approaches; (3) Foster best practices in the region.

    c. The forum must be adequately funded and staffed to be effective.

    d. NEAA is a likely candidate to host such a permanent forum.

2. (TENTATIVE) ASSESS PROPOSED STATE ENERGY CONSERVATION LEGISLATION.

    a. A number of significant energy conservation bills will be introduced in the Oregon, Washington, Idaho, and Montana legislatures.

    b. The workgroups have had no time to meaningfully discuss or evaluate the proposed bills

    c. The proposal is to create a NEET team to review major bills and offer constructive suggestions for amendments, as necessary.

3. DEVELOP A COORDINATED REGIONAL PROGRAM FOR PLUG-LOAD EQUIPMENT.

    a. Plug load equipment comprise home and office electronic equipment such computers and printers, televisions, set-top boxes, microwaves, etc.

    b. This equipment is one of the fastest growing sources of electricity use.

    c. The estimated regional conservation potential ranges from 120 to 320 average megawatts.

        i. The regional effort would seek to advance standards, improve product labeling, offer targeted incentives, pursue intelligent load control, and offer broad consumer education, among other elements. It would target manufactures, retailers, and end-users. One immediate action would be to join with the California plug-load initiative.

4. DEVELOP NEW AND INNOVATIVE FINANCING OPTIONS (for all sectors).

    a. Sample program goals:

        i. Address lack of availability of upfront financing that remains a barrier for many customers.
        ii. Encourage more comprehensive investments
        iii. Development methods for measuring performance of investments that create cash flow to service debt
        iv. Reduce barriers faced by potential lenders

    b. Innovative financing and repayment options are being considered in the region:

        i. Creation of local energy improvement districts to issue bonds to finance loans to property owners. Bonds would be repaid through higher property tax assessments.

        ii. Low-interest loans with loan repayments through utility bills

        iii. Financing tied to mandatory upgrades at time of sale

        iv. Tying interest rates to energy efficiency levels

    c. Some of the action steps:

i. Sponsor a regional energy efficiency financing forum to identify research efforts and compare best practices.
ii. Conduct pilots of different financing options.
iii. Assess financing options being used nationwide

5. DEVELOP REGIONAL COMMERCIAL AND INDUSTRIAL TARGET SECTOR PROGRAMS.

a. Tailoring regional energy efficiency offerings and service to specific types of businesses better addresses their business needs, enhances customer relationships, and increases business participation.

b. Sample target markets: Groceries, hotels, restaurants, retailers, office real estate, hospitals/health care, laundries, convenience stores, pulp and paper, food processing, electronics, chains, and multi-site customers (such as chain stores, large multi-site industrials, regional developers, and other regional and national vendors). NEAA, utilities, Energy Trust, and the states would identify potential target markets and develop collaborative work plans.

c. Design elements:

i. Tailor standard program offerings to promote technologies and services most relevant to business.
ii. Partner with trade associations, trade allies and companies that have regional or national presence within targeted markets.
iii. Align market transformation activities.

6. Establish comprehensive regional education and behavioral programs (for all sectors)

a. Behavioral change is one of the untapped areas of energy efficiency and remains a relatively unexplored resource. For example, letting households know how much energy they use compared to similar households has, in limited pilots, resulted in measureable savings.

b. Create a regional behavioral forum to develop a comprehensive regional approach, assess best practices, and share lessons learned. Among the activities of a regional effort:

i. Establish energy performance ratings and performance benchmarks for residential and commercial buildings

ii. Provide behavioral feedback to consumers through the use of such devices as real-time electricity use monitors.

iii. Expand building operator certification programs and other training programs.

iv. Document savings realized from educational and behavioral test programs.

v. Conduct pilots.

7. EXPAND REGIONAL COMMERCIAL SECTOR PROGRAMS GEARED TO INTERNAL BUSINESS PRACTICES AND BUILDING OPERATING PERFORMANCE.

   a. Improving building operating performance can save substantial electricity (10 to 15 percent of building use).

   b. Savings from improved operations is not always recognized as a source of energy savings.

   c. There is a need for better tools, education and training, and best practice documentation of high performing building operation.

   d. Among the proposed regional activities would be inventorying regional program work to date, identifying program gaps, and teaming up with business partners and trade groups.

8. ESTABLISH A MULTI-YEAR REGIONAL PROGRAM TO MOVE NEW COMMERCIAL BUILDINGS TOWARD CARBON-NEUTRALITY.

   a. California, Oregon, and others have set a target of net-zero emission homes and buildings by 2030.

   b. A collaborative regional work plan would be developed to guide actions throughout the region and systematically move toward the visionary target.

   c. Work elements would include ample demonstration projects; widespread education and training; technical and financial assistance to property owners, builders, and designers; and building code support.

APPENDIX C-2
WORK GROUP 3: REGIONAL ENERGY EFFICIENCY PROGRAM FORUM

Concept: Regional utilities, public benefits administrators, the BPA, NEEA staff and others can benefit from interacting with one another more deliberately, including sharing innovative program design features, effective implementation strategies, and furthering collaborative regional efforts. While this is happening on an informal basis now, there is recognition that interaction should happen more frequently and can benefit from some structure, dedicated resources, deliberate follow-through and accountabilities.

Features: Elements can include:

- Establish a leadership group charged with advancing best practices in the region, with a goal of enhancing individual utility and regional collaborative efforts.
- Create work groups focused on residential, commercial, and industrial markets and program activities respectively, so that innovative design features and delivery strategies are thoroughly examined and opportunities capitalized on.
- Task each work group with promoting consistency in program design elements where warranted, conducting further market research where needed, and initiating coordinated approaches to markets where useful.
- Plan and organize forums to discuss best practices, create additional avenues for information dissemination and advancing best practices.
- Provide the leadership group/work groups with appropriate resources and establish appropriate accountabilities.
- Use NEEA as a vehicle for providing administrative support to the leadership group and sector specific work groups. Meetings can be held in various locations throughout the region.

Barriers:

- Lack of awareness of each others efforts, what is working, what is not, opportunities to work together.
- Lack of venues or forums to exchange knowledge, work on solutions that meet common needs.
- Resources to pursue greater consistency in program design elements, useful market research, or coordinated approaches to markets.

Benefits: Some informal interaction is already taking place. For example, the Puget Sound utilities get together on an informal basis to explore opportunities for program collaboration. NEEA's sector specific expert committees provide regional utility representatives with some opportunity to exchange program information and ideas. However, NEET itself demonstrates the potential value of more deliberate regional discussion and follow-through.

Risks: Risks are two fold. First, progress is currently being made informally, and any additional activity must enhance rather than detract from these efforts. Second, there must be concrete follow-through resulting in greater levels of program consistency and better coordination of regional, broad based market activity. Otherwise this just takes up time and resources that can be used more productively elsewhere.

Action: Proposed steps include:

1. Establish leadership group, sector specific work groups, available resources and administrative support mechanisms.
2. Leadership group and sector specific work groups develop work plans with clear work products, resource requirements, timeframes and accountabilities.
3. Leadership group tracks sector specific work group progress, helps assure that work products are disseminated throughout the region. Issues status report and results on an annual basis.
4. Determination made by leadership group after two years and annually there after whether or not to continue with the effort and if so, what adjustments should be made to further enhance effectiveness.

Resource Requirements: Approximately $1 million per year, including:

- Voluntary participation by energy industry representatives and key stakeholders (not included in $ estimate).
- $250,000/yr. for the leadership group, $50,000 for administrative support and $200,000 for regional best practice forum/events and further best practice information dissemination.
- $250,000/yr. for each sector work group, $50,000 for administrative support and $200,000 for sector specific research and work products.

Significantly more resources will be needed to implement high priority concepts as they take shape than what is reflected here. The forum simply provides a vehicle and the means for further collaboration on strategy and design, not implementation. For example, if the region decides to create a regional platform to influence home and office electronic product purchases (plug loads), pursue a regional approach to dealing with big box retailers (Costco, Fred Meyer, Target, etc.), or support high profile demonstration projects associated with getting to carbon neutral buildings, the costs to implement these efforts are not currently reflected here. Each effort will require additional resources.

APPENDIX C-3
WORK GROUP 3: HIGH IMPACT INITIATIVES IN THE RESIDENTIAL SECTOR

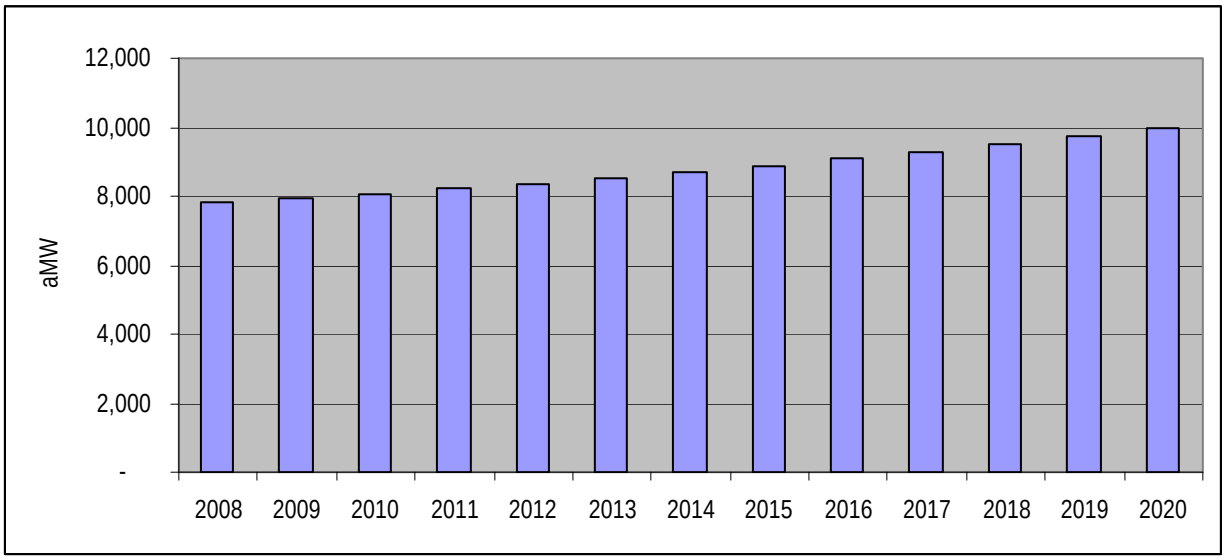
This document provides an overview of residential energy consumption in the Pacific Northwest and initial development of three potential, high-priority high impact initiatives:

- ***Plug Loads***
- ***Behavioral***
- ***EE Financing***

Regional Residential Profile

The Pacific Northwest (NW) region covers the states of Washington, Oregon, Montana and Idaho. The NW consumes roughly 5% of the total residential electricity in the country, based on 2006 statistics from EIA[9]. Current electricity consumption by residential customers in the region is about 8,000 aMW in 2008 and is projected to grow to 10,000 aMW by 2020[10].

Figure 1. Residential Load Forecast



The percentage of total NW residential consumption in each of the states is shown in Figure 2. Over half of the regional residential consumption occurs in Washington. Percentage of consumption by state closely aligns with the number of customers shown in Figure 3. Of the 5.4 million households, over half are located in Washington, followed by Oregon, Idaho and Montana.

[9] Data derived from: http://www.eia.doe.gov/cneaf/electricity/esr/esr_sum.html. 2006 Electric Sales and Revenue
[10] Preliminary residential forecast – Northwest Power and Conservation Council 6th Power Plan.

Figure 2. Percentage of Regional Consumption by State

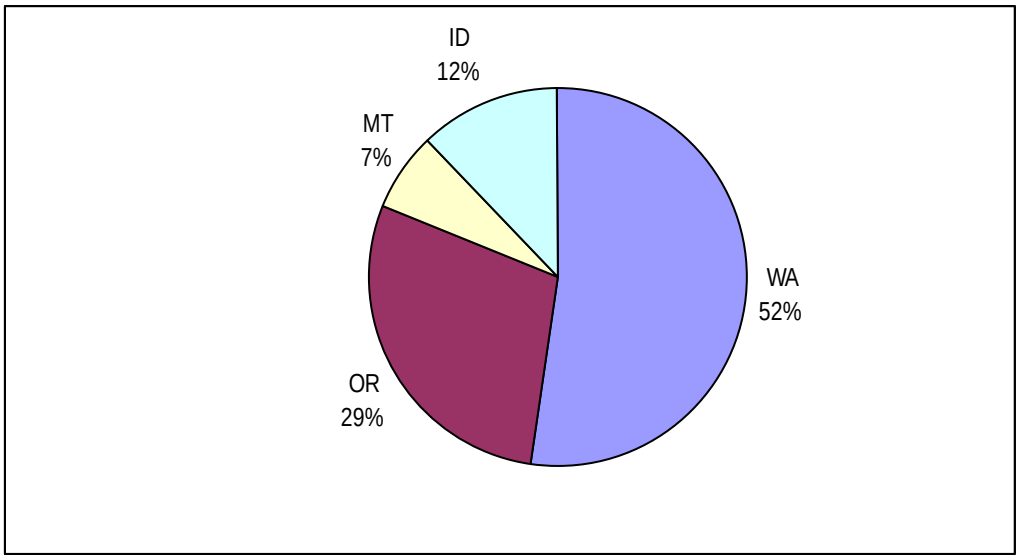
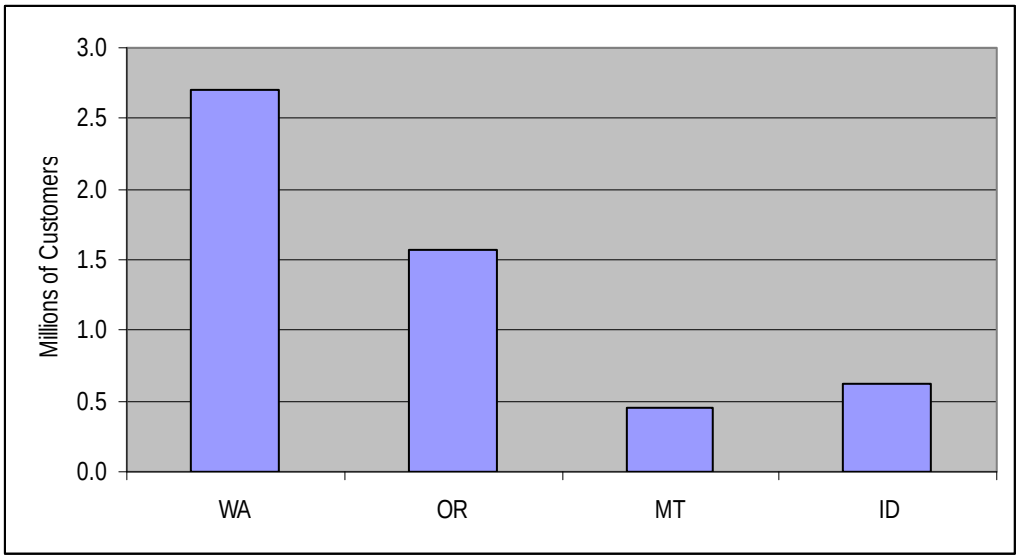


Figure 3. Residential Customers by State



Average consumption by state is similar across states except in Montana, where consumption is over 20% lower than the average in the other three NW states. (Figure 4) Prices in Montana are higher in the other states as shown in Figure 5.

Figure 4. Average Annual Residential Consumption by State

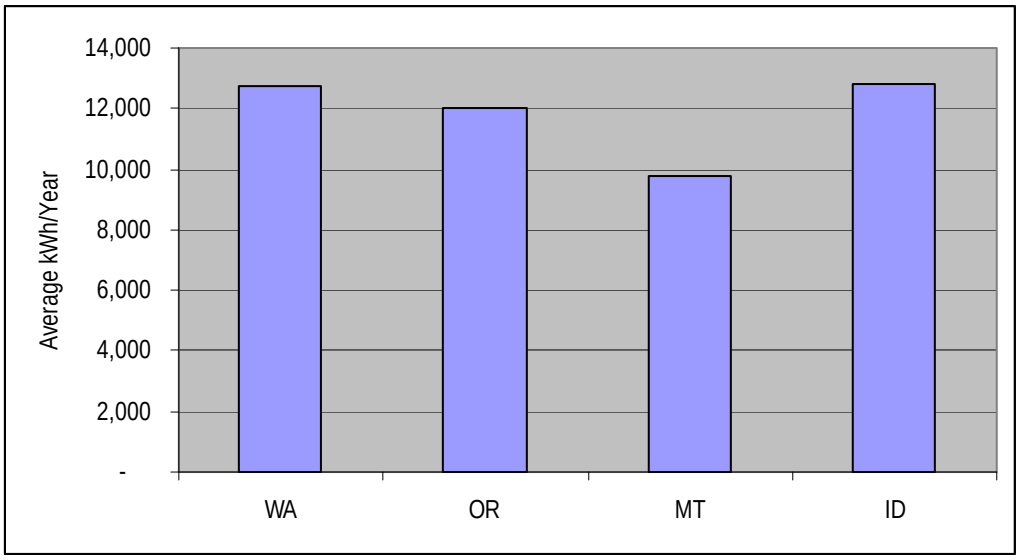
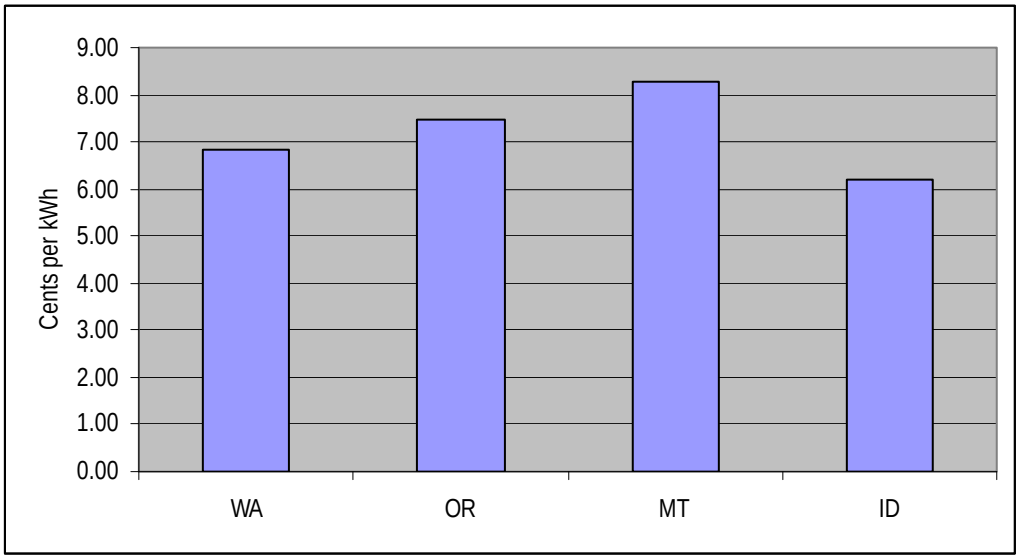


Figure 5. Average Residential Electric Price by State



Total residential electricity consumption by end-use in 2008 is shown in Figure 6. Space heating and water heating each account for about one-quarter of the residential electric energy consumption. Lighting is the next most significant use of electricity. Together, appliances account for 20% of total electric consumption while electronics represent an additional 10% of usage. Significant changes in how energy is used by residents are expected in the next several years. Residential electricity consumption by end-use in 2020 is shown in Figure 7.

Figure 6. Energy Consumption by End-Use in 2008

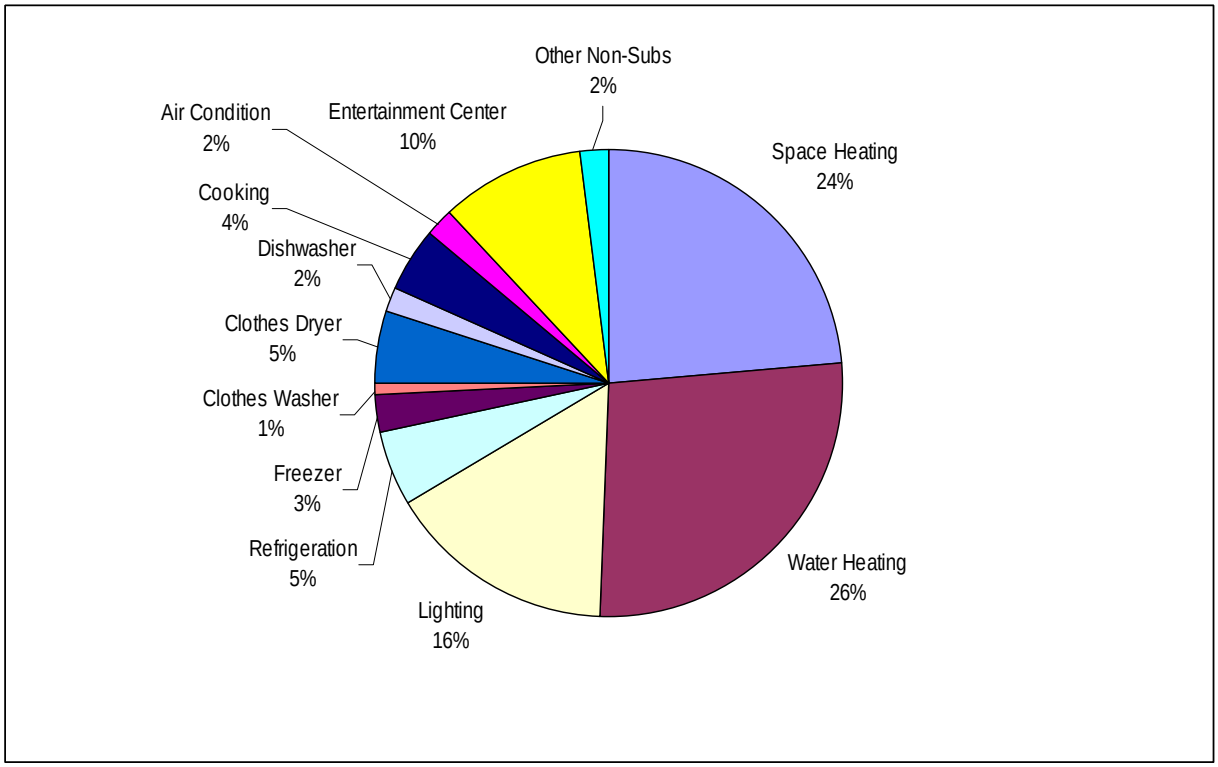
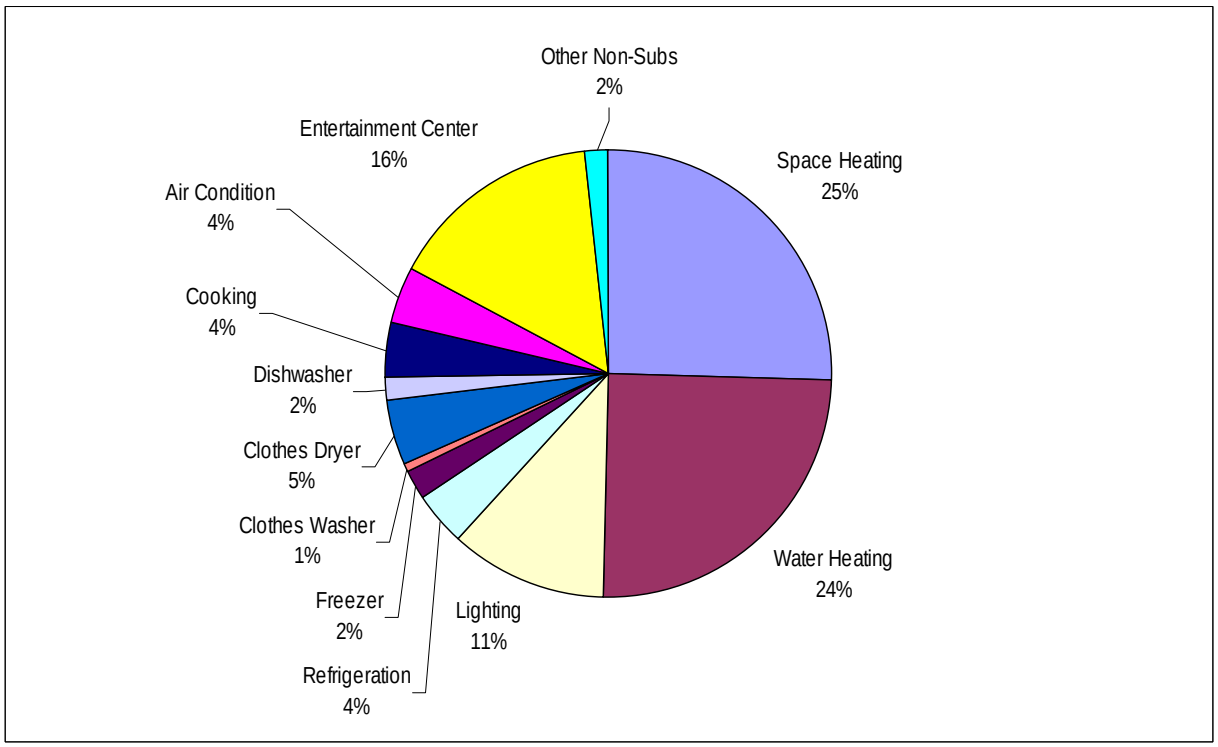
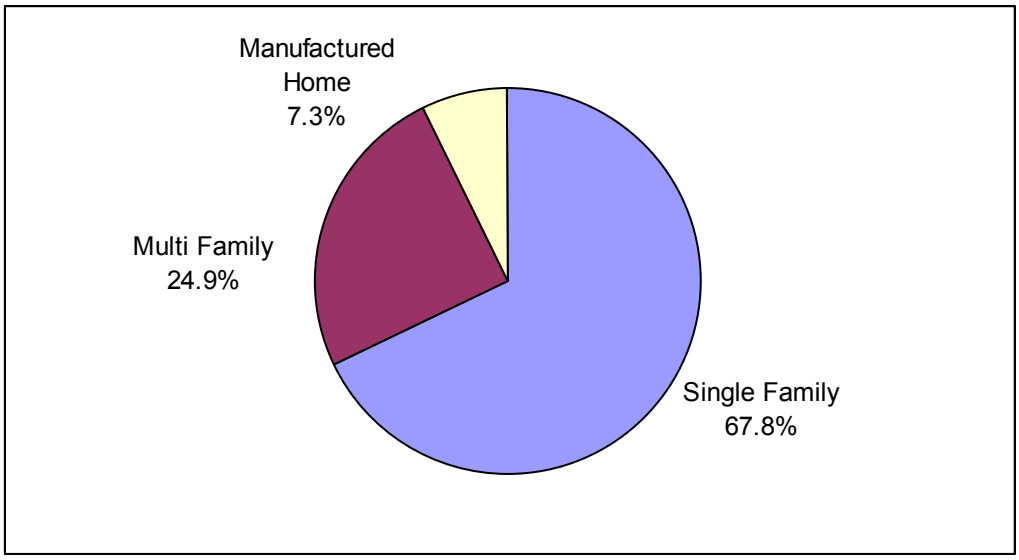


Figure 7. Energy Consumption by End-Use in 2020



Nearly 70% of electric consumption occurs in single-family homes, one-quarter in multi-family and the remaining amount in manufactured housing. (Figure 8)

Figure 8. Residential Consumption by Housing Type



The 151 regional utilities are comprised of cooperative, public, investor and federally owned utilities. Over half (56%) of the regional electric sales are made by the 8 biggest IOUs.

Historical Achievements

The 5th Power Plan, published in May 2005 and by the Northwest Power and Conservation Council, outlines annual savings targets for the region. The 2007 conservation target of 140 aMW (for all sectors: residential, commercial, industrial and agricultural) was exceeded by 14%; an additional 28% reduction was attributed to "Non-Programmatic Market Effects"[11]. Total regional conservation for 2007 exceeded 200 aMW.

Residential conservation accounts for 60% of total conservation in 2007. The leading contributors to this are: The Energy Trust of Oregon, PSE, IPC, PacifiCorp, SCL, SnoPUD, Avista, Northwestern, Clark County, and Cowlitz County, in descending order of total contribution. The greatest percentage increases in conservation from 2006 to 2007 was realized by Northwestern, Clark County, and Cowlitz County.

More on:

Equipment saturation
Fuel shares
Efficiency shares
Regional efficiency potential

[11] http://www.nwcouncil.org/news/2008/05/3.pdf

Plug Load Program

Overview: Encourage efficiency of plug loads through:

- Increased manufacturing standards
- Improved product labeling
- Targeted incentives
- Intelligent load control
- Consumer education

Plug Load refers to the various home and office electronics that are not considered major appliances and are that are not normally addressed by other conservation measures; Plug Loads include: computers & printers, televisions, set-top boxes (DVD players, cable TV/Satellite Receivers), small electronics chargers (cell phones & Ipods, PDAs), microwaves, kitchen appliances, space heaters, etc.

Based on ECOS estimates[12], 20-25% of national residential and 10-15% of commercial loads are plug loads, and 3-4 billion plug load devices are in use in the US. (In the northwest plug loads make up a smaller percentage of the total load due to the high use of electricity for space and water heating, compared to national use.) These figures present a large market opportunity for conservation and efficiency. According to a 2006 EIA report, this represents roughly 1,500 – 1,900 aMW of energy[13]. According to a 2007 McKinsey report, commercial and residential electronics are the least costly energy efficiency measures available.

Plug load efficiency opportunities may involve new technology, behavioral shifts through education and increased performance standards. As a region, we can encourage the production and selling more efficient, smarter technologies, yet we must also educate consumers about options and the impact of their buying decisions, as well as how to properly use the technology through behavior changes or use of control technologies. A regional effort will have a better chance of success because it will provide consistent messaging, reach a broader audience, create bargaining power with retailers and manufacturers and performance rating agencies (Energy STAR and MEPS), and provide economies of scale in a wide deployment.

Target markets served

Plug loads apply mostly to residential and commercial consumers, but we are particularly focused on residential. Office spaces have high plug loads due to the use of photocopiers, telephone systems, computers and monitors, printers and other small electronics. Households have a similar profile, but with a higher concentration of clustered items such as stereos, television, video equipment (cable boxes, video games, etc.), computers and accessories (routers, speakers, MP3 players). Both sectors consume some power during peak hours, with most household plug load consumption occurring in the evening hours. Plug load profiles will likely be correlated with disposable income up to a certain threshold; commercial plug loads are expected to be more flat throughout the day.

[12] Calwell, Chris. PowerPoint: "Plugging the Savings Gap: How Efficient Plug Loads Can Contribute to Your Program Portfolio". 21st Annual E Source Forum & Exhibit, September 21-25, 2008. Downloaded from E Source website.

[13] http://www.eia.doe.gov/cneaf/electricity/esr/esr_sum.html. Based on 20-25% of 2006 total regional consumption of 69.5k MWh, or 7,519 aMW, for WA, OR, ID and MT.

The primary focus of this concept paper is to discuss the types of activities that may be considered for a regional approach to address technology, behavior and policy related to plug loads. The discussion should address producers, retailers and end consumers, and opportunities with regard to production, promotion, qualification and education of plug loads.

End-uses/Measures Included

Potential measures will apply to manufacturers, retailers and consumers of plug loads, and will be technical (product based) and behavioral in nature. End consumers, for example, can only make buying decisions based on the options that they are presented (at a store or other retail outlet, for example) and based on information that they are given. This presents an opportunity to educate the public about the advantages of energy-efficient electronics and to encourage them to ask for or demand these choices when making purchase decisions. Retailers have the ability to influence end consumers' decisions, but their motive is mostly financial; offering financial incentives for retailers and distributors to sell ENERGY STAR or better equipment or appliances, for example, will help shift the market. And finally, producers are most likely to produce that which they can sell in abundance and that which returns greater profit, therefore financial incentives would be appropriate here as well. A regional effort could also make headway in defining standards that exceed current ENERGY STAR requirements.

A good marketing strategy that increases consumer knowledge of energy efficiency will result in increased demand for energy efficient technologies. If this is executed in conjunction with incentives for manufacturers and retailers to produce and sell energy efficient technologies, some considerable momentum can be created in the marketplace which will hopefully lead to greater adoption of efficient equipment and further innovation.

Possible Plug Load Measures

Active Load Reduction –*directed at production and sales channel*

- Lower wattage appliances (TVs, LCD screens, use of LEDs, etc.)
- Smart appliances (e.g. a TV that turns the screen off when nobody is in the room)
- Wattage saving accessories for other appliances (motion detection switches)
- Monitoring devices to provide real time usage data (Kill-a-Watt, whole house systems, home automation)
- Rebate only the highest performing units.
- Remove most inefficient units from market. (TV recycling)

Passive ("Vampire") Load Reduction – *directed at production and sales channel*

- Integrated Technology (monitors/TVs with sleep modes, etc.)
- Accessories (Smart Strips that "unplug" accessories upon trigger/signal)
- More efficient power supplies (computers, video games, home audio systems, set top boxes)
- Promote only most EE units - same as above

Education – *directed at end consumer*

- Education about actual consumption; published kWh/year for *all* appliances.
- Online Calculator, Plug Load Consumption

- Regional Best Practices resource savings; website?
- Dispel the notion that: new = efficient

Behavioral

- Programming Guide – how to program equipment (sleep modes, use of smart strips, etc.)
- Published guide about savings potential (online calculator?)
- Monitoring products (kill-a-watt, online calculator for plug loads, etc.)
- Published guide to energy efficient products (& retailers)

Other Regional Activity

- Direct install - hardware(power strips…)
- Direct education/install - (program monitor/TV sleep modes, etc. Hands on, in home instruction for the less tech-savvy consumer)
- Plug Load Hotline
- Lobby for more stringent standards
  - MEPS – too low standard
  - Energy STAR standards too low for some products (e.g.: computer monitors, home audio[14])

Specific actions to implement

- Assign responsibility of negotiating with manufacturers, standards and labeling groups to a regional entity to make more efficient electronic equipment available in the region
- Explore establishment of higher standards for the region
- Develop regional educational effort to inform consumers about energy consumption of electronics equipment; develop an Energy Guide type of label for electronics
- Test control technologies
- Develop regional strategy for adoption of incentives for efficient equipment and controls by local utilities
- Partner with California plug load efficiency program as a region

Size of savings potential

Potential savings calculations have yet to be performed for plug loads. Many technologies and conservation approaches are currently under development by various manufacturers and utilities and the economic potential estimates are not released. However, considering estimated size of the regional plug load market, efficiency gains of 10% - 30% could save between 150-560 aMW.

[14] Calwell, Chris, ECOS, September 21-25, 2008.

Roles & responsibilities throughout the region

Regional coordination will allow for a comprehensive understanding of the market, coordinated research, consistent messaging and economies of scale. This may include conducting pilots or focus groups to determine "tipping points" for how incentives influence behavioral patterns for retailers and consumers, and it may also involve challenging manufacturers to impose higher performance standards for the products allowed onto the markets. Retailers and producers may be more willing to work with a regional group with common objectives rather than several utilities each with their own goals.

Role of Entities in Regional Coordination

	Utilities	CPUC*	NEEA	Regional Entity (new)	Retailers	Local Support
Point of Sale	x		x	x	x	
Upstream		x		x		
Downstream						
Standards		x		x		
Customer Incentive	x		x		x	
Local Conservation	x					x

* The California Long Term Energy Efficiency Strategic Plan, published in September 2008, outlines plans for their plug load program, which may serve as a model, or partner, for Northwest utilities.

Lessons learned & best practices

Challenges to implementation/wide-scale deployment

Agreeing upon consistent messaging may clash with internal messaging conventions or restrictions for individual utilities. If necessary a 3rd party could help to facilitate, or even administer, an educational campaign or a rebate campaign – similar to PECI and Washwise.

Ensuring that new technologies are replacing old ones rather than simply adding to the overall load will be a challenge. This is similar to concerns about refrigerators entering the secondary market, and may end up following a similar path.

Resource requirements for successful deployment

If a regional Plug Load effort proceeds, considerable time and input would be required from the various utilities for designing successful programs. Depending on the scope of the task, 3rd party implementers may be enrolled to implement programs, which will require monetary outlay from the various utilities (or regional entities) involved in the effort. Marketing and education will have significant associated expenses as well. At this point it is too early to have cost effectiveness calculations that would provide savings per dollar, but with further research and discussion these figures will be attainable.

Risk analysis

In the near term there is little at risk to continue to discuss opportunities associated with Plug Loads. Early estimates indicate that there is a major opportunity for gains in energy efficiency through technology and behavior. Causing a market shift may be too large a task for any single utility, which is why a regional effort is appropriate – to maximize impact while sharing the risk and effort.

Measures of success

Plug load successes will be partially quantifiable; tracking of sales of efficient technologies with inherently lower consumption will be straightforward, but behavior related savings will require proper education on the part of the consumer and will be difficult to quantify.

Energy Efficiency Financing

Overview: Develop financing options for energy efficiency projects

- Encourage more comprehensive investments in energy efficiency
- Address barriers faced by low and medium income residents
- Develop methods for measuring performance of efficiency investments that create cash flow to service debt
- Reduce institutional barriers faced by potential lenders: utilities, agencies, private lenders

How concept meets key criteria

Energy Efficient Financing (EE Financing) provides the financial capital for energy efficiency which is often necessary due to the long term payback for many EE measures due to low energy costs in the Northwest. Given the net present value of money, most potential energy efficient participants would prefer spending that money elsewhere. If financing could be put in place that does not require a large upfront infusion of cash for participants, it could provide for the opportunity for much more energy efficiency to be implemented in the Northwest. It also addresses a major barrier to investment in efficiency faced by low to medium income customers. For largest impact, this measure would need to be implemented throughout the Northwest.

Target markets served

Energy Efficient Financing has the ability to target multiple across the residential market; low (and near low) income, existing construction (at time of purchase or in the case of continued occupancy), new construction and multifamily.

Another target market that this concept would need to include is the financial markets as partners in order to provide the financing necessary to implement this concept. Benefits: lower energy bills, carbon mitigation, ties to utilities and communities.

End-uses/measures included

Any measure that has a significant upfront cost in order to implement would be a key target for energy efficient financing.

Focusing on the shell and heating equipment on the home provides the best long term and largest impact on energy savings for the region. Financing could also be an effective tool to accelerate adoption of new high-efficiency water heating equipment predicted to be available in the near future (sub-condensing gas water heaters or heat pump water heaters).

From a legislative level, there will have to be policy to align local, state and regional energy efficient mandates to energy efficient financing and allow those government/private sector links. By reducing energy costs could help make it easier for mortgage holders to meet their loan payments.

Depending on the carbon legislation from the new administration, there is an opportunity for the financial backers to claim carbon mitigation based on their funding, this could have significant value in the future.

This is a platform for many different types of energy efficient improvements. To help quantify, the workgroup suggests that certain benchmarks are developed (level of efficiency, benchmarks such as ENERGY STAR) and tie the interest rate to these levels (the more efficient, the lower the interest rate). This allows more efficiency measures to be included in the financing. Also tying the loan to the point of sale financing and wrap it into the principal loan of the home.

Another option is to use utility rebates to buy down points or the interest rate on loans for energy efficiency measures implemented. This is another way to make the financing more attractive to potential participants.

If local or state taxation agencies can be involved, energy efficient measures applied to a home could be paid off through the property taxes that home pays with the loans originated from the government and the payback through higher assessed values and associated taxes for the home (see attached Boulder, CO case study).

Specific actions to implement

- Establish policies at the state or utility level to facilitate financing
- Educate lenders and other stakeholders
- Develop project performance metrics to inform purchase or lending decisions
- Energy Performance Standard or HERS Index or other tool to give residents a "MPG" for their home
- Educate consumers to look for seek home performance information when buying new or existing homes
- Develop policies or program offerings to encourage comprehensive efficiency improvements
    - Encourage adoption of efficiency or savings targets when pursuing retrofits
    - Provide lower interest rate or other financing benefits for greater

Size of savings potential

There remains much unknown about the true savings potential of various approaches, however this approach would address the two largest residential end-uses of electricity: space heating and water heating. In 2020, space heating and water heating will account for approximately 2500 aMW of consumption per year each. If just 10% was saved from this type of program, savings would be approximately 500 aMW annually.

Conducting pilots is recommended at this point until more is known about the amount of energy savings that can be attributed through influence of financing and the acceptance by potential participants. There is a need to conduct pilots which demonstrate real efforts and quantified savings, in order to determine best practices and lessons learned.

Roles & responsibilities throughout the region

We suggest a regional approach to compare best practices among utilities and financial institutes and to include other research efforts currently being conducted. We would also look to local, state and regional governments across the region to compare current and past efforts. This would include conducting pilots, and comparing shared results. One logical next step would be the creation of an energy efficient financing program design forum that meets on a quarterly or bi-annual basis to compare notes on pilot efforts and gain knowledge of the outcomes to influence further efforts. This is envisioned to be a voluntary group comprised of those utilities, financial institutes, regional organizations and government representatives that desire to participate in or conduct pilot efforts, whose goal is to share information and push forward the energy efficient financing platform.

Who takes which roles and the shape of the organization is yet to be determined. There are efforts currently underway, and more under consideration for 2009, which would benefit from the ability to receive regional input on the outcomes and future direction for such efforts. As a region we can begin to identify which devices, approaches and methods work and justify regional participation in the concept. Once a method is identified and validated to have participants and associated savings, consideration for a regional promotion or incentive can be discussed among the potential interested regional groups.

Lessons learned & best practices

The purpose of a regional energy efficiency financing forum would be to determine best practices and share lessons learned, particularly in the areas of policy and performance measurement (energy performance indices). The team would look nation wide at other programs over the past several years that have implemented or attempted to implement financing programs tied to energy efficiency to learn lessons and best practices that could be applied to a program that potentially can be rolled out throughout the Northwest.

Challenges to implementation/wide-scale deployment

The largest impediments to wide-scale implementation of a financing program are not much different from most wide-scale efforts; the diversity of utility policies and practices across the region, the current economic status of the nation and the financial industry. It would also have to be connected to a large region wide program to provide the implementation of the concept. There is a chance that this could become too big and complicated so simplicity of the program must be a focus so it can be easily grasped as a concept by homeowners, realtors and the building community.

We envision a regional effort to develop policies and tools to support individual state, utility or local efforts.

Resource requirements for successful deployment

Resource requirements will vary depending on the effort. It would need enough cooperation from the region to implement a full scale pilot. Regional legislative buy-in or other public sector

participation would be required. Big regional lending institutions will be necessary to roll this out.

Risk analysis

Given the state of construction and the economic uncertainty currently in the nation, this could fail due to lack of capital. This may also tie up resources that could be used elsewhere such as research and evaluation of potential new programs. A regional approach might allow pooling of funds to minimize risk.

Measures of success

- Total energy saved
- Broad participation across the region, including stakeholders such as lenders or realtors
- Consumer awareness and participation

Behavioral Program Opportunities

Overview: Create greater awareness and knowledge about energy consumption and savings opportunity through:

- Effective messaging that provides a challenge to use energy efficiently and encourages consumer action
- Early education
- Communication tools that inform customers on the level and timing of energy consumption
- Benchmarking tools that measure the opportunity and effectiveness of behavioral changes in reducing energy consumption

How concept meets key criteria

Behavioral change is one of the untapped areas of energy efficiency and remains a relatively unexplored resource, with little recognition of the potential and few agreed upon methods for measuring savings. But with the advent of technologies and a smarter grid system, there exists opportunities to assess the savings potential of behavioral based programmatic approaches to energy savings.

Target markets served

While efforts to identify and quantify how behavioral energy savings may be achieved there's no arguing that opportunity exists in all sectors—Commercial, Industrial, and Residential—to use mechanisms to influence consumption patterns and overall energy use. The primary focus of this concept paper is to discuss the kinds of activities that may be considered for a regional approach to address and influence behavioral energy consumption patterns in residential consumers. This particular area of research among the energy efficiency industry is rather undeveloped and there remains much unknown about the quantification of the level of savings that can be attributed to any particular effort. The general premise of programs in this arena is that with the appropriate knowledge-base and feedback, a consumer can and will change lifestyle patterns for the purpose of reducing energy consumption to reduce costs and affect environmental benefits.

Another underlying assumption that needs further research in order to better target and influence programs in this area is an understanding of the motives that entice a consumer to reduce consumption. Is it the pure dollar savings in their energy bill, the sense of contributing to the mitigation of global warming, or the knowledge and understanding of energy end-uses that lead a customer to take actions to reduce consumption? One innovative approach used by Positive Energy is to let a customer know how much energy they used compared to other similar households. In limited pilot applications, this approach has shown measurable savings effects.

End-uses/measures included

Measures in this particular area include physical devices that provide consumers with feedback on energy consumption, such as:

- Blue Line PowerCost™ Monitors,

- the Energy Orb
- the Energy Detective,
- Kill-a-watt meters,
- Other custom computer programs,
- Smart thermostats, and
- Other devices that have a display that conveys to a consumer the level of energy consumption of either a particular end use device or the whole house usage by a particular fuel.

Currently there are more devices that identify electrical consumption over gas consumption so a key area of potential target for behavioral programs is likely plug load devices.

Another behavioral area is energy education and how a consumer's usage may differ by delivery energy consumption information which would educate on the kinds of changes that may be incorporated to reduce a home's overall energy consumption. Educational information may vary from low-cost/no-cost measures, such as door sweeps and caulking windows, to major measures and their potential to reduce a home's usage. The most cost-effective approach to energy education is to combine the actual education with direct-install or easily installed devices that may be included to offset the cost of delivering the education by providing reportable energy savings. Some examples are seminars where aerators are provided, or energy kits by mail with informational pieces as well as compact fluorescent light bulbs.

Some regional utilities are using web-based energy analysis tools which allow a consumer to enter their home's profile into a website and receive information back about their home's energy usage, either based on their actual utility data or average information for their home's profile. These tools provide suggestions for how to reduce the home's energy consumption and give examples of potential energy savings from these measures, for example what the new energy usage would be if the consumer insulated the home, or replaced old appliances with new energy efficient models. Apogee and Nexus both have online analysis tools that are used throughout the nation by various utilities for to educate their customers on their home's energy usage and to help them identify the best opportunities for improvement. Funding a similar tool on a regional basis could be considered. Additionally there are free web based tools made available by DOE and EPA that could be incorporated into a website to inform and educate consumers, enticing them to take action to change their energy usage.

An important target segment for energy education beyond high-use customers is the K-12 audience, the energy users of tomorrow. Innovative approaches in this sector range from plays and skits that call out statistics of energy use and emphasize sustainable choices, to kits used within the classroom for students to conduct self audits on their own homes. One such effort is currently underway at the Energy Trust of Oregon, which targets 6th grade students. Each student in participating classrooms receives a kit containing CFLs, water saving devices and a workbook to educate and guide the student as they document the energy savings by replacing incandescent lamps with compact fluorescents, and high flow water devices with low flow devices. Other devices are included such as a bag to measure water flow, toilet leak detection tablets, and a thermometer to test fridge and water temperatures. These kits cost approximately $50 each and are delivered in a turn key approach by Living Wise, www.getwise.org.

Specific actions for implementation

- Develop regional educational messages that provide clear information and encourage consumer action
    - Consumer level
    - Curriculum development
- Develop methods for recognizing efficiency potential and measuring effects – include in resource assessments and utility/agency efficiency plans
- Investigate and test technologies and best practices program design to encourage and ensure persistence of behavioral changes

Size of savings potential

There remains much unknown about the true savings potential of various approaches. Conducting pilots is recommended at this point until more is known about the amount of energy savings that can be attributed through influence of feedback and education. There is a need to conduct pilots which demonstrate real efforts and quantified savings, in order to determine best practices and lessons learned. One of the goals of pilot activities is to determine the level of energy savings potential derived from behavioral change.

Roles & responsibilities throughout the region

We suggest a regional approach to compare best practices among utilities and to include other research efforts currently being conducted. This would include conducting pilots, and comparing shared results. One logical next step would be the creation of a behavioral program design forum that meets on a quarterly or bi-annual basis to compare notes on pilot efforts and gain knowledge of the outcomes to influence further efforts. This is envisioned to be a voluntary group comprised of those utilities and regional organizations that desire to participate in or conduct pilot efforts, whose goal is to share information and push forward the behavioral savings platform. As the Smart Grid space takes shape, this forum would be a logical venue for pilots into Smart Grid digitally connected home and appliance efforts.

Who takes which roles and the shape of the organization is yet to be determined. There are efforts currently underway, and more under consideration for 2009, which would benefit from the ability to receive regional input on the outcomes and future direction for such efforts. As a region we can begin to identify which devices, approaches and methods work and justify utility participation in the behavioral feedback realm. Once a device or method is identified and validated to have savings, consideration for a regional promotion or incentive can be discussed among the potential interested utility groups.

Lessons learned & best practices

The purpose of a regional behavioral forum would be to determine best practices and share lessons learned. The Regional Technical Forum is undertaking a research effort to conduct a plug load study within the region which might also provide input as to the best opportunities to target particular devices for a behavioral program. November 16-19, 2008 the American Council for an Energy Efficient Economy is holding the 2nd annual conference on Behavior, Energy & Climate Change (BECC), a national event that is well suited to inform on the current status of energy

efficiency program efforts across the nation which are targeted at linking energy consumption with behavior and climate change.

Challenges to implementation/wide-scale deployment

The largest impediments to wide-scale implementation of a behavioral program are not much different from most wide-scale efforts; the diversity of utility policies and practices across the region, as well as different weather and avoided costs cause the inability to design a one-size-fits-all program. However, individual pilot efforts which achieve local goals could be shared with the region for consideration of deployment in other areas. This would provide a good foundation to work from in a regional forum approach.

Resource requirements for successful deployment

Resource requirements will vary depending on the effort. Educational efforts in the workshop format are probably the least costly to conduct, however the actual savings that can be accounted for with such are minimal. Energy kits have actual savings that can be accounted for depending on the documentation of the installation of devices, but the costs are more significant. At approximately $50 per kit, a classroom of 25 would cost $1,250.

Risk analysis

The largest area of uncertainty is the actual percentage reduction in energy usage associated with a particular feedback device that has no history of quantitative methods to determine savings. Some approaches do have determined savings that can directly be attributed, such as direct install devices in energy savings kits. Clearly, the most significant risk is the investment in an approach that does not achieve proven savings. However, if no one tries an approach to determine savings, the untapped potential will remain unknown. A regional approach might allow pooling of funds to minimize risk.

Measures of success

Specific measurements to determine success are primarily associated with each particular effort and the implementer's goals. Obvious measurements include the percentage of energy savings reduction, number of participants, diversity of participation, actions taken, installation rates and other quantifiable metrics. Surveys are also a method to determine change in behavior based on participant response to well structured questions, thus an evaluation of impacts may be determined.

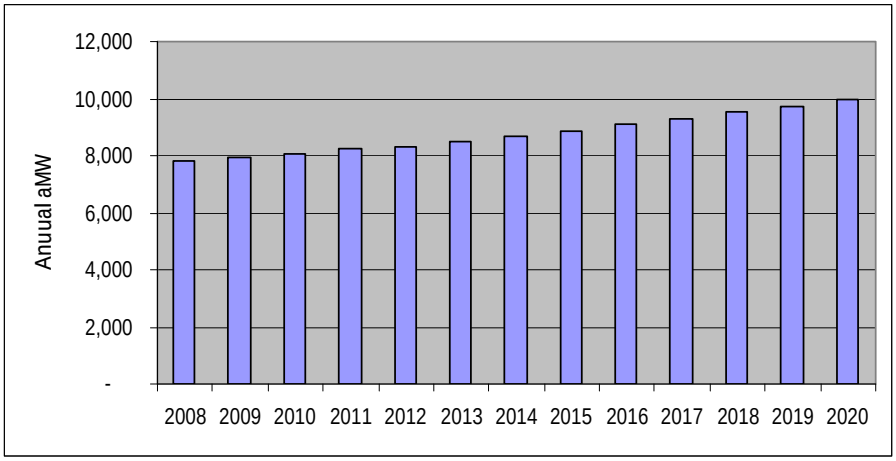
APPENDIX C-4

WORK GROUP 3: RESIDENTIAL SUB-GROUP PRESENTATION

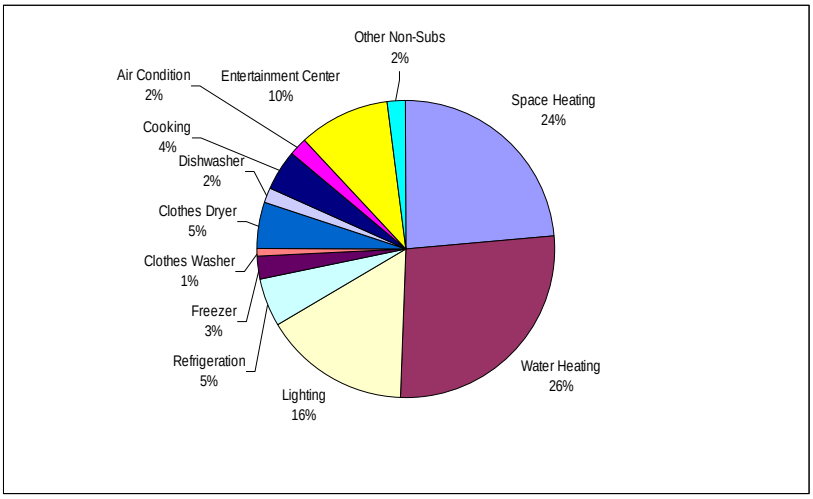
NEET Workgroup #3 - Residential Subgroup

Snohomish County PUD
November 2008

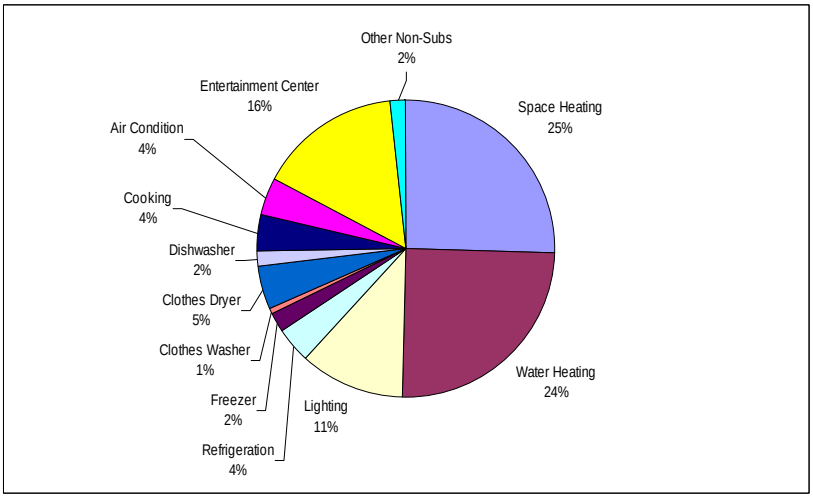
Residential Energy Consumption in the Region – Annual Load



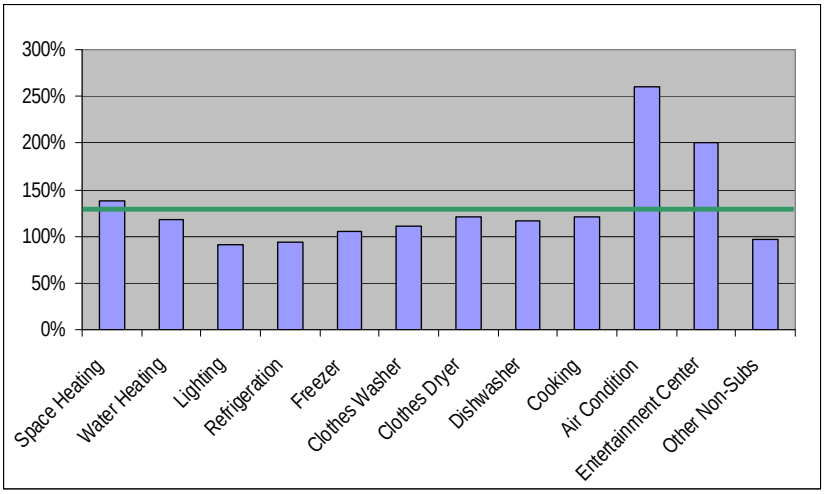
Residential Energy Consumption in the Region – End-Use 2008



Residential Energy Consumption in the Region – End-Use 2020



Residential Energy Consumption in the Region – 2008 – 2020 Growth by End-Use



High Priority Program Concepts

- Plug Load Program
- Energy Efficiency Financing
- Education and Behavioral Modification

Plug Load Program: Program Concept

- Encourage efficiency of plug loads through:
  - Increased manufacturing standards
  - Improved product labeling
  - Targeted incentives
  - Intelligent load control
  - Consumer education

Plug Load Program: Value Add

- What is the value added to the region? Why is it important?
  - Plug loads are one of the fastest growing residential end-use loads in the region – electronics alone are expected to increase from ~ 800 aMW in 2008 to 1600 aMW in 2020
  - Regional coordination is necessary to influence manufacturers and standard bodies

Plug Load Program: Not Occurring but Should

- What is not occurring now that we should be doing?
  - Little information is available about the performance of electronic goods
  - ENERGY STAR standards do not capture all efficiency potential
  - Consumers make purchase decisions without considering energy implications
  - Use of equipment is not optimized

Plug Load Program: Efficient Delivery

- Is there a way to do things more efficiently than we are doing today?
  - Coordinated efforts to influence manufacturers and standards groups (e.g., DOE, EPA) would be more effective
  - More consistent messaging to consumers about the energy consumption characteristics of electronic equipment is needed
  - Control technologies, such as occupancy sensor power strips, need more testing and validation

Plug Load Program: Implementation

- How would you suggest the recommendation be implemented?
  - Assign responsibility of negotiating with manufacturers, standards and labeling groups to a regional entity to make more efficient electronic equipment available in the region
  - Explore establishment of higher standards for the region
  - Develop regional educational effort to inform consumers about energy consumption of electronics equipment
  - Test control technologies
  - Develop regional strategy for adoption of incentives for efficient equipment and controls by local utilities
  - Partner with California??

Plug Load Program: Workgroup Support

- Is there strong support within the workgroup for the recommendation?
  - Yes

Energy Efficiency Financing: Program Concept

- Develop financing options for energy efficiency projects
  - Encourage more comprehensive investments in energy efficiency
  - Address barriers faced by low and medium income residents
  - Develop methods for measuring performance of efficiency investments that create cash flow to service debt
  - Reduce institutional barriers faced by potential lenders: utilities, agencies, private lenders

Energy Efficiency Financing: Value Add

- What is the value added to the region? Why is it important?
  - Expanded availability of financing would address a significant barrier to comprehensive investment in efficiency
    - Point-of-sale or retrofit
  - Availability of financing could allow for rapid deployment of key efficiency technologies
  - Allows us to address the major residential uses of energy – 5000 aMW for residential space and water heating in 2020

Energy Efficiency Financing: Not Occurring but Should

- What is not occurring now that we should be doing?
  - Financing programs are few and far between
  - Some customers are unable to secure funding for efficiency investments
  - Lenders and other related stakeholders do not recognize unique value of efficiency assets

Energy Efficiency Financing: Efficient Delivery

- Is there a way to do things more efficiently than we are doing today?
  - Develop indices to describe performance of efficiency investments
  - Create revolving loan fund to support rapid deployment of specific technologies

Energy Efficiency Financing: Implementation

- How would you suggest the recommendation be implemented?
  - Establish policies at the state or utility level to facilitate financing
  - Educate lenders and other stakeholders
  - Develop project performance metrics to inform purchase or lending decisions
    - Energy Performance Standard or HERS Index or other tool to give residents a "MPG" for their home
  - Educate consumers to look for seek home performance information when buying new or existing homes
  - Develop policies or program offerings to encourage comprehensive efficiency improvements
    - Encourage adoption of efficiency or savings targets when pursuing retrofits
    - Provide lower interest rate or other financing benefits for greater percentage energy reduction

Energy Efficiency Financing: Workgroup Support

- Is there strong support within the workgroup for the recommendation?
  - Moderate support – recognition of significant risks, failure of previous attempts

Education and Behavior Change: Program Concept

- Create greater awareness and knowledge about energy consumption and savings opportunity through:
  - Effective messaging
  - Early education
  - Communication tools that inform customers on the level and timing of energy consumption
  - Benchmarking tools that measure the opportunity and effectiveness of behavioral changes in reducing energy consumption

Education and Behavior Change: Value Add

- What is the value added to the region? Why is it important?
  - Technology based energy efficiency provides only a finite amount of efficiency potential
  - Additional potential can be realized through changes in behavior supported by improved knowledge and information availability

Education and Behavior Change: Not Occurring but Should

- What is not occurring now that we should be doing?
  - Consistent messaging
  - Recognition of behavior change as efficiency potential and effective measurement of its effects over time – methods need to be developed at the regional level

Education and Behavior Change: Efficient Delivery

- Is there a way to do things more efficiently than we are doing today?

Education and Behavior Change: Implementation

- How would you suggest the recommendation be implemented?
  - Develop regional educational messages
    - Consumer level
    - Curriculum development
  - Develop methods for recognizing efficiency potential and measuring effects
  - Investigate and test technologies and best practices program design to encourage and ensure persistence of behavioral changes

Education and Behavior Change: Workgroup Support

- Is there strong support within the workgroup for the recommendation?
  - Yes, need coordination with Workgroup #4 – Marketing and Communications

questions?

APPENDIX C-5
WORK GROUP 3: CONCEPTS FOR ACCELERATING ENERGY EFFICIENCY IN THE COMMERCIAL SECTOR

CONTEXT

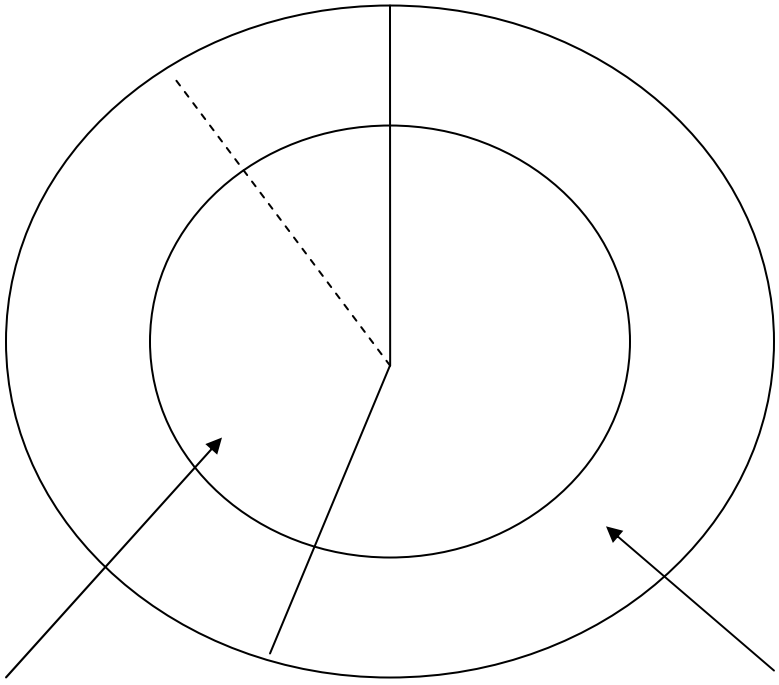
Two paths for accelerating energy efficiency:

- Increase market penetration associated with energy savings opportunities through pursuing innovative delivery approaches.
- Increase energy efficiency potential by pursuing new energy saving opportunities.

Perspective:

- The diagram below illustrates expansion of achievable energy efficiency through the two paths. The inner circle represents current energy savings opportunities and the outer circle represents new energy savings opportunities. The potential to increase market penetration is represented by the dashed line.
- Activity along both paths is already taking place in the region, with opportunity to further these efforts through greater collaboration and coordination.
- Both paths are important, with potential to pursue innovative delivery approaches and new energy saving opportunities simultaneously. The sub-committee has prioritized the concepts (and estimated energy savings) as listed below.

Commercial Sector: Achievable Energy Efficiency Potential



Increasing Market Penetration	Increasing Efficiency Potential
#1: Target market offerings (20% +)	#1: Bldg. operating performance (10-15%)
#2: Business practice change (10-20%)	#2: Towards carbon neutral bldgs (50% +)
#3: Building codes/standards (20% +)	#3: Data center efficiencies (5%)
#4: Tenant improvement focus (10-20%)	#4: Plug load efficiencies (5-10%)
#5: Education and training (2-3%)	#5: Demand management (5-10%)

INCREASING MARKET PENETRATION

Accelerating market participation can be achieved by addressing a wider range of customer and market needs. The good news here is that business is very interested in energy efficiency and sustainability as a means of improving their bottom line, their competitive market position, and their public image. However, they need help. Most businesses lack the resources and expertise needed to get the job done.

#1: Target Market Offerings

Concept: Many commercial customers operate throughout the region and make energy related business decisions corporately. Utilities/public benefits administrators can strengthen program efforts by tailoring and offering similar services in specific commercial markets, addressing all fuels, and emphasizing ease of customer and trade ally participation. Financial incentive based transactions can be combined with longer term customer relationship oriented activities designed to influence and enable a wider range of ongoing customer energy management practices.

Features: Design elements can include:

- A focus on specific commercial markets, such as grocery, hotels, restaurants, retailers, office real estate, and hospitals/healthcare.
- Tailor standard program offerings to promote technologies and services most relevant to the targeted business/building type.
- Partner with trade associations, trade allies and companies that have regional or national presence within targeted markets.
- A regional key account manager that works with regional companies building market relationships and facilitating program participation.
- Align market transformation activities, such as energy management tools and resources, or education and training opportunities, to complement acquisition program offerings.

Barriers: Market barriers include:

- Lack of awareness of energy efficiency opportunities, how to pursue them.
- Market needs vary by business type, most businesses lack energy management related resources, knowledge and expertise.
- Utility/public benefits administrator program offerings vary by service area.
- Trade associations often lack the capabilities to service member needs.
- Trade allies respond to market demand, need support in gaining customer or client attention, building market delivery capabilities.
- Competing uses for limited customer capital, split incentives.

Benefits: Successfully tailoring program offerings, partnering with relevant market actors, and aligning acquisition program offerings and market transformation activities can significantly increase customer program participation in specific markets over time.

Risks: Low level of risk. Requires greater collaboration regionally to better align activities and act in a coordinated manner with customers, trade associations and trade allies. Some activity is already taking place along these lines in certain markets.

Action: Proposed steps include:

5. Identify potential target markets and activity already happening regionally or nationally along these lines. For example, grocery is already being targeted in parts of the region, as is hospitality (hotels/motels) and restaurants (fast food).
6. To begin with, select a high priority target market that is already being targeted regionally and one that has yet to be targeted for further work.
7. Identify essential elements to be addressed in each high priority target market, such as:
    - Measure/technology packages
    - Technical assistance and financial incentives
    - Customer and trade ally expectations/requirements
    - Customer contact and account management
    - Related NEEA market transformation activity
    - Customer/trade ally education and training opportunities
8. Construct design features for essential elements, validate with key market partners (trade allies, target customers, etc.).
9. Develop a collaborative implementation plan with individual utility/public administrator and jointly supported regional responsibilities/activities.
10. Expand to other markets based on interest, opportunities and initial results.

#2: Business Practice (Behavioral) Change

Concept: Businesses lack the internal human resources to adequately pursue energy management best practices. The energy industry can support the hiring of strategic resource managers by companies of sufficient size and energy management opportunity. These companies often have facilities across the region and a strategic resource manager should be at the corporate (or regional) level in order to be most effective. Support for these positions can be tied to organizational commitments to achieving aggressive energy efficiency targets. Energy related business practice change can be further supported within these companies by providing best practices, technical assistance, education and training for strategic resource managers and others.

Features: Design features can include:

- Job description and company commitment expectations for hiring strategic resource or resource conservation managers.
- Support for development and implementation of company strategic energy management plans.
- Availability of and education/training in applying best practices.
- Technical and financial assistance.
- Assistance in tracking and reporting results.

Barriers: Market barriers include:

- Lack of awareness of energy efficiency opportunities, how to pursue them.
- Market needs vary by business type, most businesses lack energy management related resources, knowledge and expertise.

Benefits: Energy savings of 10-20% are readily available to organizations committed to achieving energy saving targets. The savings can come from a variety of energy related business

practices, including design and construction, building operations, purchasing equipment and services, and capital improvements.

Risks: Organizational commitment requires top management leadership, an internal champion, and dedicated follow through by various parts of the organization.

Action: Proposed steps can include:

1. Inventory related activity in the region, including PSE's RCM program, NEEA's business practice change efforts, etc.
2. Identify key design elements and roles/responsibilities of various entities, such as:
   - Strategic resource manager/resource conservation manager job descriptions
   - Company commitment/agreement terms and conditions
   - Best practices, education and training venues
   - Tie into related utility and regional efforts
   - Tracking and reporting results
3. Discuss with eligible companies, test program elements and delivery mechanisms with interested parties.
4. Expand and evolve as appropriate.

#3: Building Codes and Standards

Concept: Non-residential building energy codes are established and enforced by State and local governments. The energy industry can influence and support government entities interested in increasing efficiency requirements and improving code enforcement. Equipment standards are usually set nationally. New equipment standards can set the stage for incentives to encourage adoption of more efficient equipment regionally. Building labeling is a first step towards making building operating performance a key ingredient in market transactions, including tenant lease decisions and property sales.

Features: Design features can include:

Building codes

- Track and participate in state and local government processes
- Support for code implementation, such as education and training, incentives, technical assistance and/or enforcement support

Equipment standards

- Track and participate in federal standard setting (mandatory) processes, and voluntary standard setting processes
- Offer incentives when appropriate for energy efficient equipment that meets voluntary standards

Building labeling

- Track and participate in government building labeling efforts
- Support agreed upon labeling approaches, such as Energy Star or ASHRAE
- Encourage recognition and use of building labeling in the marketplace

Barriers: Market barriers include:

- Lack of knowledge/information on viable advances in building energy codes
- Lack of experience in the market on practical approaches to meeting new codes

- Unfamiliarity with new equipment standards, benefits of use
- Building operating performance metrics/transparency

Benefits: Improvements to building energy codes, if coupled with effective education, training and enforcement, can improve building energy use by 20% or more. Benefits from equipment standards vary, with potential changes in efficiency standards for fluorescent lamps in 2009 projected to yield big savings (over 400 trillion btu nationwide). Building labeling will help motivate building owners to improve building operating performance.

Risks: These actions and activities are largely led by government and our society overall. The energy industry can participate in, help enable, and support implementation.

Action:

#4: Tenant Improvement Focus

Concept: Tenant improvements (TIs) can enhance energy management or work against it. Lighting, plug loads and controls are three areas of opportunity associated with TIs that can have a big impact on building energy use and performance.

Barriers:
Features:
Benefits:
Risks:
Action:

#5: Education and Training

Concept: Professional development (current workforce)
Workforce development (future professionals)

Barriers:
Features:
Benefits:
Risks:
Action:

INCREASING ENERGY EFFICIENCY POTENTIAL

In the near-term, significant opportunities to increase energy efficiency potential in the commercial sector involve encouraging energy efficient building design, construction and operations. While promoting energy efficient technology options remain critically important, and there are additional near-term technology oriented opportunities, a focus on improving on-going building operating performance, and advances in building design and construction, are key.

#1: Building Operating Performance

Concept: Improving existing building operating performance represents one of the biggest untapped areas of commercial energy efficiency potential. Building owners, managers and operators are increasingly interested in looking for operational improvements, with service providers beginning to respond. The energy industry can encourage this trend by encouraging benchmarking building energy use, promoting better building operating performance and supporting related customer, trade ally and government activity.

Features: Design elements can include:

- Benchmarking and tracking ongoing building operating performance using tools such as Energy Star Portfolio Manager (with climate specific target EUIs by building type/end use).
- Best practices for tuning up and maintaining existing systems and equipment. Education and training for building operators, service providers and others.
- Technical and financial assistance to building owners, managers and operators to encourage improvement in benchmark scores
- Building labeling for transparency to tenants, occupants and others regarding a building's operating performance.

Barriers: Barriers to encouraging better building operating performance:

- Building owner, manager and operator awareness of the opportunities
- Lack of management focus on improving building operating performance
- Service providers often emphasize equipment sales more than service
- Service provider or in-house technical capabilities to identify opportunities, make needed corrections and adjustments
- Split financial incentives between owners and tenants

Benefits: Significant energy savings are available through improving the operating performance of existing systems and equipment (10-15% on average). The energy savings available can rival the savings available through investing in new efficient equipment and comes at a much lower cost.

Risks: There is a shortage of skilled and experienced energy engineers capable of advising building owners/operators and working for/with service providers on building specific opportunities. In addition, the energy savings achieved can be short lived without ongoing tracking and enhanced operations and maintenance activities.

Action: Proposed steps include:

1. Collect information on current regional activities associated with building operating performance. Identify tools, resources and best practices.
2. Develop program features, including further examination of tools and best practices.
3. Discuss with potential market partners, such as trade associations (BOMA, IFMA, etc.), trade allies (mechanical contractors, control companies, etc.) and EPA/DOE Energy Star.
4. Work plan for further development/implementation in collaboration with others.

#2: Moving Towards Carbon Neutral Buildings

Concept: There is growing political and market momentum associated with sustainable, energy efficient building design and construction. Political leaders, government, trade organizations and others have adopted the 2030 Challenge, which outlines performance targets leading to carbon neutral commercial buildings by the year 2030. There is an opportunity for the energy industry to partner with and enable others in their efforts.

Features: Combine resources and coordinate with others to create a pathway towards carbon neutral commercial buildings. Features can include:

- Education and training through trade associations, educational institutions and others with professional development mandates
- Technical assistance to property owners and developers, design and construction firms seeking to build energy efficient, high performance buildings
- Financial incentives that reflect the full incremental cost of design and construction, including consideration of innovative fee structures
- Demonstration projects that explore the technical and economic feasibility of innovative design and technology applications
- Building code support at the local or state levels.

Barriers: Barriers include:

- High performance building experience in the region is limited, and many owners/designers/builders do not go beyond energy code requirements
- Owners/developers interested in sustainability often look to LEED, which doesn't necessarily result in a high level of energy efficiency
- Design and construction firms respond to client (owner/developer) demands
- Lack of support (technical, financial) for those interested in pursuing high performance buildings
- Design features and technology options beyond 50% energy savings are a challenge, requiring further research and demonstration efforts

Benefits: Successfully creating a pathway towards carbon neutral new building construction will reduce the energy consumption of new commercial building stock by more than 50%. With over half the commercial building stock expected to be new or renovated over the next twenty five years this represents tremendous energy savings.

Risks: The energy industry cannot create this pathway on its own. It can work with and help enable others, including building owners and developers, the building design and construction industry, and state and local government.

Action: Proposed steps include:

1. Collect information on utility new construction programs, activities by potential regional market partners (AIA, USGBC, State & local governments, BOMA, ULI, etc.), and innovative national activity.
2. Further identify and characterize features and activities that can contribute to creating a pathway towards carbon neutral commercial buildings.
3. Convene a group of market actors (governments, real estate industry, design and construction companies, etc.) to help shape and support the effort.
4. Develop a collaborative work plan for further development and implementation.

#3: Data Center Efficiencies

Concept: Data centers are a growing load in commercial buildings, particularly offices. This effort focuses on developing IT and engineering expertise for data center energy efficiency within these buildings or housed in near by co-location facilities. It does not target large server farms located outside commercial centers.

Features: Data center energy efficiency features include:

- Coordination with national efforts (i.e. Climate Savers)
- Regionally coordinated design and equipment specifications (best practices)
- Common data center metrics (i.e. watts/sq.ft, amps/circuit, power cost/server, kWh/rack, power costs/rack, performance/rack, power usage effectiveness)
- Regionally available technical expertise and advice.

Barriers: Market barriers include:

- Lack of IT and engineering data center energy efficient design expertise in the region (best practices)
- Limited operational experience and willingness to improve data center energy performance (not perceived as part of IT manager's job)
- Lack of efficiency standards for servers, power supplies, uninterruptible power supplies, transformers, etc.
- Lack of capital to invest in data center design and upgrades.

Benefits: Data centers are a growing energy load within offices and other commercial buildings. As these loads continue to grow energy savings can be on the order of 5% of overall building use. Left unchecked data centers will become one of the most prominent building loads, negating energy efficiency gains in other end-use areas.

Risks: There is a shortage of skilled IT and engineering expertise able to address data center energy efficiency. In addition, developing uniform metrics for data center efficiency and performance requires coordinated action on the part of the industry itself. There is also a significant organizational (behavioral) change element within companies in making efficiency a part of the IT manager's job responsibilities.

Action: Proposed steps include:

1. Convene regional work group to further develop and coordinate data center activity. Involve IT industry and data center owners/managers.
2. Step up involvement in industry efforts to develop data center metrics for energy efficiency. Research and develop best practices.
3. Identify data centers in the region by state and utility service area. Research current market characteristics, design practices and compare to best practices.
4. Develop energy efficiency program features based on best practices and performance metrics.
5. Promote and support IT and engineering data center energy efficiency course work at major universities and other educational centers in the region.

#4: Plug Load Efficiencies

Concept: Plug loads within offices and other commercial buildings represent an important opportunity for energy savings. Plug loads include a wide range of office equipment, including computers, monitors, printers, copiers and other electronic equipment; and well as other energy consuming equipment such as task lighting and kitchen equipment. It also addresses operational behavior through smart plugs and other energy management devices.

Features: Design features can include:

- Regionally consistent platforms for promoting energy efficient electronic equipment, including manufacturer or retail financial incentives
- Advancing awareness of purchasing specifications for high efficiency products (i.e. Energy Star)
- Participation in national efforts to establish next generation efficiency specifications
- Promotion and assistance to building owners, managers and tenants in addressing operational behavior opportunities

Barriers: Barriers include:

- Manufacturer motivations to build efficiencies into product lines
- Wide variety of people responsible for organizational purchasing decisions
- Lack of awareness on the part of businesses on the availability and operating cost savings from high efficiency products
- Split incentives between building owners/managers and tenants

Benefits: Plug loads represent approximately 10% of commercial building energy use and are expected to grow to 20% without intervention. With active intervention, growth in plug loads can be flattened while the use of electronic equipment continues to grow, resulting in 10% energy savings.

Risks: Continued advances in plug load efficiencies depend on national efforts working collaboratively with original equipment manufacturers (OEMs), governmental entities (EPA, etc.) and others.

Action: Proposed steps include:

1. Examine feasibility of expanding regional energy efficient electronic equipment platform beyond desktop computers (80+ and Energy Star 4.0) to include other equipment and efficiency levels.
2. Promote equipment specifications that enable businesses to easily purchase high efficiency equipment.
3. Establish incentive levels and program mechanisms for eligible products, engage market actors, build relationships.
4. Participate in national efforts to further advance equipment energy efficiencies.

#5: Demand Management

Concept: Smart grid, enabling technology, appropriate price signals, etc.
Barriers:
Features:
Benefits:
Risks:
Action:

APPENDIX C-6
WORK GROUP 3: ANSWERS TO EXECUTIVE COMMITTEE QUESTIONS ON COMMERCIAL SECTOR HIGH-PRIORITY CONCEPTS

INCREASING MARKET PENETRATION
Business is very interested in energy efficiency and sustainability as a means of improving their bottom line, their competitive market position, and their public image. However, they need help. Most businesses lack the resources and expertise needed to get the job done.

#1: Target Market Offerings
Continue to strengthen focus on customer and market needs, addressing all fuels and tailoring offerings to specific commercial markets. Build related association and trade ally relationships, and emphasize ease of customer participation. Combine financial incentive based transactions with longer term customer relationship oriented activities designed to influence and enable a wider range of ongoing customer energy management practices. Design elements can include:

- A focus on specific commercial markets, such as grocery, hotels, restaurants, retailers, office real estate, and hospitals/healthcare.
- Tailor standard program offerings to promote technologies and services most relevant to the targeted business/building type.
- Partner with trade associations, trade allies and companies that have regional or national presence within targeted markets.
- Align market transformation activities, such as energy management tools and resources, or education and training opportunities, to complement acquisition program offerings.

What is the value added to the region? Why is it important?
Tailoring energy efficiency offerings and service to specific types of businesses better addresses their business needs, enhances customer relationships, and can significantly increase business participation in energy efficiency (20% or more participation increase).

What is not occurring now that we should be doing?
Utility efforts targeting specific businesses with tailored offerings should be regionally consistent (to the extent practical) and regional in coverage since these businesses operate throughout the region (or nation). In addition, offerings can be tailored for more markets and NEEA's MT efforts can be better aligned to complement the offerings.

Is there a way to do things more efficiently than what we are doing today?
Yes, bring greater uniformity in tailored offerings across the region, expand the number of markets and businesses addressed, and better align market transformation efforts with the tailored offerings.

How would you suggest that the recommendation be implemented? Who and how? Establish a working group with key utility and NEEA representation. Charge the group with identifying potential target markets and current regional activity. Select two high priority markets, one that is already being targeted regionally and one that has yet to be targeted. Identify essential elements to be addressed for each market, validate with key market partners and implement a collaborative work plan. Consider expanding the effort to additional markets.

Is there strong support within the workgroup for the recommendation? This is the #1 recommendation for increasing energy efficiency market penetration in the commercial sector of energy use.

#2: Business Practice Change

Businesses lack the internal human resources to adequately pursue energy management best practices. The energy industry can support the hiring of strategic resource managers by companies of sufficient size and energy management opportunity. Support for these positions can be tied to organizational commitments to achieving aggressive energy efficiency targets. Energy related business practice change can be further supported within these companies by providing best practices, technical assistance, education and training for strategic resource managers and others. Design features can include:

- Job description and company commitment expectations for hiring strategic resource or resource conservation managers.
- Support for development and implementation of company strategic energy management plans.
- Availability of and education/training in applying best practices.
- Technical and financial assistance.
- Assistance in tracking and reporting results.

What is the value added to the region? Why is it important?

Energy savings of 10-20% are readily available to organizations committed to achieving energy saving targets. The savings can come from a variety of energy related business practices, including design and construction, building operations, purchasing equipment and services, and capital improvements.

What is not occurring now that we should be doing?

Energy industry support for hiring strategic resource managers is limited in the region right now. Energy related business practice change can be further supported by providing best practices, technical assistance, education and training that can further enable these managers and others to take action.

Is there a way to do things more efficiently than what we are doing today?

Work across the industry to standardize job descriptions, establish guidelines or business parameters for agreements with companies, develop best practices, education/training curriculum, and accessible tools and resources for companies to use.

How would you suggest that the recommendation be implemented? Who and how?

Inventory related activity in the region, including PSE's RCM program, NEEA's business practice change efforts, etc. Identify key program elements, roles/responsibilities of various entities, and test program elements and delivery approaches with interested parties. Expand and evolve as appropriate.

Is there strong support within the workgroup for the recommendation?

This is the #2 recommendation for increasing energy efficiency market penetration in the commercial sector of energy use.

INCREASING ENERGY EFFICIENCY POTENTIAL

In the near-term the most significant opportunities to increase commercial sector energy efficiency potential involve encouraging energy efficient building design, construction and operations (and in the process encourage energy efficient technology).

#1: Building Operating Performance

Improving existing building operating performance represents one of the biggest untapped areas of commercial energy efficiency potential. Building owners, managers and operators are increasingly interested in looking for operational improvements, with service providers beginning to respond. The energy industry can encourage this trend by encouraging benchmarking building energy use, promoting better building operating performance and supporting related customer, trade ally and government activity. Design elements can include:

- Benchmarking and tracking ongoing building operating performance using tools such as Energy Star Portfolio Manager (with climate specific target EUIs by building type/end use).
- Best practices for tuning up and maintaining existing systems and equipment. Education and training for building operators, service providers and others.
- Technical and financial assistance to building owners, managers and operators to encourage improvement in benchmark scores
- Building labeling for transparency to tenants, occupants and others regarding a building's operating performance.

What is the value added to the region? Why is it important?

Significant energy savings are available through improving the operating performance of existing systems and equipment (10-15% on average). The energy savings available can rival the savings available through investing in new efficient equipment and comes at a much lower cost.

What is not occurring now that we should be doing?

Improving the operating performance of existing systems and equipment in buildings needs to be recognized as a valuable source of energy savings. Tools for benchmarking and tracking building performance need to be supported (including easy access and use of utility billing data), best practices need to be promoted, education and training opportunities need to be expanded, building labeling needs to be advanced.

Is there a way to do things more efficiently than what we are doing today?

Yes. A collaborative approach by the energy industry and potential market partners is needed to further advance building operating performance.

How would you suggest that the recommendation be implemented? Who and how?

Collect information on current regional activities associated with building operating performance. Identify tools, resources and best practices. Develop program features, including further examination of tools and best practices. Discuss with potential market partners, such as trade associations (BOMA, IFMA, etc.), trade allies (mechanical contractors, control companies, etc.) and EPA/DOE Energy Star. Create a work plan for further development/implementation in collaboration with others.

Is there strong support within the workgroup for the recommendation?

This is the #1 recommendation for increasing energy efficiency potential in the commercial sector of energy use.

#2: Towards Carbon Neutral, High Performance Buildings

There is growing political and market momentum associated with sustainable, energy efficient building design and construction. Political leaders, government, trade organizations and others have adopted the 2030 Challenge, which outlines performance targets leading to carbon neutral commercial buildings by the year 2030. There is an opportunity for the energy industry to partner with and enable others in this effort. Features can include:

- Education and training through trade associations, educational institutions and others with professional development mandates
- Technical assistance to property owners and developers, design and construction firms seeking to build energy efficient, high performance buildings
- Financial incentives that reflect the full incremental cost of design and construction, including consideration of innovative fee structures
- Demonstration projects that explore the technical and economic feasibility of innovative design and technology applications
- Building code support at the local or state levels.

What is the value added to the region? Why is it important?

Successfully creating a pathway towards carbon neutral new building construction will reduce the energy consumption of new commercial building stock by more than 50%. With over half the commercial building stock expected to be new or renovated over the next twenty five years this represents tremendous energy savings.

What is not occurring now that we should be doing?

Greater support for innovation in building design and technology application, including advances in government policies, increased flexibility and availability of technical and financial assistance, advances in design tools and prescriptive solutions, and further investment in education and training.

Is there a way to do things more efficiently than what we are doing today?

Yes, a coordinated effort by all entities involved in or influencing the new construction market is needed to advance design and construction practices.

How would you suggest that the recommendation be implemented? Who and how?

Collect information on utility new construction programs, NEEA activities, activities by potential regional market partners (AIA, USGBC, State & local governments, BOMA, ULI, etc.), and innovative national activity. Further identify and characterize features that can contribute to creating a pathway towards carbon neutral commercial buildings. Convene a group of market actors (governments, real estate industry, design and construction companies, etc.) to help shape and support the effort. Create a collaborative work plan for further development and implementation.

Is there strong support within the workgroup for the recommendation?

This is the #2 recommendation for increasing energy efficiency potential in the commercial sector of energy use.

APPENDIX C-7
WORK GROUP 3: ACCELERATING ENERGY EFFICIENCY ACHIEVEMENTS IN THE INDUSTRIAL SECTOR

Industrial facilities in the Northwest can significantly accelerate their energy efficiency achievements with additional support from the region's utilities. This additional support should come in two focused areas: Coordinated Market-Focused Programs and Services; and the expansion of utility funded EE programs into services supporting Behavioral and Operations and Maintenance Practices.

1. Coordinated and Market-Focused Programs

The industrial sub-group recommends the expansion and development of coordinated and market-focused programs to accelerate market participation. This coordination and development work would be accomplished by Regional Energy Efficiency Programs Forums.

Concept: The industrial sub-group identified target market or niche focused programs as an important tool to increase market penetration for many of the same reasons the commercial sub-group did. Many of the features, barriers, benefits, risks and actions are similar to the commercial group and are not re-stated in their entirety. Features unique to the industrial market are outlined below.

Market-Focused Programs: Design elements should include*:*

- Focus should be on high-value, specific industrial markets, such as food processing, cold storage, CVR, compressed air, pulp and paper, electronics, etc.
- Programs are more successful when they are developed in partnership with and marketed together with Industrial Trade Association partnerships (Northwest Food Processor Association for example).
- Acquisition programs that address cross sector technologies such as compressed air, industrial cooling, pneumatic conveying, etc should be developed.
- Programs already being offered by utilities can be considered pilots with those best practices shared as appropriate. New pilots should be considered with sites selected under a competitive process.
- Energy savings acquisition programs can decide to offer programs developed within the Forum as appropriate.

Regional EE Programs Forum Features:

- A standing forum for best practice exchange, delivery coordination, etc. is a necessary structural requirement to efficiently accomplish much of the work discussed here.
    - Delivery entities should devote considerable time to making this simple for customers and analyzing the success of existing regional work
    - Coordinated market segmentation (customers vs. technology, etc.) within the industrial sector is needed.
    - There are more program offers for these customers because of their energy intensity: USDOE, utilities, Alliance, trade associations, state energy offices,

universities, etc; and a forum should help simply participation by individual facilities. Multiple offers put this market in tension between simple offers vs. making sure nothing is left on the table when there are multiple comprehensive offers.

- A single point contact is absolutely necessary to respect the time commitment of the staff of the industrial site. Utilities already have close contact with most industrial facilities and their trade allies; and EE efforts should continue to build on, rather than create new market channels. The customer and project implementation should be the focus of both the selection of the scope of the forum and the activities within.
- Natural markets divisions should be utilized to determine where the coordination of efforts is applied. Natural market divisions include by industry type (NFPA), but also by geography to take advantage of existing relationships among customer facilities and with trade allies. Coordination should not be attempted by an entity located far from the facilities and the organizations serving program offerings.
- These EE Program Forums should have a natural connection with the Industrial Efficiency Alliance and the existing market transformation activities, such as energy management tools and resources, or education and training opportunities, to complement acquisition program offerings.

Action Plan and Resources:

- An initial meeting of industrial programs staff should identify and prioritize 5-7 sub-markets on which to begin.
- Organizations can then self-select participation in the forum.
- An acquisition program organization should be designated as the coordination lead / market champion. Typically this will be based on EE activities within the identified sub-sector.
- An action plan should be developed by the members, including any budget requirements and associated funding plans and market-focused programs development and best practice sharing processes.
- Resources will vary considerably. Support of initial formation and start-up from the region may be necessary, but not desired on an on-going basis. In-kind contributions by members' organization will provide the bulk of the resources necessary.

Barriers: Market barriers include:

- Many of the commercial market barriers exist for industrial customers however, there are some key differences.
- Industrial energy management related resources, knowledge and expertise are available in varying degrees in industrial in the northwest. The ability for industrial facilities to focus on energy management may be diluted by or trumped by production considerations.
- Industrial trade associations are high functioning, but members have to make energy savings a priority for the association staff when establishing goals and budgets.

Benefits: same as those identified by commercial sub-group.

Risks: Low level of risk with some activity already taking place along these lines in certain markets.

2. BEHAVIORAL AND O&M PRACTICES

The industrial sub-group believes there are significant near-term opportunities to increase energy efficiency in the industrial sector by promoting O&M practices that focus on the efficient use of energy. This opportunity is in addition to and complements energy savings from the traditional installation of measures.

Concept: The concept of improving system and facility operation represents a large, mostly un-tapped energy savings opportunity. Energy efficiency organizations can help industrial sites gain this energy efficiency by encouraging monitoring and tracking of energy use, promoting better maintenance and operation practices, and by developing consistent and supportable estimates of energy savings.

Features: Design elements are similar to the commercial sector and specific industrial comments are listed below.

- Benchmarking allows industrial customers to trend their energy intensity, and benchmark consumption in comparison their other similar facilities. Benchmarking also provides utilities with a potential data source to more cost-effectively determine savings from energy efficiency and O&M improvements and to determine and deliver best practices to other industrial sites. Benchmarking for industrial is challenging and may be influenced by feedstock and production factors and tools are less available.
- O&M practices for energy efficiency must build-on and be delivered right with existing O&M practices focused on reliability. EE O&M practices cannot be seen as a separate program, but as a part of the existing O&M program.
- Education of behavior changes to reduce energy use must be consistently applied and supported throughout the customers' organization like safety is today. Development of behavior practices is site specific and requires an on-site staff person to act as the champion for resource conservation and energy efficiency.

Action Plan and Resources

5. A large part of this effort should be implemented by the EE Programs Forums discussed above. Industry-specific opportunities and barriers will dictate much of what can and should be accomplished with behavioral changes and O&M Practices.
6. This will require identifying facilities that have an on-going commitment to business practice improvement and are willing to provide funding for resource conservation managers to develop and implement practices, maintain and analyze benchmarking systems, and insure that savings persist.
7. The EE industry should provide facility resource conservation managers with benchmarking software tools, start-up and on-going training, EE technical support, best practices forums, and other general support. Some of this support is already available from various acquisition programs and NEEA's industrial programs
8. In order to benchmark, industries and commercial businesses need energy consumption data – ideally routinely downloaded from utility billing systems (or uploaded from AMI systems) in a regionally, if not nationally standardized format. The most cost-effective method of providing the data needs further exploration. The National Energy Action Plan Group has developed a publication addressing this issue. The NEET executive committee or a workgroup addressing data management should consider an action item geared at addressing this issue and coming up with a recommendation.

9. There are several programs currently underway that can be considered pilots for this activity. The BOC program operated by NEEC for building operators, BPA's Champions program for industrial sites and PSE's Resource Conservation program are the main examples.
10. Resources to implement this activity are not insignificant. First, the region must value and consistently support the use of efficiency funds for programs and services that produce energy savings through operational and behavior programs. The sharing of best practices in this area can be accomplished in the EE Programs Forum but new resources from acquisition programs and for the development of new O&M practices will be needed to follow-through. Finally, the individual industrial facilities will need to support a staff member to be the Resource Conservation Manager and their activities. While acquisition programs can provide significant support, the site must be convinced that this position is a long-term sound financial investment.

Barriers: O&M is an on-going focus for many customers for up-time and through-put. Adding a systematic energy focus expands the bundle of attributes. Also, staff skilled in the practice of

Benefits: Significant energy savings are available from industrial O&M and the potential is being further identified through the 6th Power Plan, the most recent Energy Trust of Oregon Resource Assessment and several utility potential studies.

Risks: The principal risk identified is from a planning perspective where energy savings achieved can be short lived and widely variable without a systematic approach for either on going tracking and continued focus on the activities. Risk will be reduced if there is some regional alignment on how the savings are tracked and their role in resource planning.

Additional Notes:

- The need for financing (low hassle, low interest) is becoming increasingly important. Sharing any successes or approaches in real time is high impact.
- Work force remains a structural barrier. This sub-group supports and encourages work by other group focused on this.

APPENDIX D-1
WORK GROUP 4: THE ROLE OF MARKETING AND PUBLIC AWARENESS IN ENERGY EFFICIENCY

What is the role of marketing in fostering an energy efficient economy?

SITUATION

Many regional consumers are unclear what being energy efficient is, how it "fits" and benefits them, and how they can realize those benefits. To construct a regional communications effort we need to use strategies that will both change behavior and bolster local efficiency programs. If we capitalize on what has been learned about behavior change, conduct research to improve our insights, and add a regional voice to individual efforts, we can catalyze the process of making energy efficiency as normal as recycling or not littering.

RECOMMENDATIONS

1. **Create a Coordinating Council of interested utilities, businesses, NGO's and other interested organizations**
    a. Organize under the NEEA umbrella for administration and execution support.
    b. Establish regional marketing coordination framework
    c. Meet quarterly to discuss and design regionally-coordinated marketing activities in existing energy efficiency marketing efforts

2. **Once established, the Council's second initiative will be to research and, if indicated, design a new regionally-coordinated outreach effort to enhance local energy efficiency marketing efforts. The NEET committee recommends the following steps as an outline for the Council in designing any new regional initiative.**
    a. Evaluate current research and conduct new research to assure regional success
        > Identify what consumers believe are conservation and energy efficiency behaviors
        > Determine what motivates consumers to be more energy efficient

    b. Use that research to develop a regional outreach campaign
        > Advance the energy efficiency efforts across the region by developing an outreach plan with specific goals and outcomes, seeking commonality among participants
        > Provide specific actions for consumers to take (especially "contact your utility/energy organization")
        > Target residential consumers initially because those efforts will also reach other sectors at some level

    c. Achieve participation by most regional utilities and energy organizations
        > Create opportunity through development and provision of a useful tool kit to promote implementation of the campaign at the local level
        > Assure that individual utilities and organizations can support the campaign on the local level in a way that leverages and augments their unique relationship with their constituents

d. Develop ongoing (multi-year) outreach efforts that will build on the value of the original campaign to maximize overall impact

> Track key success metrics over time—including public awareness, media coverage and increased energy efficiency—and optimize the campaign accordingly

> Be prepared to meet additional value propositions as more partners, such as businesses and state and local government, are recruited to support the efforts

RESEARCH

The Research Subgroup found that several segmentation studies have already been carried out or are underway across the region. The methodology for these studies has largely been modeled after the study launched by Puget Sound Energy, which was carried out with the purpose of moving customers to take action on specific utility-driven options (e.g., home energy audits, CFL programs, etc.). Additional local studies include those conducted by BC Hydro, Snohomish Public Utility District and the Energy Trust of Oregon. Bonneville Power Administration is conducting this research at a regional level, which will provide a broader view of Northwest residential segments. Much of the data collected from these studies can be used to craft a regional outreach effort designed to change the behaviors of Northwesterners; however, making energy efficiency a new social norm (akin to recycling and not littering) will require additional research. We still need to understand:

> *What consumers think are conservation and energy efficient behaviors*
We know very little about what consumers think constitutes "conservation" or "energy efficiency." How does energy efficiency fit with being "green," sustainability, and global warming—is there any connection? How well do consumers understand energy terms and choices? What behaviors, decisions or equipment do they associate with saving energy? Do they understand where they can save the most? This information is critical to choosing marketing/outreach messages.

> *The motivating benefits of conservation and energy efficient behaviors*
We don't know what factors are most important for motivating specific segments of people to do energy efficiency regionally. Do they need to know that a behavior or widget is needed for energy efficiency? Is there a better reason for a specific energy efficiency behavior that motivates them (such as saving money)? This information would help determine outreach messages.

> *How successful other energy efficiency (and possibly climate change, water conservation, non-energy) campaigns have been*
There have been some large-scale outreach campaigns in energy efficiency and other "green" fields, but there is little sense of their identifiable effect. Some may have been formally evaluated. In addition to investigating viable outreach tactics that have already been demonstrated, we should examine what metrics were used to judge effectiveness. As part of that research, we need to determine what we think are *appropriate* metrics for evaluating such outreach efforts.

The subgroup used the following guiding principles to develop their recommendations:

1. Analyze what has already been done and learned *before* conducting additional research
2. Refrain from conducting more primary research until outreach goals and success metrics are specified
3. Specify how research will be linked to outreach goals, decisions and success metrics before being conducted

The final recommendation of the Research Subgroup, which was adopted unanimously by the full membership of Workgroup #4, is:

Conduct qualitative and quantitative research that identifies what consumers believe to be conservation and energy efficiency behaviors and determines what motivates consumers to be more energy efficient

Research framework recommended by the Research Subgroup for the Coordinating Council to consider:

Phase 1: **Secondary Research** Summarize what we know about the regional population
- > Summarize what has been done and learned from key energy efficiency/global warming behavior change efforts
- > Summarize what has been done and learned from other relevant efforts (non-energy related)

Phase 2: **Primary Research—Exploratory**
- > Explore strategies for how to get "believers" to do more
- > Explore strategies for reaching and motivating "quasi- and non-believers"

Phase 3: **Primary Research—Conclusive**
- > Identify most compelling messaging by key behavioral and demographic segments; quantify baseline levels of key success metrics (e.g.: awareness, perceptions, behaviors)
- > Test specific "delivery approaches" (e.g., copy, creative executions, "messengers")

If an outreach campaign is launched it is recommended that key success metrics are tracked over time to inform campaign optimization.

COORDINATED MARKETING SUBCOMMITTEE/TOOLKIT

The Workgroup explored numerous localized energy efficiency outreach efforts (primarily conducted by local utilities) as well as coordinated regional efforts conducted outside of the Northwest (California's "Flex Your Power," Connecticut's "One Thing," Ireland's "Power of One"). While it is clear that utilities and energy-efficiency organizations provide actions for consumers to take to promote energy efficiency at a local level, individually we don't have the resources to influence behavior change at the level of other successful regional efforts.

While Coordinated Marketing Subcommittee members agreed that some type of regional outreach was needed to develop a new social norm, opinions varied greatly on the breadth of that outreach. The subcommittee conducted foundational strategy work to gain consensus among all members. As a result of that work, the subcommittee developed the following guiding principles to craft their recommendations:

- > **Mission Statement:** Cooperatively promote increased energy efficiency behavior throughout the Northwest to reduce energy use
- > **Statement of Purpose:** Consumers embrace energy efficiency resulting in reduced demand

> **Success Looks Like:** People know what steps to take, there is more consumer engagement with utility programs, and efficiency is the new social norm

The final recommendation of the Coordinated Marketing Subcommittee, which was adopted unanimously by the full membership of Workgroup #4, is:

Establish a cooperative regional outreach effort that will promote increased energy efficiency behavior throughout the Northwest to reduce energy use

To accomplish this, the subcommittee recommends:

> Develop channel strategy for utilities, utility organizations, governments, businesses, local organizations and individuals to participate
> Seek to promote the needs of utilities across the region by seeking commonality among them
> Provide specific actions for consumers to take (especially, "call your utility/energy organization")
> Create a toolkit with consistent messaging, graphics, and style for use by all channels

The subgroup further recommends that this is an ongoing effort. Incremental results are critical; the value of ongoing communications outreach far surpasses the original value. Additional participation from other stakeholders, including local/state governments and private business, will be important to ongoing success.

TACTICS

Startup costs:

> NEEA administrative costs to support the establishment and initial work of the Coordinating Council $75K -- $150K

Implementation:

> Research
> Creative (messaging, strategy, creative/campaign development, social media)
> Collateral development, including toolkit and consumer website
> Packaging/distribution of materials (including internal website)
> Further exploration will inform the need for public relations (including social media implementation)

Ongoing Efforts

- Research/metrics
- Creative optimization
- Collateral optimization, website maintenance
- Packaging optimization including internal website maintenance
- Administration

EXECUTIVE COMMITTEE QUESTIONS

1. **What is the value added to the region by the recommendation(s)?**
   If we coordinate our resources we get a much better understanding of what motivates energy consumers. The result of that understanding and the subsequent activities benefits the consumer and reduces confusion in their mind about how to become more efficient. None of us can do it as effectively or as cost-efficiently alone as we can do it regionally. We need to gain the synergies of coordinated efforts.

   More importantly, there is a cost of not promoting energy efficiency at a regional level. Continuing to use the same channels to promote efficiency means getting the same results. Instead, we need to see dramatically increased energy efficiency. We expect to see success due to increased understanding by consumers, clarity of message, consistency of message, extended reach and the activation of social channels that currently don't exist.

2. **What is not occurring now that we should be doing?**
   We do not leverage consistent messaging and marketing from one another that would significantly contribute to increased energy efficiency. Today there are pockets of cooperative efficiency program marketing and messaging. Establishing a formal mechanism to both better coordinate existing marketing efforts as well as look for new channels would significantly contribute to increased efficiency.

3. **Is there a way to do things more efficiently than what we are doing today?**
   These recommendations will produce materials that support coordination of marketing efforts to add incremental value to current programs. We are going to bring new value, not take away from current efforts. The local utility will be more effective at what they do because there is a regional message.

4. **How would you suggest that your recommendations be implemented?**
   The Workgroup recommends the implementation entities:
   1. *Coordinating Council with an executive committee.* The council will have a regional voice, with a membership consisting of representatives from public and private utilities, energy-efficiency non-government organizations and other appropriate stakeholders. They will direct the work through a tactical point person or subgroup.
   2. *Facilitation entity.* We recommend that NEEA fill that role, providing administrative and fiscal oversight and housing campaign assets.
   3. *Contractor(s).* Agencies and consultants as needed to do the work output.

   We recommend shared-cost funding. The method of determining the shared costs would be developed with direction from NEET Executive Committee.

5. **Is there strong support within your Work Group for priority recommendations?**
   There is strong support in the Work Group for enhanced coordination of outreach activities at a regional level. Additionally, the workgroup feels that a regional coordinating council will play an important role in addressing two existing concerns: a shared desire to manage costs; and a call to position the local utility/energy organization as the energy efficiency authority.

APPENDIX D-2
WORK GROUP 4: RESEARCH SUB-COMMITTEE RECOMMENDATIONS

Guiding Principles

4. Analyze what has already been done/learned **before** conducting additional research
5. Refrain from conducting more primary research until marketing goals and success metrics are specified
6. Specify how research will be linked to marketing goals/decisions and success metrics before it is conducted

Research Objectives

1. Identify what consumers believe are conservation and energy efficiency behaviors
2. Determine what motivates consumers to be more energy efficient

Objective	Methodology	Estimated Budget	Time Required
Phase 1: Secondary Research			
1. Summarize What We Know About the **NW Population**, including: • Energy efficiency and other environmental attitudes & behaviors • Identify size and characteristics of various behavioral and demographic segments • Hypothesize likely motivators for/approaches to behavior change	Compile/analyze/summarize data from existing studies (specifically, segmentation studies from PSE, BPA, Snohomish PUD, Energy Trust of OR, BC Hydro, Ontario Power Authority)	$25K - $50K (depends on amount of analysis)	8 – 12 weeks (could be done concurrently with tasks 2 and 3)
2. Summarize What's Been Done/Learned from Key Energy Efficiency/Global Warming Behavior Change efforts, including: • Energy efficiency behavior change efforts/campaigns to date (e.g., Avista "Every Little Bit", CA "Flex Your Power," CT "One Thing," Northeast's "Start Small Save Big," Gore's "We" campaign) • Compile lessons learned/ideas from the above efforts • Identify success metrics from campaigns	Secondary research + interviews	$25-50K (depends on amount of analysis)	8 – 12 weeks (could be done concurrently with tasks 1 and 3)
3. Summarize What's Been Done/Learned from Other Relevant Efforts (Non-energy Related) • Identify and compile summary of effective behavior change efforts outside of the energy efficiency field (e.g., anti-littering; recycling, preventive health) • Summarize lessons learned/ideas from the above efforts	Secondary research	$25-50K (depends on amount of analysis)	8 – 12 weeks (could be done concurrently with tasks 1 and 2)

Phase 2: Primary Research—Exploratory			
4. Explore strategies for how to get customers who have already acted to do more / explore strategies for reaching and motivating customers who have not done energy efficiency • How to reach them/what will get their attention in this "green" world • What will motivate them (even if they don't know it, like normative behavior) • What will change what they do/increase what they do • Who are the most effective "messengers" and situations for success (i.e., under what circumstances do people learn the best, change the most)	TBD, but may include: focus groups, ethnographic research, experimental research or applied experiments to test behavioral economics concepts like choice order, opt-in/opt out strategies, the power of free, normative behavior	$50K - $150K (depending on number of groups and locations: $50K for 6-7 groups in 2-3 cities)	3 – 6 months
Phase 3: Primary Research—Conclusive			
5. Identify most compelling messaging by key behavioral/ demographic segment; quantify baseline levels of key success metrics (e.g., awareness, perceptions, behaviors)	Regional quantitative survey	$150K	8 – 12 weeks
6. Test specific "delivery approaches" (e.g., copy, creative executions, "messengers")	TBD, but may include: focus groups, quantitative copy testing and experimental test approaches as above	$50K - $150K (depending on number of groups and locations: $50K for 6-7 groups in 2-3 cities)	3 – 6 months
7. Track key success metrics over time	Regional quantitative survey	$150K+ every 1-2 yrs	8-12 weeks
8. Repeat segmentation	Regional quantitative survey	$200 - $300K every 3-5 years	3 – 4 months

Outstanding Questions: Limit to residential consumers or add in business, institutional customers? There are many links among these groups that need exploring. In addition, business/institutions might sponsor research, implementation.

- Will research only target consumers?
- Do we include business/institutions?
- What about other stakeholder groups, like policy makers?

APPENDIX D-3
WORK GROUP 4: COORDINATED MARKETING SUB-COMMITTEE RECOMMENDATIONS

Mission Statement: Cooperatively promote increased energy efficiency behavior throughout the Northwest to reduce energy use.

Statement of Purpose: Consumers embrace energy efficiency resulting in reduced demand.

Success Looks Like: People know what steps to take: there is more consumer engagement with utility programs; and, efficiency is the new social norm.

I. **Through a coordinated regional outreach and communications effort, drive increased energy efficiency.**
   A. Seek to promote the needs of utilities across the region by seeking commonality among them.
   B. Provide specific actions for consumers to take (especially, "call your utility").
   C. Develop a tool kit for use by utilities in the region as each sees the way clear.
   D. Develop and implement consistent messaging
   E. Develop graphics and style guide for using tool kit elements.
   F. Consider future regional awareness campaign run by utility partnership—after effort is established.
   G. Channel strategy: local organizations and individuals.

II. **Research will inform the outreach and communications effort.**
   A. Ask research to analyze existing segmentation studies and determine sufficiency.
   B. Ask research to focus on defining segments and motivations behind changing behavior.
   C. Encourage research to review and incorporate existing best practices.

III. **Establish a forum for regional coordination.**
   A. Type of structure for future implementation dependent on funding and informed by research outcomes.
   B. Where structure is housed and how it is framed is fundamental to success.
   C. Must be representative of the region and its varied interests.
   D. Coordinating body, like this subcommittee, can provide direction to a day-to-day implementation body.

IV. **Achieve participation by most utilities and energy organizations.**

A. Develop plan with goals and outcomes.
B. Define decision makers and identify barriers to participation.
C. Create the opportunity through development and provision of a useful tool kit.
D. Define successful level of participation.
E. Chanel strategy by utilities and utility organizations.

V. **Gain support from businesses and local and state governments.**

A. Develop a plan and timetable for how these entities could be involved.
B. Be prepared to meet a different value proposition.
C. Value of third-party participation lies with validation, credibility and adding local relevancy.
D. Chanel strategy: a defined way for businesses and governments to participate.

VI. **Create and apply a framework for measuring results.**

A. Work with planning and evaluation experts to identify what measures and determine how to measure.
B. Quantify participation by businesses and other third parties.
C. Work with planning and evaluation experts to identify what measures and determine how to measure.
D. Analyze public awareness and media coverage.

VII. **Identify and secure funding.**

A. Explore BPA role in funding (ratepayer funds).
B. Explore NEEA model (based on kWH sales) and role in funding.
C. Sustainability of funding is key to overall success.
D. Keep start-up costs modest and assign execution to utilities, businesses and local and state governments.
E. Encourage the Executive Committee to address funding and prioritization for all Work Groups.
F. Look into how potential funding from business and government might be leveraged.

VIII. **Potential Costs**

Startup costs:

A. Research $325−600k
B. Creative (messaging, strategy, creative/campaign development, social media) $200k−$500k
C. Collateral development, including toolkit and consumer website: $200−$500k
D. Packaging/distribution of materials (including internal website): $50−$150k
E. Administrative costs: 10%

This does not include budget for local implementation. Further exploration will inform the need for public relations (including social media implementation), which could cost $150-$600k if determined appropriate.

Ongoing costs (per year for multi-year efforts):

A. Research/metrics $100−$150k
B. Creative optimization: $50−$200k
C. Collateral optimization, website maintenance: $50−$200k
D. Packaging optimization including internal website maintenance: $20−$50k
E. Administrative costs: 10%

Supporting Details

Goal 1: Through a coordinated regional outreach and communication effort, drive increased energy efficiency.

A. Seek to promote the needs of utilities across the region by seeking commonality among them.
B. Provide specific actions for consumers to take (especially, "call your utility" or "visit www.xyz.com").
C. Develop a tool kit for use by utilities in the region as each sees the way clear.
D. Develop and implement consistent messaging.
    1. Drive home why people should engage in efficient use of energy
    2. Residential customer messaging to focus on "why."
    3. Communicate the why. The call to action is: call—or visit the website—to find out how.
    4. Needs to be compelling and personal.
E. Develop graphics and style guide for using took kit elements.
    1. Logo and/or tagline to be used consistently
    2. Web elements
    3. Clear guidelines and usage requirements for third parties
    4. Call to action
    5. Ad templates
    6. Direct mail
    7. Radio scripts
    8. Social networking tools
    9. Central landing place (website) directs to specific utilities
    10. PR, media relations tools
    11. Peer-to-peer viral elements
F. Consider future awareness campaign run by utility partnership—after initial effort is established.
G. Channel strategy: local organizations and individuals.
    1. Tool kit: self-service elements with general guidelines
    2. Value proposition that's compelling for NGOs and individuals
    3. Viral elements for peer-to-peer promotion

Goal 2: Research will inform the outreach and communications effort.

A. Ask research to analyze existing segmentation studies and determine sufficiency.
    1. Review/aggregate/analyze existing segmentation studies (BPA, Snohomish PUD, PSE, etc.)
    2. How effective are existing communications?
    3. Define segments and determine what motivates.
    4. Direct toward key messages.
    5. Review and incorporate best practices.

B. Ask research to focus on defining segments and motivations behind changing behavior.
    1. Who will be our "early majority" audience?
    2. What messages will resonate with them, yet have spillover engagement?

C. Encourage research to review and incorporate existing best practices.
    1. Examine past regional efforts. What lessons and best practices can we take?
    2. How will we do pre- and post-awareness measurement?
    3. How can we better coordinate methodologies and approaches to make information comparable/consistent across the region?

Goal 3: Establish a forum for regional coordination.

A. Type of structure for future implementation dependent on funding and informed by research outcomes.
    1. Consider continued participation in this subcommittee.
    2. This subcommittee could give direction to a third party.
    3. NEEA is a definite possibility.

B. Where structure is housed and how it is framed is fundamental to success.

C. Must be representative of the region and its varied interests.

D. Coordinating body, like this subcommittee, can provide direction to a day-to-day implementation body.

Goal 4: Achieve participation by most utilities and energy organizations.

A. Develop plan with goals and outcomes.

B. Define decision-makers and identify barriers to participation.

C. Create the opportunity through development and provision of a useful tool kit.

D. Define successful level of participation.

E. Channel strategy by utilities and utility organizations.
    1. Specific style and usage guidelines.
    2. Energy efficiency awareness building
    3. Program promotion.
    4. PR, media relations

Goal 5: Gain support from businesses and local state governments.

A. Develop a plan and schedule for how these entities could be involved.
B. Be prepared to meet a different value proposition.
C. Value of third-party participation lies with validation, credibility and adding local relevancy.
D. Channel strategy: a defined way for government and business to participate.
    1. Specific style and usage requirements.
    2. Compelling value proposition.
    3. For both promotion of energy efficiency generally and for product promotion.

Goal 6: Create and apply a framework for measuring results.

A. Work with planning and evaluation experts to identify what measures and determine how to measure.
B. Quantify participation by businesses and other third parties.
C. Work with planning and evaluation experts to identify what measures and determine how to measure.
D. Analyze public awareness and media coverage.

Goal 7: Identify and secure funding.

A. Explore BPA role in funding (ratepayer funds).
B. Explore NEEA model (based on kWH sales) and role in funding.
C. Sustainability of funding is key to overall success.
D. Keep start-up costs modest and assign execution to utilities, businesses and local state governments.
E. Encourage the Executive Committee to address funding and prioritization for all Work Groups.
F. Look into how potential funding from business and government might be leveraged.

<u>Subcommittee members</u>
Larry Bryant, co-chair (Kootenai Electric Cooperative)
Kathi VanderZanden, co-chair (PNGC Power)

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Diana Echeverria (Idaho Power)
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Grant Ringel (Puget Sound Energy)
Jan Schaeffer (Energy Trust of Oregon)

APPENDIX E-1
WORK GROUP 5: DRAFT REPORT AND RECOMMENDATIONS WORKFORCE OF THE FUTURE

Draft Final Report

I. Introduction

Work group five was drafted to address the central question, "Facing today's demographics, how do we create systems that build and sustain energy efficiency talent to meet today's and the future's needs?" In the preliminary meetings in mid-August and early September of 2008, the workgroup decided to focus its approach through input from group member expertise and a literature review. Additionally, a decision was made to focus on short-term actionable items. Staff from PSE and PacifiCorp provided support and conducted research.

II. Brief Discussion of Background and Literature Review

A convergence of factors presents both opportunity and challenge for increased energy efficiency deployment. Economic and policy actions are driving the expansion of energy efficiency at a rapid rate. Long term projections of energy supply costs are climbing making energy efficiency an alternative resource choice. 26 states have renewable portfolio standards in place and 16 states have energy efficiency requirements in place.

The growth of energy efficiency both regionally and nationally is also documented from a variety of sources. The National Action Plan for Energy Efficiency reports energy efficiency programs will increase 15% in the near term and energy service companies (ESCO) revenues to increase 22%.[1] The American Solar Energy Society counts 8 million jobs created in the U.S. Energy Efficiency industry in 2006 [2] and The Center on Wisconsin Energy estimates 10 jobs are created for every $1 million invested in energy efficiency measures. [3]

While these trends are reason for optimism for the growth of energy efficiency in the Northwest, several other factors present challenges that may impede the projected attainment of energy efficiency. Primary among these is the imminent retirement of 50% of the workforce in the coming five years. Magnifying the importance of this trend is a general decline in the working age cohorts of the population until 2030, and particularly declining numbers of workers in the skilled trades as well as graduates and enrollments in engineering programs.[4] Confounding these broader trends, there is difficulty in identifying true workforce and job data for the energy efficiency industry. Employment in energy efficiency is refracted across utilities, federal and state programs, manufacturing, construction, and other disparate job classifications. This makes it especially challenging to assess the specific numbers of employees needed to attain energy efficiency goals. Additionally, the economic downturn of 2008 may dampen energy efficiency demand for the short term and it is likely that state discretionary funds may not be available for workforce issues until a recovery ensues.

III. Findings and Issues

Among the available literature for review, a great deal was written about Green Collar/Green Economy Job development, but little specific mention or analysis of energy efficiency projections or needs. Some efforts that are slated for completion beyond the timeframe of the Northwest Energy Efficiency Task Force offer promise such as the DOE office of Energy Efficiency and Renewable Energy draft report from LBNL on Commercial and Industrial workforce needs, due in February 2009. Also a report is expected in August 2009 from the Oregon Economic and Community Development Department which has a workgroup examining energy efficiency as part of its Clean Tech Action Plan.[5]

A suite of jobs have been suggested as areas of need including mechanical engineering, building commissioning, HVAC specialists, program management and skilled labor positions in construction, metal working, pipe fitting, and others. However, there has not been a specific classification of numbers of positions needed nor prioritization of need.

Research has also indicated that there is a lack of strategic coordination and communication among institutions able to address the impending need. These include: utilities, education, organized labor, state workforce coordinating boards, community based and non-profit organizations, and private training programs. There is a lack of data as to the skills required to complete energy efficiency work, types of positions needed, demand for these positions, and pay rates. Colleges, labor union training programs and other learning institutions need this information in order to expand their offerings and attract students. One may also conclude that given the lack of specific focus on energy efficiency in the reviewed studies, there is likely a lack of public awareness of the career opportunities and contributions of energy efficiency to the green economy. Table 1 summarizes the primary research findings.

Table 1

Key Themes That Emerged From the Literature Review	
Lack of data for energy efficiency workforce development	• Skills required • Positions needed • Pay rates • Public Awareness
A lack of strategic coordination among energy efficiency workforce development players	• Community based training programs • Education • Organized labor • Private training programs • State workforce and training boards • Utilities and Industry
Lack of funding for workforce development training	• Present economic downturn • State budget deficit (WA)

IV. Recommendations

Given the research findings and regional resources, three recommendations summarized in Table 2 on page 4 are put forward to advance the development of a regional energy efficiency workforce. A brief explanation of each recommendation follows with a rationale for the best organization to carry them forward. Figure 1 on page 5 presents a high-level organizational scheme illustrating a regional model for energy efficiency workforce development.

Recommendation 1

The findings from the literature review make clear that a primary step is to conduct an assessment for the region that will define and segment energy efficiency from other green economy jobs, establish skill standards, and identify job classifications that will be referenced across the region. Several studies may have high value informing the regional study and need to be tracked closely as a part of this effort. These studies are listed as a part of this action item in Table 1. It is suggested that NEEA become the responsible party in the region to implement this recommendation. NEEA is best positioned to coordinate such a project for the region, including selecting and managing a third-party professional assessment with a scope that is inclusive of the many dimensions of energy efficiency employment as outlined above.

Recommendation 2

The second recommendation advises that a clearinghouse of the results and findings from the regional energy efficiency study to be made accessible to the regional organizations. The clearinghouse should include relevant study data such as skill standards and defined energy efficiency job classifications, best practices in recruitment and retention, and a place for organizations to post openings. Additionally, an index of regional education and training program needs, offerings, and providers should be included. This will help both employers and education and training organizations speak a common language regarding their employment needs and program focus. NEEA again makes sense as the body to implement this recommendation due to its regional communication capabilities and consistency with its mission.

Recommendation 3

The research findings also support the establishment of a strategic coordinating body for the region. As articulated earlier, energy efficiency is a diffuse industry with employment and training across a broad range of occupations. A central coordinating body will partner with other entities in the region to advise training institutions on energy efficiency skills standards and aid them in the development of their curriculum. The coordinating body will establish and maintain communication between industry, labor and training institutions to: assure that quality programs are developed, industry's needs are met by graduates, and students are being placed in appropriate positions. It will also help avoid unnecessary duplication of effort and therefore more efficient use of available

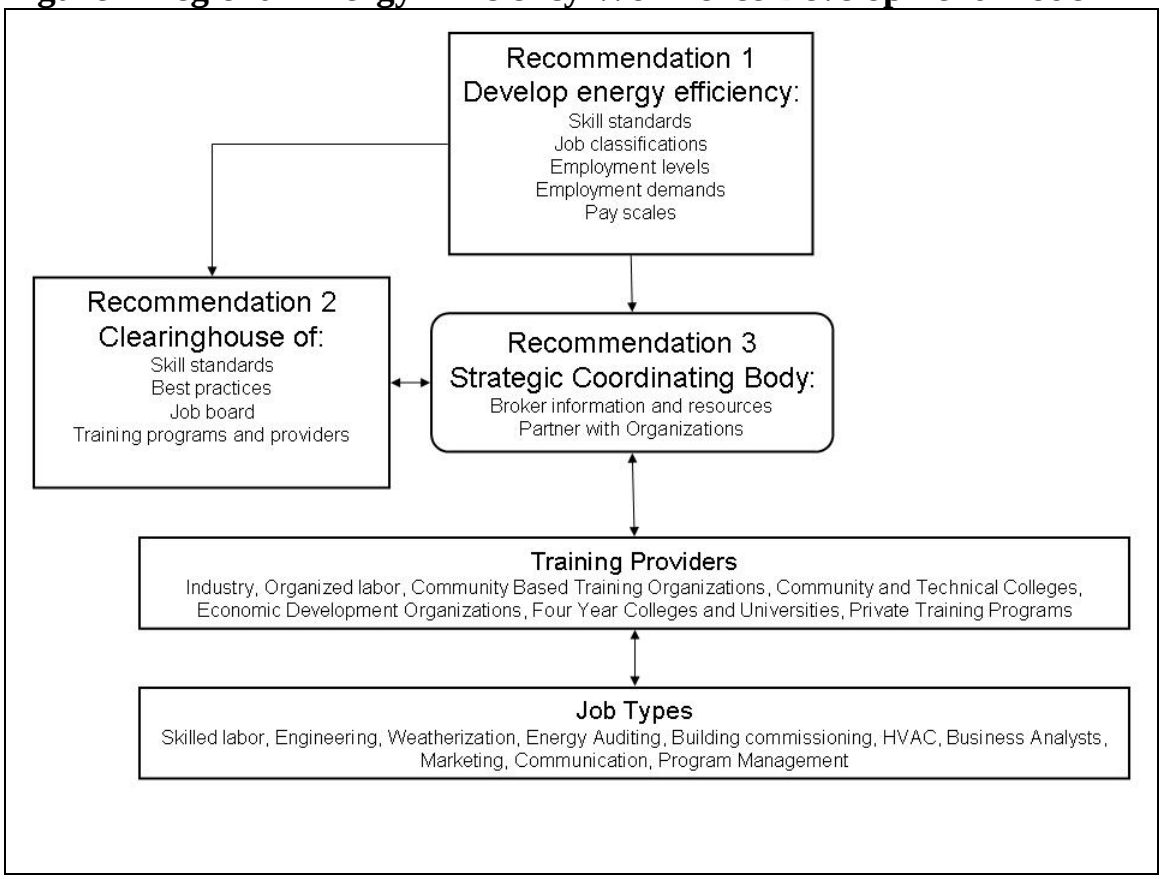
Table 2 NEET Workgroup Five Summary of Recommendations

Area of Focus	Recommendation	Responsible party	Timeframe of Accomplishment
Define need for and job classifications of energy efficiency workforce	Conduct a regional workforce assessment for Energy Efficiency detailing: • Skill standards • Job classifications • Employment levels • Employment demands • Pay scales Track and integrate results of: 1. Sustainable Oregon Workforce initiative (3E Strategies) 2. Washington State Green Workforce Labor Market Survey 3. LBNL Study of C/I workforce needs	NEEA	2009
Build and maintain a regional jobs and skills clearinghouse	Establish a clearinghouse for: I. Skill standard assessment data II. Best practices in recruitment and retention III. Place to post job openings IV. An index of training programs and providers	NEEA	2009-2010
Facilitate strategic Coordination of the workforce pipeline.	Create/leverage an education and training model for the region	Center of Excellence for Energy Technology at Centralia College	2009-2010

funding in the region. Training programs will continue to be developed, conducted, and controlled by individual schools, labor organizations, and local economic development agencies.

The Center of Excellence for Energy Technology at Centralia College (COE) has built up substantial expertise in workforce development for the electrical energy sector, and has worked beyond its state borders to consult with sister institutions in Oregon and Idaho about developing similar workforce programs. It has also demonstrated the ability to work with a diverse set of education and training institutions, each operating in a unique set of mission goals, funding systems, and accountability requirements. Given its proven track record, it makes sense that the COE takes this role of acting as a facilitator in the region complementing the roles recommended for NEEA.

Figure 1 Regional Energy Efficiency Workforce Development Model



Note the examples listed in the above diagram are intended to be a representational though not exhaustive list of involved organizations and job type.

V. Transition and Next Steps

Action to implement the energy efficiency workforce development project can begin in January 2009. Preliminary steps below may be completed within approximately a four month timeframe. A total of $125,000 in seed money will be required to enable both NEEA and The Center of Excellence for Energy Technology to begin work. Given the present economic conditions and state budget constraints, it is assumed that additional grant based funding and contributions from the energy industry will need to be acquired to implement the recommendations in this report. Given the regional scale of the project, public/private collaboration, diversity of the parties involved, and political will to stimulate green economic development, the energy efficiency workforce development project appears ripe to attract funding.

NEEA will require $75,000 to allocate a staff person to the project and form an advisory board representing industry, organized labor, education, community based training organizations and other relevant parties from the four state region. The advisory board will inform the scope of work for both the energy efficiency labor assessment and clearinghouse. The assessment will create an index of energy efficiency occupations and work skills and estimate the demand levels for each. As part of this process create a common language and consistent process across the region to define and track green jobs. NEEA will also identify an existing entity to host a clearinghouse function to track energy efficiency job data.

The COE will need $50,000 for startup costs. This money will be used to secure a professional grant writer, part-time administrative support, and travel within the region. Work will begin immediately to secure partnerships among the utility industry, organized labor, community and technical colleges, workforce development boards, and economic development councils. The initial approach will identify educational leaders in each state for example: Idaho States Energy Systems Technology Education Center Program, Montana State University, Lane Community College, Portland State University, and the existing relationships between Washington Community and Technical colleges and the COE. Simultaneously the hired grant writer will research and secure funding for the regional effort to complement funds supplied by industry. These preliminary steps will enable the COE as the strategic coordinating body to:

1. Develop strategic partnerships.
2. Ensure quality of existing training programs and coordinate the development of new programs.
3. Maintain the training inventory portion of the regional clearinghouse.
4. Facilitate the growth and maintenance of the workforce development pipeline.

APPENDIX F-1
WORK GROUP 6: DRAFT REPORT AND RECOMMENDATIONS RETHINKING GOVERNANCE AND ENERGY EFFICIENCY POLICIES

How do we optimize the alignment of regulatory practice with public policy goals?

Draft Report and Recommendations

Work Group 6 divided itself into four sub Work Groups: Program Policies, which dealt with cost effectiveness and cost recovery policies; Load Management and Smart Grid, Direct Application Renewables and Decoupling. This Report covers the first three sub Work Groups' first and second priority recommendations. The Decoupling sub Work Group submitted its final report separately. Although none of the Work Group 6 recommendations calls for the formation of new regional entities or substantial new responsibilities for existing regional entities, they ask for new thinking and new solutions for a very broad variety of actors throughout the region. They ask public utility commissions, individual utilities both publicly and investor owned, the governing boards of publicly owned utilities, the Northwest Power and Conservation Council, the Bonneville Power Administration and others to make changes in some of the important policies that govern the acquisition of energy efficiency in the region. Work Group 6 members believe that these changes are critical for a new generation of energy efficiency to provide the foundation for green jobs, a healthy economy and a stable climate the twenty first century.

1. Cost Effectiveness

Priority Recommendation on Cost Effectiveness: To accelerate regional energy efficiency, cost-effectiveness rules and regulations should allow "bundling" of energy efficiency measures so long as the bundle of measures costs less than avoided cost.

Problem: Some utilities miss a lot of conservation potential by applying the cost effectiveness test to the measure level instead of the building or project level. This approach limits regional energy savings in several important ways:

- It misses the opportunity to motivate customers to do more energy efficiency measures at the same time;
- Many customers are turned off from participating in any conservation program the utility offers because the one measure they really want (e.g., windows) isn't eligible for incentives;
- Not including minor repair work (e.g., a hole in the roof) as part of low-income weatherization negates the very purpose of the program.

Solution: Rules and regulations should encourage bundling at the project (home, building, facility) level. For example, utility incentive programs are likely to attract more program participants to their home weatherization programs IF they offer financial incentives for retrofitting windows (paying for the kwh savings value to the utility) as a package deal. For low-income weatherization programs, measures essential to the proper installation and effective functioning of the efficiency measures should be bundled with the efficiency measures with the bundle subjected to the avoided cost test.

Discussion:

- Investing in measures that are more expensive than avoided cost might lead to increases in "free-riders," but including those measures only when they can be bundled into a package that costs less than avoided cost mitigates that risk.
- The Direct Application Renewables recommendation proposes bundling customer-side-of-the-meter renewable projects with energy efficiency measures for many of the same reasons cited in this recommendation.
- Endorsing bundling would expand the I-937 definition of conservation Washington utilities are required to achieve. But utility IRPs and conservation plans calculate the TRC of energy efficiency portfolios and programs, not individual buildings. Over time, the Council's model may be able to capture the conservation potential of bundling at the individual building or project level, the first time that would happen comprehensively would be in the Seventh Power Plan, more than five years from now.

What is the value added to the region of the recommendation? Why is it important?
This change would increase efficiency savings

a) By doing more measures,
b) By leveraging less attractive but more cost-effective measures through customer interest in less cost-effective measures (leveraging attic insulation with new windows in single family homes), and
c) By meeting customer interests and preferences.

This recommendation would reduce long-term program costs by eliminating the need to return to a project in the future when, for example, windows do meet the cost effectiveness test. Cutting off cost-effectiveness at the measure level is one of the main reasons energy efficiency investments at the program level come in so much lower than the avoided cost of new generation. While this phenomenon helps sell energy efficiency in policy debates, it is not clear that society, utilities or customers are better off when we invest in energy efficiency only up to 1¢ or 2¢ per kwh.

What is not occurring now that we should be doing?
Many utilities are already bundling, but there is widespread confusion on the application of Northwest Power and Conservation Council (NPCC) and Regional Technical Forum (RTF) methodologies, Bonneville program specifications and in some cases, state law restrictions. Public utility commission guidelines may not be as ambiguous. All energy efficiency incentive programs should be bundling measures at the project level.

Is there a way to do things more efficiently than what we are doing today?
The Council and the RTF should develop a "Cost-Effectiveness for Dummies" handbook written for non-technical policy makers and utility managers. Such a handbook would increase regionally consistent understanding and application of how cost-effectiveness is calculated and how and when to apply it. It would eliminate one barrier cited by some utilities that continue to avoid investing in energy efficiency.

How would you suggest that your recommendations be implemented? Who and how?
The NPCC, the Regional Technical Forum, the Bonneville Power Administration, and individual publicly owned utilities and public utility commission should examine their cost-effectiveness rules, regulations, orders, specifications and other guidelines to determine whether they allow bundling at the project level and if they do not, adopt changes to allow it.

Is there strong support within your Work Group for the priority recommendations? Support was nearly unanimous.

Secondary Recommendations on Cost Effectiveness

In addition to the Primary Recommendation, above, the sub-Work Group on Program Policies considered a number of additional possible changes to current cost-effectiveness definitions and rules, many of which would increase the amount of deliverable energy efficiency in the region and thus align regulatory practice with public policy goals. Workgroup 6, with nearly unanimous support, is endorsing two of those recommendations for further consideration by the Executive Committee. They are presented below and relate to how energy codes and standards interact with cost-effectiveness restrictions and how cost effectiveness tests treat non-energy benefits.

Three other policy concepts were also put forward but for a variety of reasons, they are not included as secondary recommendations:

- Health and safety measures in low-income energy efficiency programs
- Determination of avoided cost for BPA customers post 2011
- Regionally consistent CO2 values for utilities to include in their IRPs and to use in assessing cost effectiveness of energy efficiency at project and program levels.

- ***Secondary Recommendation on Cost Effectiveness - Codes and Standards:*** In commercial building retrofits, existing HVAC operating conditions should be considered as baseline instead considering building energy codes or standards as baseline.

***Problem*:** Some commercial HVAC energy efficiency retrofits are considered to be building renovation project, thereby triggering local or state energy codes or standards. Since utility financial incentives pay only for the incremental energy savings associated with *exceeding* codes and standards, the utility may no be able to offer a financial incentive large enough for the customer to proceed with the project. The customer then opts to continue with the old, inefficient equipment.

Solution: Even if an HVAC energy efficiency retrofit project inadvertently triggers the energy code (i.e., the project was initiated as an energy efficiency project – not as part of a building renovation) the retrofit's energy savings value (and potential utility incentive payment) should be based on the incremental savings between the existing equipment and the more energy efficient equipment.

Discussion: Many utility program staff and others involved in implementing energy efficiency retrofits are reporting that advanced energy codes are, in certain circumstances, actually *slowing* investments in energy efficiency. What can happen is that a commercial building owner responds to a conservation program offer to help pay up to 75% of the cost of an HVAC improvement. Once actual design and specification work gets started, the building owner learns that the size of the project triggers the energy code, and the only incentive payment available is, if any, the small amount to exceed the energy code. This means a substantial out-of-pocket expense for the owner to replace an old but still functioning HVAC system (or component) – and how many of us are willing to spend a lot of money to replace something that is working, To achieve more of our region's energy conservation potential, utility incentive programs and rules need to be structured to *encourage* early replacement of inefficient equipment.

What is the value added to the region of the recommendation? Why is it important?
By adopting this recommendation, we can replace more older, inefficient HVAC equipment with efficient, new equipment – in other words, capture a lot more of the energy efficiency that is identified as cost effective but not achievable. This policy change removes a real barrier to increased energy efficiency, making it easier for utilities to market their programs and to achieve their goals.

What is not occurring now that we should be doing?
See above.
Is there a way to do things more efficiently than what we are doing today? NA

How would you suggest that your recommendations be implemented? Who and how?
This recommendation is aimed at utilities, the Regional Technical Forum, BPA and all decision makers involved in conservation program design and implementation. As per an earlier recommendation, a *Cost Effectiveness for Dummies Handbook* would be a useful implementation tool for this recommendation.

Is there strong support within your Work Group for the priority recommendation?
Support was nearly unanimous.

- ***Secondary Recommendation #2 on Cost Effectiveness - Customer Contribution/Non-energy Benefits***

Problem: The Total Resource Cost (TRC) test compares all quantifiable societal costs against all quantifiable societal benefits to establish whether a particular energy efficiency resource is a better investment than an alternative generating resource. It works well for IRP purposes and for setting energy efficiency priorities, but on a project or program level it inhibits utility investment in energy efficiency especially in the situation in which the non-energy benefits are not known (or easily quantifiable), but the customer is willing to pay for those benefits. For example an improvement in an industrial process that will reduce energy and raw materials cost as well as the risk of air pollution fines. The utility incentive program or project analysis may not be able to quantify the raw material and regulatory cost savings, but the customer may be willing to pay for them as well as a portion of the energy savings costs. If the customer's contribution for all three benefits is balanced against the value of the energy savings ONLY because the other benefits are not quantified, the opportunity may fail the TRC test and the region will forego energy the efficiency. In addition the TRC favors existing technologies that have already achieved economies of scale: it doesn't allow for a long-term costs perspective, and thus sometimes prohibits investment in new energy efficiency opportunities for the future.

Solution: On the project level, when non-energy benefits are not known or quantifiable, utilities and other TRC test users should be allowed to assume that any amount the customer is willing to pay above the value to the customer of the energy savings (calculated at the customer's retail energy costs) is going for the unknown or unquantifiable non-energy benefits. In other words, the customer's payment above the value at the customer's energy costs can be ignored. Furthermore utilities and other TRC test users should be encouraged to provide incentives up to the level at which total program costs (excluding customer contribution) are equal to or less than avoided cost.

Discussion: So long as the program costs (excluding customer contributions) do not exceed avoided cost, the region's expenditure for the efficiency savings will not be too high. The concern about whether this change will allow free riders (customers that would have made the investment to obtain the non-energy benefits (the raw materials and regulatory savings in the example above) will have to be dealt with on a case by case basis and should be the subject of program evaluation studies, but the potentially lost opportunities justify those risks.

What is the value added to the region of the recommendation? Why is it important?
This change will allow utilities and other efficiency incentive providers to capture efficiency savings that would otherwise not occur. It may reduce program costs by achieving more of the savings potential in a specific home, building or facility in one program intervention rather than several over time.

What is not occurring now that we should be doing?
Efficiency incentive programs are foregoing energy efficiency opportunities that also produce significant non-energy benefits are unknown or unquantifiable when the customer's willingness to pay for those non-energy benefits makes the energy benefits fail the Total Resource Cost test. In this situation, we should encourage incentive providers to ignore customer contributions that are higher than the customer's energy benefit so long as the total program costs (excluding customer contribution) do not exceed avoided cost.

Is there a way to do things more efficiently than what we are doing today?
Allowing incentive providers the ability to put together a more attractive package of efficiency investments will reduce program costs by convincing customers to put their investment into a more comprehensive package and potentially reduce program costs by avoiding multiple interventions over time in the same building/facility.

How would you suggest that your recommendations be implemented? Who and how?
TRC test rules for individual incentive providers differ. NEET, its successor and/or the Northwest Power and Conservation Council should survey public utility commissions, individual publicly owned utilities and Bonneville to determine the situations in which a change in the TRC test would achieve the savings identified in by the Work Group and propose specific new rules to achieve them.

Is there strong support within your Work Group for the priority recommendation?
Yes

Which other Workgroups do these Cost Effectiveness recommendations link to? Work Group 3's new program initiatives

2. Cost Recovery

Primary Recommendation on Cost Recovery: Policies and regulatory practices should encourage and support utility use of nontraditional marketing activities.

Problem: In the past, there have been instances where the value of broad based programs promoting themes like energy efficiency have been questioned by utility regulatory agencies and cost recovery has been challenged, This has created a reluctance by some utilities to engage in activities that will be

necessary to change customer behavior in ways that create long lasting change in energy consumption habits.

Solution: The recommendation is for approval for recovery of energy efficiency marketing expenses for both program and non-program specific marketing activities. One type of example would be to create a more prominent image for energy efficiency that provides a unifying theme for various specific energy efficiency products and services. A formal policy adopted by the NPCC and/or state legislatures would influence utility commissions to approve cost recovery for marketing more consistently.

What is the value added to the region of the recommendation? Why is it important? Consumer acceptance of, and participation in, efforts to accelerate energy efficiency can be increased by extending marketing activities into areas that utilities have not traditionally ventured. To a certain extent, this may involve applying marketing techniques commonly used in other industries. It may also require finding innovative ways to approach customers and increase their involvement in energy efficiency. Creating a readily recognizable image for energy efficiency can help increase consumer awareness of it as the preferred energy product, one that delivers multiple benefits.

What is not occurring now that we should be doing? There are no regionally consistent parameters used by regulators for cost recovery of energy efficiency programs that can't demonstrate quantifiable energy saving benefits. This is a disincentive for some utilities to invest in energy efficiency awareness and education programs. Generally this disincentive to investment in effective marketing efforts is higher for investor-owned utilities than for publicly owned ones because of the difference in regulatory regimes.

Is there a way to do things more efficiently than what we are doing today? NA

How would you suggest that your recommendations be implemented? Who and how? Each state's utility commission addresses cost recovery differently. Depending on history and relationships, not all utility requests for cost recovery for these kinds of programs are considered consistently within a commission. Those utilities that can document other metrics – i.e., number of ads, brochures, customer survey results, etc – have been successful in obtaining utility commission approval of cost recovery for education and awareness.

The risk of inappropriate cost recovery associated with marketing is low because ratepayer advocates scrutinize each case and public utility commissions retain decision-making authority.
Generally, the issue of cost recovery does not apply to publicly owned utilities because their elected boards or city councils have decision making authority on issues like spending rate payer dollars on promoting energy efficiency as the cheapest, most abundant and environmentally sound energy resource available.

Note that when the NPCC conducts its cost effectiveness analysis, it adds 20 percent to cover the cost of program implementation, including marketing, staff, evaluation, etc.

Is there strong support within your Work Group for the priority recommendation?
Support was nearly unanimous.

Secondary Recommendations on Cost Recovery

- ***Secondary Recommendation #1 on Cost Recovery:*** **Policy and regulatory practices should encourage and support recovery of costs for research, development, demonstration and commercialization of technologies to improve energy efficiency.**

Problem: At times, utility regulatory commissions have been reluctant to allow cost recovery for energy efficiency programs that do not deliver quantifiable benefits such as costs associated with promising new technologies that would further improve energy efficiency, both by consumers and within the electric utility system. While utilities are not positioned to perform basic research and development themselves, the utility industry can play a more prominent role in ensuring that R&D is focused on appropriate technologies. Paving the way toward adoption of such technologies can also be improved. This will require increased attention, participation and cost by utilities up front, but can pay off in terms of increased assurance that the technologies will be effective, along with quicker results.

Solution: The utility industry should take on increased responsibility for providing input and feedback to "upstream" R&D activities. Utilities should also devote greater resources to "downstream" demonstration and commercialization activities. The increased levels of utility industry involvement will incur costs, which should be recognized as necessary and approved for recovery.

What is the value added to the region of the recommendation? Why is it important?
More rapid introduction of new technologies will accelerate the capture of energy savings and other benefits that new technologies can deliver. Meanwhile, increased participation by the utility industry will help to ensure that specific new technologies are robust and integrate more effectively with other technologies, including complementary new technologies and the existing utility system.

What is not occurring now that we should be doing?
Recently, BPA and a few other organizations have begun to devote increased attention to modern technologies and the opportunities that they offer for increasing energy efficiency. However, the overall level of attention and investment in this area by the utility industry is quite low. One sign of this is the relative lack of communication and coordination between the electric utility industry and organizations that are developing new technologies. Specific new technologies are being developed without adequate emphasis on practical needs such as interoperability. In addition, the processes for identifying, selecting and field-testing promising new technologies are inadequate. As a result, the development and introduction of new technologies occurs haphazardly, inefficiently and slowly. In certain instances, vendors also gain the ability to hold attractive new technologies captive (e.g., within proprietary systems), which increases costs and delays adoption.

Is there a way to do things more efficiently than what we are doing today?
Utilities should become more involved in guiding research and development activities, including defining system constraints and opportunities that could be addressed with modern technologies. Higher costs and risks for initial implementations of new technologies should also be recognized as a necessary and justifiable cost of achieving long-term benefits.

How would suggest that this recommendation be implemented? Who and how?
Northwest utilities should become more actively engaged with R&D organizations to better define the needs and opportunities that can be addressed with more energy-efficient technologies. In addition there should be greater and better organized utility participation in technology demonstration and commercialization, including collaborative, cost-sharing efforts. Regulators and other policy makers should adopt policies that recognize the higher costs of first-time implementations can be justified by long-run benefits, and ensure recovery of associated costs.

Is there support within your Work Group for this recommendation?
Strong support from most group members.

- ***Secondary Recommendation #2 on Cost Recovery:*** **Policy and regulatory practices should encourage and support smart grid and load management investment cost recovery and rate structures.**

Problem: Smart grid technologies have become recognized as offering various benefits to the electric utility system, including opportunities to achieve increased energy efficiency. However, the smart grid represents a major shift from use of familiar electro-mechanical technologies that were developed decades ago toward increased use of more complex digital technologies that offer expanded capabilities. Rather than a quick and simple fix, implementation of smart grid approaches will occur over the long term, involving a number of incremental steps. Meanwhile, the value of load management appears to be increasing in the Northwest, a region that has historically had relatively little need or experience in this area.

Recommendation: The region's utilities should consider plans for investments in smart grid and load management. They should also consider rate structures designed to maximize the benefits, including increased energy efficiency that smart grid and load management can deliver. Policy and regulatory practices should provide assurance for recovery of costs for smart grid and load management.

What is the value added to the region of the recommendation? Why is it important?
Investments in smart grid and load management, in combination with complementary rate structures, can help the Northwest region acquire larger amounts of energy efficiency. Smart grid and load management will also provide more flexibility to "dispatch" energy efficiency at the times and locations that it is most valuable. Providing assurance of cost recovery will encourage utilities to move forward to capture these benefits with minimal delay.

What is not occurring now that we should be doing?
Policies and regulatory practices do not provide adequate guidance or assurance of recovery of costs for utility investments in smart grid and load management, or for associated rate structures. Utilities bear an inordinate share of the risks of committing to these new and different approaches. As a result, progress toward realizing the opportunities they present has been slowed.

Is there a way to do things more efficiently than what we are doing today?
In order to encourage utilities to move forward with smart grid and load management, policies and regulatory practices should recognize the costs and risks that are a natural part of the learning

process. Rather than discouraging early adopters, policies and regulatory practices should assure utilities that commit to move forward that they will be able to recover their costs.

How would suggest that your recommendations be implemented? Who and how?
At the regional level, the Power Council should identify the overall benefits that smart grid and load management can provide to the power system. Policy makers should acknowledge that investing in load management and smart grid is desirable, and recognize that higher costs and risks are typical for new technologies and approaches. Regulators should provide assurances that utilities will have the opportunity to recover their costs.

Is there support within your Work Group for the priority recommendations?
Support from most group members.

- ***Secondary Recommendation #3 on Cost Recovery:*** **Policy and regulatory practices should encourage and support cost recovery for participation in regional or other collaborative energy efficiency efforts, such as the Northwest Energy Efficiency Alliance.**

Problem: Collaborative energy efficiency efforts can create substantial benefits that flow to the Northwest region as a whole. One example of this type of regional collaboration is the Northwest Energy Efficiency Alliance. NEEA's market transformation and other activities are helping to accelerate the commercialization and implementation of more energy-efficient products and services. While this and other partnerships provide clear net benefits to the region as a whole and to individual utilities, there have been challenges in obtaining commitments from utilities to provide funding support for them. In some cases, this has been due to regulatory practices that do not recognize utility funding support for collaborative efforts as a justified expense.

Solution: Policies and regulatory practices should clearly recognize that broad participation in regional and other forms of collaborative efforts represents a cost-effective approach to accelerating the development and acquisition of energy efficiency. Utilities should be encouraged to participate in regional and other collaborative efforts. Assurance of cost recovery should also be provided.

What is the value added to the region of the recommendation? Why is it important?
Collaborative efforts help to leverage investments in new technologies and approaches for acquiring energy efficiency. By pooling funds where appropriate, economies of scale are achieved, maximizing the net benefits to the region and to individual utilities. Encouraging utility participation in such efforts and assuring recovery of participation costs will reduce the barriers to regional collaboration. In turn, this will cost-effectively accelerate the availability and acquisition of energy efficiency.

What is not occurring now that we should be doing?
In certain cases, policies and regulatory practices do not recognize the value of collaborative efforts around energy efficiency. As a result, not all utilities are adequately incentivized to participate and given assurance that their costs will be approved for recovery. This can reduce the effectiveness of existing collaborative efforts. In addition, it makes the process of forming desirable new efforts more difficult.

Is there a way to do things more efficiently than what we are doing today?
Yes. Policy makers and regulators should clearly recognize the value of collaborative efforts on energy efficiency. Utilities should be given assurances that their costs of participation are a necessary and important expense.

How would suggest that your recommendations be implemented? Who and how?
The Power Council should reiterate its support for collaborative efforts on energy efficiency, and request support from policy makers and regulatory bodies around the region. Policy makers and regulators should encourage utility participation, and approve recovery of the costs to do so.

Is there support within your Work Group for the priority recommendations?
Support from most group members.

- **Which other Workgroups might link with these cost recovery recommendations?**

The Marketing and R&D work group recommendations and the Smart Grid/Load Management recommendations that follow in this report.

3. Load Management/Smart Grid

Recommendation: Regional Load Management/Smart Grid (LM/SG)

Cooperation/Coordination: Form a group of interested persons from the region's utilities, governance, and non-profit sectors to 1) share information and experience about emerging technology and practices in the areas of load management and smart grid, 2) lead regional efforts on analysis and research value of capacity, reliability, and energy efficiency associated with LM/SG, 3) assess and monitor the state of applicable LM/SG regulations and legislations, and 4) assemble and share information of the impacts that (LM/SG) technologies and applications will have on low and limited-income households.

Background and Discussion:

- More analysis and research is needed to evaluate the potential amount of energy efficiency that may be accomplished through LM/SG activities.
- The grid must contain significantly more "intelligence" than currently as we transition to a two-way flow of power, support customers in developing strong energy management practices that enable them to reach their financial and environmental goals, and strive for the high reliability the system will require for increasingly sensitive electrical applications.
- Load management is already important in parts of the country that have faced capacity constraints far earlier than the Northwest. As the Northwest adds additional intermittent resources, however, and the hydro-electric systems reaches the limit of its ability to provide large amounts of on-demand and extended capacity, load management will become increasingly important in the Northwest as well.
- Individual utilities and personnel within various government agencies and non-profits are currently engaged in research, experiments, and projects pertaining to both LM/SG.
- Significant activity is occurring at the federal level and in several national groups, the activities of all of which are time-consuming, but important, to follow.

- The residential sector cannot meet its full energy efficiency, demand management, and carbon reduction potential if such a large proportion of the sector are living in energy inefficient dwellings and utilizing appliances that do not have the capability of effectively interfacing with the Smart Grid; effective evaluation and assessment needs to occur regionally.
- The Energy Independence and Security Act of 2007 already requires that state commissions consider some smart grid. Close monitoring of regulatory activity and effective communication to the region would be beneficial. It could also lead to coordinated lobbying activities.
- While the capability of the NW hydro system has not yet been exhausted, it seems inevitable that the region will need new ways to cover peak loads and ancillary services in the foreseeable future. Completion of the Sixth Power Plan by the NWPCC is intended to give us a better understanding of this situation. The assessment of costs should include both the short term and long term perspectives. More analysis and research is needed to evaluate the potential value of meeting these capacity needs with LM/SG activities

1. What is the value added to the region of the recommendation? Why is it important?

- More analysis and research is needed to evaluate the potential amount of energy efficiency that may be accomplished through LM/SG activities.
- Coordination and cooperation could significantly speed the region's realization of benefits/risks from load management and adoption of smart grid components, as well as lessen the chance of costly mistakes.
- Such efforts depend on the continued willingness of regional entities to provide in-house resources and, potentially, funding. If managed effectively, this group could lead to more effective use of funds, and may better position the region (thru BPA) to secure grants.

2. What is not occurring now that we should be doing?

The region has no process or forum through which it can coordinate efforts, particularly with respect to research and experimentation, share findings, or cooperatively design and fund major work that would advance the region's understanding of benefits, risks (e.g. impacts on low/limited income customers) and costs associated with both LM/SG.

3. Is there a way to do things more efficiently than what we are doing today?

Coordination and cooperation could significantly speed the region's realization of benefits from load management, impacts on low/limited income customers and adoption of smart grid components, as well as lessen the chance of costly mistakes.

4. How would you suggest that your recommendations be implemented? Who and how?

A group sponsored/supported by NWPPC, NEEA and BPA, and having NWPCC act as facilitator, may be the best approach for this group, using an informal letter of intent to guide its formation and include a date certain by which the region will assess the effectiveness of the group. Participation from regional IOU utilities, publicly owned utilities, regional stakeholders (e.g. low/limited income representatives), national labs, universities, large business, technology centers (e.g. NCAT) to attend meetings and staff projects identified by the group would provide diverse viewpoints and broader acceptance. The group could agree on simple cost-sharing for work beyond the time or experience capabilities of the in-house resources, such as detailed cost-benefit studies. Governing bodies, such as the state public utility commissions, public utility boards and member organizations, and other state government agencies should request that the group provide an annual report of its activities, findings, and plans for the following year.

Further, we suggest this group have a defined life (e.g. 3 years) and an obligation to poll whether it should continue thereafter before going further. In essence, the groups above would re-up to their roles.

5. Is there strong support within your Work Group for the priority recommendations?
Yes – if managed effectively and efficiently, with clear goals and purpose defined.

Which other Workgroups do these Smart Grid/Load Management recommendations link to?
The Cost Recovery recommendation on Smart Grid/Load Management above and the R&D recommendation.

Direct Application Renewables

DAR Priority Recommendation 1: **Point of Application of TRC: Bundle DAR and EE Measures for Cost-Effective Projects**

There is the potential to increase energy efficiency in the region by combining less visible but low cost energy efficiency measures with higher profile DAR measures to create a compelling and cost-effective bundled package at the project level. Customer-sited clean distributed generation, including renewables and combined heat and power, could be effectively delivered to consumers within some energy efficiency programs and the inclusion of these high public recognition measures could increase consumer interest and demand for the programs.

Background and discussion:

- NW Policy Framework Does Not Exclude DAR From Conservation Programs
    - The 1980 Pacific Northwest Electric Power Planning and Conservation Act's section 839 (d) Conservation Measures: Resources[15] says that "The Administrator shall acquire such resources through conservation, implement all such conservation measures and acquire such renewable resources which are installed by a residential or small commercial consumer to reduce load". (839d (a) (1)) . There are a number of other supporting references to customer-sited renewables as conservation resources throughout section 839d.
    - In Washington, RCW 54.16.280 and RCW 35.92.360 legislation created low interest loan programs to be which administered by public utilities which specifically called out customer-cited renewables as a type of conservation.
    - Oregon's Business Energy Tax Credit (BETC) funds customer sited renewables along with energy efficiency. Oregon's SB 1149 establishes systems benefits charges administered by the Energy Trust which fund thermal renewables as conservation, while renewable electricity generators at customer sites are administered under a separate fund. The Energy Trust is currently piloting ways to seamlessly deliver both offerings to consumers through program collaboration.

- This recommendation is related directly to the NEET Workgroup 6 Cost-Effectiveness Recommendation 1, on bundling energy efficiency measures at the project level for cost-effectiveness tests. **Since this recommendation basically expands upon the qualified measures for the Bundling Measures for Cost-Effectiveness recommendation, most of the**

[15] Northwest Power Act, 6 (e)(1). 94 Stat. 2714

background and answers to the executive committee's questions in that recommendation also apply to this recommendation, but are not repeated here.

1. What is the value added to the region of the recommendation? Why is it important?
The rise of the green building and integrated design movements along with the availability of emerging technology and growing public awareness of the societal and individual impacts and costs of energy are creating widespread public interest in deploying clean distributed generation (DG). This interest is sparking an unprecedented investment of private capital in comprehensive energy projects in buildings that cross the lines of conservation, efficiency and renewable generation. From the perspective of the end user, these measures all have initial capital cost and all reduce their electricity or gas bills while reducing their environmental footprint. From the perspective of many in the design community and some policy makers promoting or mandating major reductions in energy use in buildings, industry and agriculture or driving towards zero energy building goals, these energy efficient buildings of the future will include distributed renewable energy whenever possible.

Simultaneously, the commercialization status and relatively low current deployment of direct application renewables (DAR) creates questions and challenges around best practices in system integration and performance in buildings and on-going concerns about cost-effectiveness.

2. What is not occurring now that we should be doing?
The market increasingly packages energy efficiency and solar measures together, especially in new construction. Distinctions between the two are being reduced in the eyes of the consumer and many policy makers. End-use consumers are increasingly interested in implementing bundled energy efficiency and solar measures.

By continuing to create policies and programs which dis-incentivize comprehensive approaches to decreasing the negative impacts of power generation, the energy policy community fails to serve customer demand or to capitalize on these occurring market forces to meet public policy goals.

3. Is there a way to do things more efficiently than what we are doing today?
As a stand-alone measure, these types of DAR are relatively expensive when compared to other energy efficiency measures, and Solar PV is not considered total resource cost effective as a stand-alone measure at this time. But there is the potential to bundle a single DAR measure with multiple low cost energy efficiency measures in an efficient integrated program delivery approach for an overall cost-effective project, driving both increased cost-effective energy efficiency and increased consumer participation in these programs

4. How would you suggest that your recommendations be implemented? Who and how?
The NPCC, the Regional Technical Forum, the Bonneville Power Administration, and public utility commission should examine their cost-effectiveness rules, regulations, orders, specifications and other guidelines to determine whether they allow bundling at the project level and if they do not, adopt changes to allow it, explicitly including DAR.

5. Is there strong support within your Work Group for the priority recommendations?
There was agreement supporting this recommendation amongst almost all Workgroup 6 participants, with 2 participants expressing concern and a need for analysis to ensure that funding for conservation measure implementation is not negatively affected by this recommendation.

A near term opportunity exists to employ some of these ideas in the region within the BPA's Conservation Rate Credit program, as detailed in the DAR subgroup's Recommendation 2 below.

DAR Priority Recommendation 2: **Modify Treatment of Solar PV and Solar Water Heating Systems Under BPA's Conservation Rate Credit**

Currently BPA's program includes solar strategies and other DAR with other, primarily utility-scale renewable resources rather than with the efficiency programs. **Considering solar strategies along with the conservation measures would better reflect the role they play in the utility system and in the consumer's mind, as well as aligning the resources better for acquisition.** Finally, by not including solar strategies in utility consumer-directed resource acquisition efforts, we are sending consumers the message that we do not value the contribution to the system that solar systems can make.

Background

- The treatment of DAR changed when BPA closed out the Conservation and Renewable Discount (C&RD) "infrastructure development" program and implemented the Conservation Rate Credit (CRC) "conservation acquisition" program beginning in October 2006. This resulted in solar thermal and solar PV being included within the list of eligible projects in the renewables option (CRC-CAA Implementation Manual, Section 9, April 2008).
- Under the previous C&RD, these DAR measures had been included within the conservation program.
- This change has had an unfavorable effect for these DAR systems, as they are now in competition with more cost-effective, larger scale renewable power projects for a much more limited amount of total available funding.

1. What is the added value to the region of the recommendation? Why is it important?

Harmonized policies, incentives and regulation should encourage everyone to innovate and get to a common goal - energy services that minimize costs to individuals, the environment, utility, system. By continuing to create policies and programs, which are difficult to navigate or which actually discourage customer investment in comprehensive approaches to achieving energy savings, the energy policy community fails to serve customer demand or to capitalize on these occurring market forces to meet public policy goals.

2. What is not occurring now that we should be doing?

There are many incentive mechanisms in place for renewable energy today at the state and federal levels. But these systems are not well supported by policy mechanisms or incentives which lump utility scale renewable power projects with small scale distributed renewable energy. Solar is a particularly relevant example of this. Considering solar strategies along with conservation measures would better reflect the role they play in the utility system and in the consumer's mind, as well as aligning the resources better for acquisition. Finally, by not including solar strategies in utility consumer-directed resource acquisition efforts, we are sending consumers the message that we do not value the contribution to the system that solar systems can make.

3. Is there a way to do things more efficiently than what we are doing today?

The exclusion of these measures from the conservation section creates a challenge in program delivery, as home owners and businesses are asked to rework integrated energy efficiency project packages to back out the energy savings associated with DAR elements.

4. How would you suggest that your recommendation be implemented?
This development of this recommendation has benefited from the involvement and contributions of BPA energy efficiency program staff. Although the outcome remains to be determined, they are committed to bringing this recommendation up through BPA's established procedure for proposing, reviewing and adopting proposed changes to the program.

Recommendation Details: Treat Customer-sited DAR as a separate category, distinct from commercial (or generation) scale renewables, and package solar strategies with energy efficiency measures.

The recommendation is predicated on the following assumptions:

(a) That the DAR measure is cost-effective and included in the Power Planning Council's resource supply curves in the 5th Power Plan (or any future Power Plan) such that any associated savings would count toward the achievement of BPA's conservation targets (i.e., our limited funds must be used to acquire the conservation savings that help meet our current and future targets), and

(b) Any DAR measure would be subjected to the same qualifying criteria (e.g., cost effective) as any conservation measures as outlined in the most current edition of the CRC/CAA Implementation Manual.

5. Is there strong support within your Work Group for the priority recommendations?
Yes, there was unanimous support for this recommendation within the workgroup.

DAR Secondary Recommendations

***DAR Recommendation 3*. Conduct Primary and Secondary Research Designed to Characterize Different DAR Options to Inform Policy Decisions**
As emerging technologies that are beginning to see broader commercialization in a changing energy supply landscape, the economic, environmental and performance characteristics of DAR systems are also changing. **There is a need to keep current in characterizing the attributes and quantifying the costs and benefits of various types of DAR systems to customers, to utilities and to society in order to determine the appropriate policy response.**

This recommendation could be supported in priority recommendation 2 of **NEET Workgroup #1** by explicitly including customer-sited renewables in data collection and analysis efforts.

1. What is the added value to the region of the recommendation? Why is it important?
To support better-informed energy policy decision-making and design throughout the region, achieve regional environmental and economic benefits of reduced energy impacts.

More thorough research on the characterization of DAR is needed - system size, fuel type, typical application, and performance. There is a need to capture how different policy/ regulatory mechanisms support different "flavors" of renewables. Although there is a desire to be technology neutral, targeting incentives or programs to support less contentious, zero-emissions renewables such as solar and small scale wind residential or commercial applications may prove easier than incenting biomass or biogas systems in ag or industrial applications. Regardless, the differences in typical system size, generation characteristics (intermittent vs baseload), cost effectiveness (biomass and biogas chp can be half the $/kW of small solar and wind) and end-use sector would suggest that separate policy mechanisms would be effective.

2. What is not occurring now that we should be doing?
During Phase 1 preliminary literature search, the workgroup was unable to locate a recent and regionally relevant characterization of DAR systems, which also compares the costs and benefits of various system types to customers, to utilities and to society. Similar recent research is available for merchant scale systems related to the development of State RPS' but much of the information uncovered is not directly relevant to distributed generation systems.

3. Is there a way to do things more efficiently than what we are doing today?
By not excluding and ideally including DAR in regional energy efficiency planning and research efforts. For instance, this recommendation could be supported in priority recommendation 2 of NEET **Workgroup #1** by explicitly including customer-sited renewables in data collection and analysis efforts. This recommendation could also be connected to some of **Workgroup 2**'s Innovations efforts.

4. How would you suggest that your recommendation be implemented?
This is essentially a research question. It is expected from current events that increased public funding will be targeted to R&D for clean distributed generation in upcoming years. Work with the Council and RTF. Identify opportunities through the National Labs and opportunities to collaborate with private sector leaders in the green building industry on regional research.

***DAR Recommendation 4*. Provide Coordinated, Comprehensive Rebate, Incentive and Technical Assistance Information**

Integrated and coordinated rebate, incentive and technical information for consumers will help them make wise choices at the right time regarding energy and other related utility services. Although electric and gas utilities are stakeholders and may provide their customers with access to this information, informational assistance programs that cross disciplines to serve customers may be best administered by others.

This recommendation, which is essentially a program concept, could link to the efforts and some of the recommendations of NEET **Workgroup #3, High Impact Energy Initiatives**, for instance, the recommendation related to promoting low or zero carbon buildings.

1. What is the added value to the region of the recommendation? Why is it important?
Harmonized policies, incentives and regulation should encourage everyone to innovate and get to a common goal - energy services that minimize costs to individuals, the environment, utility, system. By continuing to create policies and programs which are difficult to navigate or which actually dis-incentivize customer investment in comprehensive approaches to achieving energy savings, the energy policy community fails to serve customer demand or to capitalize on these occurring market forces to meet public policy goals.

2. What is not occurring now that we should be doing?
This recommendation addresses two barriers to the adoption of DAR – (1) the perceived lack of easy, reliable sources of information about DAR technologies themselves and their appropriate use, and (2) the perceived absence of a reliable source for information about available incentives for DAR projects and how those affect DAR project economics.

The first barrier stands in the way of consumers seeking to make informed choices, because gathering the information they need about their choices is difficult and is subject to conflicting information about

the benefits, costs, implementation challenges and uncertainties associated with various DAR options. Reducing this barrier will facilitate the adoption of DAR strategies that are appropriate and that can serve as success stories for the others to follow.

The second barrier mentioned above reflects the challenge individual consumers face to find all of the programs they are eligible for, because they vary from area to area, fuel source, contractors, codes and retail options, and because it is hard for consumers to find someone knowledgeable about federal, state and utility assistance efforts. Integrated and coordinated rebate and incentive information for consumers will help them make wise choices at the right time regarding energy and other related utility services. Although electric and gas utilities are stakeholders and may provide their customers with access to this information, informational assistance programs that cross disciplines to serve customers may be best administered by others.

3. Is there a way to do things more efficiently than what we are doing today?
Integrated and coordinated rebate, incentive and technical assistance information available for consumers will help consumers make wise choices at the right time regarding energy and other related utility services.

- It is challenging for individual consumers to find all of the programs they are eligible for because they vary from area to area, fuel source, contractors, codes and retail options. If consumers better understood the construction process and how the various infrastructures interrelate they could optimize decisions.
- There should be a common methodology and verification to rank choices. In addition to a simple rating system, full lifecycle cost information should be provided. Water, sewer and energy are all related thus the information; rebates and incentives should be integrated.
- Although electric and gas utilities are stakeholders and may provide their customers with access to this information, informational assistance programs that cross disciplines to serve customers may be best administered by local, state or federal agencies.

4. How would you suggest that your recommendation be implemented?

1. Identify regional organizations currently providing information on DAR, their strengths, technology scopes, current funding, etc. (examples include a number of WSU Energy Program managed efforts: **Northwest Solar Center, Regional CHP Application Center, Northwest Building Efficiency Center** and the **Energy Efficiency and Renewable Energy Information Center**, as well as NEEA's integrated design labs and smaller efforts by the Energy Trust of Oregon, and the states of Idaho and Oregon)

2. Develop strategy to strengthen, support or replace these in order to provide a more effective mechanism for addressing consumer DAR questions

3. Have states or some other entity prepare financial resource availability summaries covering state and federal incentives for DAR that can be used by utility staff and consumers to identify assistance options and their impact on project economics. If the summaries are done by different entities, they should follow a common methodology and cover standard topics, such as:

    - Type of incentive
    - System(s) supported
    - Fuel source - electricity, gas, oil, wood
    - Related utilities - water, sewer, garbage, recycling

- Location
- Program delivery approach
- Products by category
- Incentive application process and timing
- Documentation required
- Connection with LEED or other certification system

***DAR Recommendation 5*. New Construction Focus – Solar Ready / Upgradable/ DG Codes - Preventing Lost Opportunities**

Integrating DAR into existing building electrical and mechanical systems can be technically challenging and expensive. New buildings offer a unique opportunity to optimize efficiency, integrate the envelope, lighting (both electric and daylighting) and HVAC systems. New buildings can be more easily upgraded with additional features, such as solar PV, if these future improvements are anticipated and the buildings are designed for the upgrades.

The Pacific Northwest currently does not have in place land use or building code regulations that support either "DAR-ready" construction or community-scale DAR implementation. However, there are examples of such rules from other parts of the world. Examples include:

- The City of Vancouver Green Home Program – a building bylaw requiring a number of EE features for single family homes, one of which is solar readiness. http://www.city.vancouver.bc.ca/commsvcs/CBOFFICIAL/greenbuildings/greenhomes/

- The Merton Rule in England requires new buildings above a certain size and potentially subdivisions to provide a certain percentage of its own energy, including waste heat recovery, co-gen, or renewables. http://www.themertonrule.org/

Although the DAR subgroup was very interested in this recommendation, there are still many unanswered questions and too little time for performing this research, although the next step is clear. **There is need to better understand the technical specifications and costs of DAR-ready buildings in order to consider the application of solar-ready or other DAR-ready codes in the PNW.** Since there is research needed, consideration should be given to the connections between this recommendation and the efforts of **NEET Workgroup #2** on Energy Innovation. There may also be an opportunity to collaborate with the **Workgroup # 6** Smart Grid subgroup, which may have a similar opportunity. .

Which other Workgroups do these Direct Application Renewables recommendations link to?

The Cost Effectiveness recommendation of Work Group 6 on bundling.

5. Decoupling

Submitted separately

APPENDIX F-2
WORK GROUP 6: LOAD MANAGEMENT AND SMART GRID SUB-GROUP REPORT

Northwest Energy Efficiency Taskforce (NEET)

Workgroup #6
"Rethinking Governance and Energy Efficiency Policies"

Load Management and Smart Grid

Final Report

December 15, 2008

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Team Members

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Inder Chawla	Elcon Associates	
Pamela Lesh	PGE/NRDC	
Jim Abrahamson	Community Action Partnership of Oregon	
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Patrick Mazza	Climate Solutions	
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Dave Warren	Washington PUD Association	
Pete Catching	Energy Trust	
Ken Korum	NWPCC	
Terry Dillon	Tacoma Power	
Randy Karr	Tacoma Power	
Cyndi Wikstrom	Tacoma Power	
Dave Ward	Tacoma Power	Chair

Executive Summary

Introduction

The Load Management/Smart Grid Sub-workgroup (LM/SG SWG) of Workgroup #6 (WG6) was to focus on "Rethinking Governance and Energy Efficiency Policies." The group agreed to meet weekly by conference call. The LM/SG SWG was asked to identify what parts of the Smart Grid concept are in and out of the Taskforce work.

> **Task 1:** Clarify scope of load management and Smart Grid topics appropriate to the exercise.
>
> **Task 2:** Review load management programs and determine best practices. Determine customer reactions (good and bad) to load management programs. What has worked and what hasn't? Define the objectives and characteristics of a Smart Grid system in the Northwest (NW). Make recommendations regarding current and future Smart Grid application.

The LM/SG SWG first established a work plan to place focus on key issues and to be able to provide a work product in a timely manner. The following were the key elements of the LM/SG SWG work plan:

Scope

The Subgroup will work collaboratively to:

1. Collect materials regarding the current state of load management and Smart Grid efforts (including work regarding the cost effectiveness of each), with an emphasis on the NW, and prepare a brief description of that state;
2. Assess the contribution that load management and Smart Grid can make to significantly increasing the efficiency with which the NW uses energy to do work (in the physics sense);
3. Identify whether any policy barriers exist to achieving that contribution;
4. Make recommendations on actions the Executive Committee can endorse and/or take in pursuit of that contribution.

Working Definitions

The LM/SG SWG established the following working definitions:

> **Load management**: Technology and/or behaviors in use at a given customer's premise that enable the customer, directly or indirectly through devices installed on his or her equipment and appliances, to reduce the use of electricity during peak times. Examples include:
>
> - Rate designs: time-of-day, real-time pricing, critical peak pricing, demand buy-back
> - Behaviors: manual, semi-automated, or automated management of on-premise equipment and appliances in reaction to the various rate designs
> - Devices: utility-controlled management of equipment or appliances on the customer's premise via communication by pre-arrangement with the customer, typically with compensation to the customer in the form of a bill credit. This can include devices producing site generation, storage, or loads.
>
> **Smart Grid**: The convergence of digital information technology and the electrical power grid to enhance communications and control capacities. A properly planned, designed, implemented, and operated Smart Grid will:
>
> - Enable active participation by consumers
> - Accommodate all generation and storage options, including distributed generation
> - Enable new products, services, and markets
> - Provide power quality for the range of needs in a digital economy
> - Optimize asset utilization and operating efficiency
> - Anticipate and respond to system disturbances in a self-healing manner
> - Operate resiliently against physical and cyber attack and natural disasters
>
> The first three characteristics relate directly to the efficiency of how the NW uses energy to achieve work. The fifth characteristic relates to the energy efficiency of the NW grid itself.

These concepts are not mutually exclusive. With respect to "devices," the difference between load management and the Smart Grid is one of degree and integration, rather than nature. Load management behaviors will affect energy efficiency with both types of technology choices.

Recommendation

Foster Regional Load Management/Smart Grid (LM/SG) Cooperation/Coordination

Action Recommended

Form a group of interested persons from the region's utilities, governance, and non-profit sectors to (1) share information and experience about emerging technology and practices in the areas of load management and Smart Grid; (2) lead regional efforts on analysis and research value of capacity, reliability, and energy efficiency associated with LM/SG; (3) assess and monitor the state of applicable LM/SG regulations and legislations; and (4) assemble and share information of the impacts that LM/SG technologies and applications will have on low and limited-income households.

Background and Rationale

- More analysis and research is needed to evaluate the potential amount of energy efficiency that may be accomplished through LM/SG activities.
- The grid must contain significantly more "intelligence" than currently as we transition to a two-way flow of power, support customers in developing strong energy management practices that enable them to reach their financial and environmental goals, and strive for the high reliability the system will require for increasingly sensitive electrical applications.
- Load management is already important in parts of the country that have faced capacity constraints far earlier than the Northwest. As the Northwest adds additional intermittent resources, however, and the hydroelectric system reaches the limit of its ability to provide large amounts of on-demand and extended capacity, load management will become increasingly important in the Northwest as well.
- Individual utilities and personnel within various government agencies and non-profits are currently engaged in research, experiments, and projects pertaining to both LM/SG.
- Significant activity is occurring at the federal level and in several national groups, the activities of all of which are time-consuming but important to follow.
- The residential sector cannot meet its full energy efficiency, demand management, and carbon reduction potential if such a large proportion of the sector are living in energy inefficient dwellings and utilizing appliances that do not have the capability of effectively interfacing with the Smart Grid; effective evaluation and assessment needs to occur regionally.
- The Energy Independence and Security Act of 2007 already requires that state commissions consider some Smart Grid. Close monitoring of regulatory activity and effective communication to the region would be beneficial. It could also lead to coordinated lobbying activities.
- While the capability of the NW hydro system has not yet been exhausted, it seems inevitable that the region will need new ways to cover peak loads and ancillary services in the foreseeable future. Completion of the Sixth Power Plan by the NWPCC is intended to give us a better understanding of this situation. The assessment of costs should include both the short-term and long-term perspectives. More analysis and research is needed to evaluate the potential value of meeting these capacity needs with LM/SG activities.

Answers to EC Questions

What is the value added to the region of the recommendation? Why is it important?

- More analysis and research is needed to evaluate the potential amount of energy efficiency that may be accomplished through LM/SG activities.
- Coordination and cooperation could significantly speed the region's realization of benefits/risks from load management and adoption of Smart Grid components, as well as lessen the chance of costly mistakes.
- Such efforts depend on the continued willingness of regional entities to provide in-house resources and potentially funding. If managed effectively, this group could lead to more effective use of funds and may better position the region (through BPA) to secure grants.

What is not occurring now that we should be doing?

- The region has no process or forum through which it can coordinate efforts, particularly with respect to research and experimentation, share learnings, or cooperatively design and fund major work that would advance the region's understanding of benefits, risks (e.g. impacts on low/limited-income customers) and costs associated with both LM/SG.

Is there a way to do things more efficiently than what we are doing today?

- Coordination and cooperation could significantly speed the region's realization of benefits from load management, impacts on low/limited-income customers and adoption of Smart Grid components, as well as lessen the chance of costly mistakes.

How would you suggest that your recommendations be implemented? Who and how?

A group sponsored/supported by NWPPC, NEEA and BPA, and having NWPCC act as facilitator, may be the best approach for this group, using an informal letter of intent to guide its formation and include a date certain by which the region will assess the effectiveness of the group. Participation from regional IOU utilities, publicly owned utilities, regional stakeholders (e.g. low/limited-income representatives), national labs, universities, large business, technology centers (e.g. NCAT) to attend meetings and staff projects identified by the group would provide diverse viewpoints and broader acceptance. The group could agree on simple cost sharing for work beyond the time or experience capabilities of the in-house resources, such as detailed cost-benefit studies. Governing bodies, such as the state public utility commissions, public utility boards and member organizations, and other state government agencies should request that the group provide an annual report of its activities, findings, and plans for the following year.

Further, we suggest this group have a defined life (e.g. 3 years) and an obligation to poll whether it should continue thereafter before going further. In essence, the groups above would re-up to their roles.

Is there strong support within your Workgroup for the priority recommendations?

Yes – if managed effectively and efficiently, with clear goals and purpose defined.

Introduction

The following is a summary of the Load Management/Smart Grid Sub-workgroup (LM/SG SWG) of Workgroup #6 (WG6) which was to focus on "Rethinking Governance and Energy Efficiency Policies." The key question of WG6 is

> How do we optimize the alignment of regulatory practice with public policy goals?

The following guideline was provided the LM/SG SWG:

> Load management/Smart Grid can involve many aspects of a utility's interaction with customers' load. This can range from automatic meter reading to real-time communication of electricity usage/price to the customer. Typically, it includes the ability of the utility to control the timing of appliance use to control peak loads on the utility system. Smart Grid is a new, broad term that can encompass activities ranging from power generation to transmission to distribution to end-use customers. For this exercise, the workgroup should identify what parts of the Smart Grid concept are in and out of the Taskforce work.
>
> **Task 1:** Clarify scope of load management and Smart Grid topics appropriate to the exercise.
>
> **Task 2:** Review load management programs and determine best practices. Determine customer reactions (good and bad) to load management programs. What has worked and what hasn't? Define the objectives and characteristics of a Smart Grid system in the Northwest. Make recommendations regarding current and future Smart Grid application.

The LM/SG SWG first established a work plan to place focus on key issues and to be able to provide a work product in a timely manner. The following were the key elements of the LM/SG SWG work plan:

> **Scope**
> The Subgroup will work collaboratively to:
> 1. Collect materials regarding the current state of load management and Smart Grid efforts (including work regarding the cost effectiveness of each), with an emphasis on the NW, and prepare a brief description of that state;
> 2. Assess the contribution that load management and the Smart Grid can make to significantly increasing the efficiency with which the NW uses energy to do work (in the physics sense);
> 3. Identify whether any policy barriers exist to achieving that contribution;
> 4. Make recommendations on actions the Executive Committee can endorse and/or take in pursuit of that contribution.
>
> **Background (from the NEET Work Plan)**
> Load management/Smart Grid can involve many aspects of a utility's interaction with customers' load. This can range from automatic meter reading to real-time communication of electricity usage/price to the customer. Typically, it includes the ability of the utility to control the timing of appliance use to control peak loads on the utility system. Smart Grid is a new, broad term that can encompass activities ranging from power generation to transmission to distribution to end-use customers.
>
> **Work Process**
> Step 1 – collect information (reports, programs, policies, legislation, etc.)
> Step 2 – organize and share information across workgroup/decide which is Smart Grid or load management focused or both
> Step 3 – decide which information is most useful for group's scope/which are best practices/determine if there is enough information available for the group to continue
> Step 4 – determine objectives and characteristics of Smart Grid and load management that relate to the scope of this group and how they can advance the efficiency with which this region uses energy
> Step 5 – review current policies and legislation and identify gaps where they do not support Smart Grid/load management initiatives that may advance energy efficiency measures
> Step 6 – identify preliminary strategies and draft policies
> Step 7 – finalize policy recommendations
>
> **Schedule**

The group agreed to meet weekly by conference call on Thursdays at 1:15 PM.

Working Definitions

The LM/SG SWG established the following working definitions:

Load management: Technology and/or behaviors in use at a given customer's premise that enable the customer, directly or indirectly through devices installed on his or her equipment and appliances, to reduce the use of electricity during peak times. Examples include:

- Rate designs: time-of-day, real-time pricing, critical peak pricing, demand buy-back
- Behaviors: manual, semi-automated, or automated management of on-premise equipment and appliances in reaction to the various rate designs
- Devices: utility-controlled management of equipment or appliances on the customer's premise via communication by pre-arrangement with the customer, typically with compensation to the customer in the form of a bill credit. This can include devices producing site generation, storage, or loads.

Smart Grid: The convergence of digital information technology and the electrical power grid to enhance communications and control capacities. A properly planned, designed, implemented, and operated Smart Grid will:

- Enable active participation by consumers
- Accommodate all generation and storage options, including distributed generation
- Enable new products, services, and markets
- Provide power quality for the range of needs in a digital economy
- Optimize asset utilization and operating efficiency
- Anticipate and respond to system disturbances in a self-healing manner
- Operate resiliently against physical and cyber attack and natural disasters

The first three characteristics relate directly to the efficiency of how the NW uses energy to achieve work. The fifth characteristic relates to the energy efficiency of the NW grid itself.

These concepts are not mutually exclusive. With respect to "devices," the difference between load management and the Smart Grid is one of degree and integration, rather than nature. Load management behaviors will affect energy efficiency with both types of technology choices.

Findings

Federal Activity

- ***Energy Policy Act of 2005***

  The Energy Policy Act of 2005 added five new standards to Public Utility Regulatory Policies Act (PURPA) related to:

  - Net metering
  - Fuel sources
  - Fossil fuel generation efficiency
  - Interconnection
  - Smart metering and time variable rates

  PURPA was passed by Congress in 1978 and subsequently amended. The original law enacted policies that were intended to foster energy conservation efforts undertaken by electric utilities; to encourage efficiency of electric utility resources; and to support equitable rates for electric utility customers. Among other things, the law passed in 1978 included six standards related to ratemaking practices: cost of service, declining block rates, time-of-day rates, seasonal rates, interruptible rates and load management techniques.

  The Energy Policy Act of 1992 added integrated resource planning, conservation, demand management, and power generation efficiency investments to the original list of PURPA standards. Since that time, electric utilities have embraced integrated resource planning methods that include both supply- and demand-side resources. The law has allowed utilities and state regulatory authorities latitude in how to apply these standards to local utility circumstances.

  The Energy Policy Act of 2005 added: "in undertaking the consideration and making the determination required under section 2621 of this title with respect to the standard for time-of-day rates established by section 2621(d)(3) and the **standard for time-based metering and communications** established by section 2621(d)(14) of this title, a time-of-day rate charged by an electric utility for providing electric service to each class of electric consumers shall be determined to be cost-effective with respect to each such class if the long-run benefits of such rate to the electric utility and its electric consumers in the class concerned are likely to exceed the metering and communications costs and other costs associated with the use of such rates."

- ***Energy Independence and Security Act (EISA) of 2007***

  The keys points of the EISA of 2007 related to LM/SG were
  - Announces that it is the policy of US to support modernization of nation's electricity grid
  - Identifies 10 SG "characteristics" and 9 SG "functions"
  - Establishes a Federal Smart Grid Task Force
  - Gives several mandates to DOE, including:
    - Every 2 years, report on status of SG deployments nationally and government barriers
    - Lead SG R&D and demonstration programs
  - Makes it the responsibility of the National Institute of Standards and Technologies to coordinate development of a SG "framework" that includes protocols and standards to "achieve interoperability" of SG devices and systems
  - Requires that each state start a proceeding by December 2008 and conclude it by December 2009 to consider:
    - Requiring utilities to evaluate suitability of SG investments BEFORE deploying any "NON-advanced grid technologies"
    - Authorizing utilities to recover costs for SG deployments and earn reasonable rate of return on associated capital

- Authorizing utilities to recover cost of equipment made obsolete by SG deployments

State/Province Activity

Legislative

- ***Washington***

In 2007, SENATE BILL 6112 was proposed and first read on February 22, 2007. It read

> AN ACT Relating to smart grid energy technology; amending RCW 82.63.010; adding a new section to chapter 43.21F RCW; adding a new section to chapter 82.08 RCW; adding a new section to chapter 82.12 RCW; providing an effective date; and providing expiration dates

Sec. 1. A new section is added to chapter 43.21F RCW to read as follows:

> (1) The state energy office within the department of community, trade, and economic development shall develop a strategic plan for public and private collaboration to promote more efficient use of current electrical transmission and distribution systems. The plan shall include recommendations for appropriate legislative and administrative policy changes, tax credits, and legislative appropriations. The plan shall also recommend proposals for creating and strengthening public and private partnerships to promote smart grid energy improvements, proposals for federal financial assistance, expenditures for research and development programs, and enhancement of smart grid business development in Washington State. The finalized strategic plan shall be provided to the governor and to the appropriate committees of the senate and House of Representatives by January 1, 2008.
> (2) No later than December 1, 2008, the department shall adopt rules creating a tax credit certification process for smart grid energy technologies that promise to significantly improve the reliability, efficiency, and environmental integrity of electrical transmission and distribution systems. The rules may not take effect until after the end of the next regular legislative session. "Smart grid energy technology" has the same meaning as provided in RCW 82.63.010.
>
> It also proposed adding the following definitions:
>
> (17) "Smart grid energy technology" means a technology certified under the provisions of section 1(2) of this act and developed with the intent to significantly improve the reliability, efficiency, and environmental integrity of electrical transmission and distribution systems, and may include advanced metering, load management, and control technologies, high-temperature superconductor technologies, the development and use of advanced grid design, operation, and planning tools, and advanced energy delivery, storage and transmission technologies, materials, and systems that contribute to significant load reductions or enhancements in reliability, operational flexibility, or power-carrying capability within electric transmission or distribution systems.
>
> (18) "Smart grid energy technology product development" means research, design, and engineering activities performed in relation to the development of smart grid energy technology.

Finally, it proposed certain tax exemptions for products and services related to Smart Grid technology.

It was never entered into law.

- ***Oregon***

The Oregon Legislature has neither considered nor taken action on Smart Grid or load management.

- ***Idaho***

  The 2007 Idaho Energy Plan was prepared by the Idaho Legislative Council Interim Committee on Energy, Environment and Technology. This Energy Plan contains 18 policies and 44 actions that were approved by the Committee on a consensus basis.

The following policies were related to SG/LM:

- *Idaho electric utilities should conduct Integrated Resource Plans (IRPs) that assess the relevant attributes of a diverse set of supply-side and demand-side resource options and provide an opportunity for public input into utility resource decisions.*

- *When acquiring resources, Idaho and Idaho utilities should give priority to (1) conservation, energy efficiency and demand response; and (2) renewable resources; recognizing that these alone may not fulfill Idaho's growing energy requirements.*

- *The Idaho PUC and Idaho's municipal and cooperative utilities should ensure that their policies provide ratepayer and shareholder incentives that are consistent with this priority order.*

The Committee finds that demand-side resources, including energy conservation, energy efficiency and demand response, possess the best mix of low cost and low environmental impact, while contributing to fuel diversity and helping to grow Idaho's economy by keeping dollars at home. Local renewable resources also provide fuel diversity and help create jobs in Idaho. Consequently, the Committee establishes conservation, energy efficiency and demand response as the highest priority resource for Idaho, and local renewable resources as the second highest priority.

The following recommended actions were or could be related to SG/LM:

E-1. All Idaho utilities should fully incorporate cost-effective conservation, energy efficiency and demand response as the priority resources in their Integrated Resource Planning.
The Committee intends that Idaho utilities should make cost-effective conservation, energy efficiency and demand response the highest priority resources in their IRPs. The Committee recommends the "Total Resource Cost" perspective as the appropriate test of the cost-effectiveness of conservation measures, and provides the following definition of cost-effectiveness as guidance: "Cost-effectiveness of a conservation measure means that the lifecycle energy, capacity, transmission, distribution, water and other quantifiable savings accruing to Idaho citizens and businesses exceed the direct costs of the measure to the utility and participant."

E-7. Idaho's municipal and cooperative utilities should annually report to the Energy Division their estimates of cost-effective conservation in their service territories, their plans for acquiring this resource, their conservation and energy efficiency expenditures, and their estimated savings in electrical energy (MWh) and peak capacity (kW) during the lifetime of the measures implemented.

E-8. Idaho should offer an income tax incentive for investments in energy efficient technologies by Idaho businesses and households.
The high initial cost of many energy-saving technologies is among the most important barriers to increased deployment of energy efficiency. While the lifecycle cost of these technologies (including the cost of energy during the lifetime of the product) is lower than the cost of less efficient technologies, consumers typically demand very rapid payback periods for efficiency investments. The state can help to lower the initial cost of these technologies by providing tax incentives. Idaho's current Residential Alternative Energy Tax Deduction allows an income tax deduction up to $20,000 over four years for solar, wind, geothermal and pellet stoves. The Committee recommends expanding this program to include energy efficient technologies and provide an income tax incentive for businesses as well as residences.

E-9. Idaho should offer a sales and use tax exemption on the purchase of energy efficient technologies.
Idaho's current state sales tax is 6 percent. Under this recommendation, Idaho would not collect sales tax for a list of approved energy-efficient technologies. This would provide a visible signal to customers encouraging energy efficiency at the time of purchase, and would at the same time educate the sales force about which technologies meet the state's energy efficiency guidelines.

E-11. State government will:
i. Demonstrate leadership by promoting energy efficiency, energy efficient products, use of renewable energy and fostering emerging technologies by increasing energy efficiency in all facets of State government;
ii. Ensure that public facility procurement rules provide appropriate incentives to allow full implementation of cost-effective energy efficiency and small-scale generation at public facilities;
iii. Collaborate with utilities, regulators, legislators and other impacted stakeholders to advance energy efficiency in all sectors of Idaho's economy;
iv. Work to identify and address all barriers and disincentives to increased acquisition of energy conservation and efficiency; and
v. Educate government agencies, the private sector and the public about the benefits and means to implement energy efficiency.

- ***Montana***
    - On January 24, 2008, Greg Jergeson, Commission Chairman, Montana Public Service Commission (PSC), provided an update of PSC rulings and issues for the Energy and Telecommunications Interim Committee of the Montana Legislature. He noted more emphasis should be placed on Smart Grid, demand-side management, and energy conservation and efficiency.
    - The Montana Legislature has neither considered nor taken action on Smart Grid or load management.

- ***California***
    - Considering legislation comparable to the EISA's SG provisions.

Regulatory

- ***Washington (WUTC)***
    - August 22, 2007, the Commission reaffirms its policy adopted in 1980 that time-of-day ratemaking is acceptable only if cost-justified.
    - The Commission finds and determines that it is not appropriate to require generally that electric utilities provide and install time-based meters and communications devices for each of their customers which enable such customers to participate in time-based pricing rate schedules and other demand response programs as specified in Section 1252(a) of the Energy Policy Act.
    - Commission expects that time-of-use metering and rate designs will be examined on a case-by-case basis in rate investigations or other proceedings considering the varying circumstances of each utility and each utility's customer classes.

- ***Oregon (OPUC)***
    - IRP guidelines require evaluation of demand response resources on par with supply-side resources.
    - OPUC recently approved PGE's plan to install two-way meters throughout the service territory, including a component for accelerated depreciation of existing meters and means of addressing regulatory lag associated with the rapid deployment of the new meters.
    - All active parties in the case other than residential consumer advocates supported a stipulation adopted by the Commission. The stipulation includes conditions related to demand response programs, including filing a critical peak pricing experimental tariff for residential and small business customers first quarter 2009. Residential consumer advocates viewed AMI

technology as not sufficiently mature, disagreed with early retirement and accelerated depreciation of a limited number of "advanced" meters deployed in the recent past, found the net present value of operational cost savings benefits over 20 years insufficient, and were concerned that advanced metering could lead to mandatory time-varying pricing for residential customers. *(Citizens' Utility Board UE 189 Testimony, December 21, 2007).*

- Idaho Power plans to file soon for accelerated write-off of existing meters in its Oregon service area in preparation for advanced metering system-wide.

- ***Idaho (IPUC)***

    - In January 2007, IPUC considered the five new PURPA standards contained in the Energy Policy Act of 2005. It declined to adopt the "Smart Metering" standard but will continue to implement cost-effective smart metering programs for each utility on a case-by-case basis.

    - After reviewing the public comments, IPUC found it is not appropriate to adopt this federal standard. While it concurred with the intent of the standard, its ubiquitous scope and implementation timeline are unrealistic. It found that requiring smart meters across the board for each utility has not been demonstrated to be cost effective. "Although we decline to adopt this federal standard, we find that the Commission embraces the spirit of the standard." In particular, IPUC has implemented smart metering communication programs for all three utilities. For example, nearly a third of Rocky Mountain residential customers are subscribers of time-of-day service; Idaho Power has installed power line carrier AMR meters for more than 25,000 customers; and Avista is installing AMR devices on all of its Idaho meters by 2009. In addition, Idaho Power also offers an Irrigation Peak Reduction program for its large irrigation customers and the A/C Cool Credit program for residential customers. The Commission remains committed to implementing smart meter programs that are cost effective and that offer benefits to both the utilities and their customers. It adopted staff's recommendation that Avista and Rocky Mountain address the status of their smart meter programs in their next general rate cases. In particular, Avista shall address the status of its current AMR program, its cost recovery proposal, and its plans for implementing time-of-use rates, demand responses, or other appropriate rate structures. For its part, Rocky Mountain shall address the status of its time-of-day program, provide justifications for the existing rate differentials, and advise the Commission of any appropriate changes to its rate structures for its customers or classes of customers.

- ***Montana (MPSC)***

    No activity at this time.

- ***British Columbia***

    - In February 2007, Richard Neufeld, Minister of Energy, Mines and Petroleum Resources, announced the new BC Energy Plan: A Vision for Clean Energy Leadership set aggressive targets in British Columbia for zero net greenhouse gas emissions, new investments in innovation, and an ambitious target to acquire 50 percent of BC Hydro's incremental resource needs through conservation by 2020.

    - This will require building on the "culture of conservation" that British Columbians have embraced in recent years. The plan confirms action on the part of government to complement these conservation targets by working closely with BC Hydro and other utilities to research, develop, and implement best practices in conservation and energy efficiency and to increase public awareness.

    - The BC Energy Plan's 55 policy actions focus on the province's key natural strengths and competitive advantages of clean and renewable sources of energy. Among the highlights:

        - Encourage utilities to pursue cost effective and competitive demand-side management opportunities.

        - Explore with BC utilities new rate structures that encourage energy efficiency and conservation.

        - Exploring new rate structures to identify opportunities to use rates as a mechanism to motivate customers either to use less electricity or use less at specific times.

- Employing new rate structures to help customers implement new energy efficient products and technologies and provide them with useful information about their electricity consumption to allow them to make informed choices.

Investor-Owned Utilities

- ***Washington***

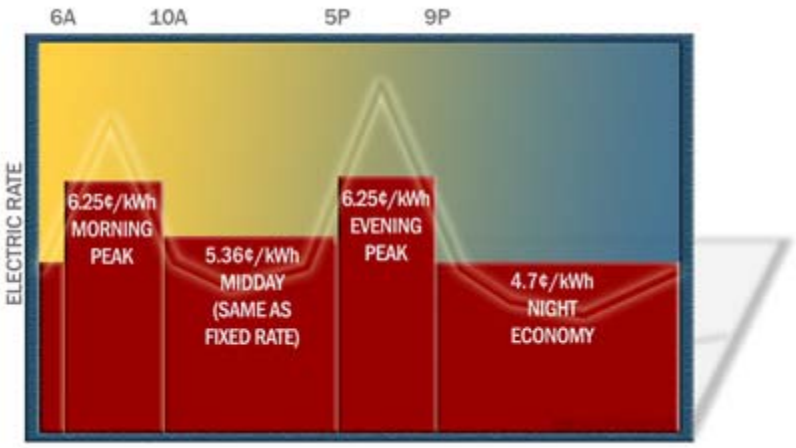
  - Summary of PSE Time-of-Use (TOU) Program (Demand Response)

    Puget Sound Energy (PSE) has over 1.5 million meters dating back to 2004 using an AMI system provided my CellNet. CellNet has just purchased Hunt Technologies who makes PLC power line carrier equipment. The PSE system is an early example of a one-way meter reading only project. The system is capable of metering TOU rates. A two-way system upgrade is now being studied.

    In most discussions of time-based billing for electricity, Puget Sound Energy's experience is used as a reference case. The Washington State utility installed smart meters and tested time-of-use pricing in 2001-2003 and learned some important lessons. It was the energy crisis of 2000 and PSE faced unprecedented increases in wholesale energy costs. Prices on the spot market were setting record highs, while droughts in the Northwest threatened to trim hydropower supplies. During the morning and evening peaks, when customers' power demands exceeded the resources available, PSE had to buy more than expected on the spot market at prices several times higher than ever before.

    PSE executives knew that shifting enough demand from peak morning and evening periods into the mid-day and nighttime hours would reduce peak power demands and alleviate the problem. With only a slight shift in consumer behavior, PSE could buy much less of its energy at record-high spot-market prices.

    PSE proposed the Personal Energy Management program to the WUTC in early 2001. Program participants could keep their energy bills steady, or even save money, with a few minor changes in their daily routines. They could choose to run certain appliances at night or on weekends, and pay a lower price per kilowatt-hour (kWh), rather than place those demands on the utility during periods of peak energy consumption. The Personal Energy Management (PEM) program was potentially a long-term solution to the supply and cost crisis. In addition, it could help the utility use its power plants more efficiently, postpone building new power plants, and avoid costly expansions of its distribution infrastructure. The WUTC approved a limited trial of a TOU tariff -- electric rates based on time of use -- starting May 1, 2001.



Instead of visually checking meters and manually recording the readings, PSE invested in automated meter reading (AMR) technology to gather the data electronically, four times a day, over a fixed wireless network. In addition to the investment in technology, PSE invested in marketing for PEM. Public outreach efforts informed customers about the program and suggested ways to shift loads from peak to off-peak hours. For many families, it would be as simple as running the dishwasher in the late-evening economy period, and doing the laundry on the weekend when standard flat rates applied.

During an initial test phase, PSE switched on the system, but did not yet apply the TOU rates. It simply gathered baseline information that would later help the utility analyze whether customers responded to the TOU price incentives by shifting some of their demand from peak to off-peak hours.

PEM was launched in April of 2001 with a test group of 300,000 customers. A control group of 100,000 more customers would participate, but remain on a flat-rate tariff without the price incentives. A third group would have their consumption measured in the same way, but continue to receive only monthly summaries of their consumption at a flat rate, as before AMR.

PSE customers participated in PEM for about two years, during which time PSE learned some valuable lessons. Those lessons would later benefit utilities who decided to deploy smart meters and apply TOU rates in other regions. PSE felt that the concept works, customers understand it, and they are in fact willing to step up and make a change in their behavior if they're given the right information.

As PSE hoped, customers shifted their loads according to the price incentives. The average residential customer shifted 13 kilowatt-hours out of peak periods and into off-peak periods. That four percent shift translated to about 25 Megawatts of reduced peak demand.

There were a few surprises for PSE from their PEM experience. One was that some customers in the control group also shifted their loads, even though they didn't have the incentive of a lower price. This may be reflective of customers' desire to do the right thing, the effect of having the information and being educated about energy costs, short-term curiosity, or confusion about whether the TOU rates applied to them.

The second surprise was a net decrease in energy consumption among PEM participants, which PSE called the "conservation effect." They weren't asking people to use less energy, they were strictly asking them to move their loads. Instead, they actually used less energy. PSE received a measurable conservation effect of one to two percent, which is significant when multiplied by the thousands of kilowatt-hours involved.

PSE and the WUTC ended the PEM program in August of 2003, ahead of schedule. There were several factors in the decision, first among them being the end of the current energy crisis. Market power prices returned to near-normal levels, easing the financial pressure on PSE for meeting demand during peak hours.

Some observers feel that there was not enough of a differential between peak and off-peak electric rates to result in meaningful savings on participants' energy bills. Shifting 200 kWh in a month saved less than $2 for most customers. The savings were reduced by a $1 per month charge added late in the program to help PSE to recover part of the meter-reading cost. Without measurable savings on customers' bills, observers felt the shift in behavior would be short-lived.

A larger price differential was not tested in Washington, but California utilities offer higher price differences in their TOU tariffs. Those utilities experience three to four times as much energy shift among their customers -- about 15 percent.

As PEM entered its second year, most PSE customers' bills had actually increased by an average of $0.80 per month under the program. With a larger rate differential, the WUTC was concerned that bills might increase even more. After much discussion, the program was ended.

Today, even without TOU rates, PSE still gathers valuable data from the 900,000 smart meters in its AMR system. The utility uses that data to help it control costs and improve customer service. One such use is in the PSE call center, where customer service representatives help customers understand the source of sudden increases in their energy usage. Another advantage of AMR data is that outages can be detected and isolated in minutes over the network, rather than waiting for calls to come in.

The greatest value from AMR may have yet to be realized: Having made the technology investment, and having learned from experience how effective TOU rates can be, PSE is prepared to implement new programs in the future.

- ***Oregon***

  The IOUs have several load management/demand response programs, including time-of-day rates, the demand buyback, and real-time pricing. As noted above, PGE is implementing advanced metering infrastructure. See Note above regarding CUB UE 189 testimony. In addition, PGE is encountering unfortunate cost issues with its AMI rollout. PGE has currently spent 40 percent of its anticipated AMI project management O&M budget with only around 0.3 percent of the meters changed out. Additional potential project costs may emerge from potential damage at customers meter boxes and related equipment.

  Portland General Electric (PGE) has just announced a phased project with Sensus metering to provide 850,000 of the FlexNet AMI meters. The system will enable on demand reads, remote connect/disconnect services, outage verification and remote firmware upgrades and future smart applications. http://na.sensus.com/Module/PressRelease/PressReleaseDetail/electric?id=44

- ***Idaho***

  All investor-owned utilities have, at minimum, initiated smart metering technology. Avista Utilities, in northern Idaho, began installing advanced meter reading (AMR) devices on electric and gas meters in 2005. Rocky Mountain Power in eastern Idaho, formerly Utah Power, has offered time-of-day service for many years. Idaho Power has implemented an AMR pilot program for more than 23,000 customers. A recent federal report says Idaho ranks fifth in the percent of customers who use AMR, 16.2 percent. Participants disagreed with or said they could not meet an 18-month deadline – by February 2007 – to have smart metering offered for all customer classes. Instead, the standard should be based according to each utility's distinct territories and customer base.

- Avista Summary

  In 2006, Avista announced a 339,000-meter initiative for DR in Washington, Idaho and Oregon. http://www.metering.com/node/6585. More recently, Avista is conducting AMI pilots in Idaho using RF and PLC communications. So far, it has installed over 40,000 electric PLC meters, 27,000 electric and gas RF meters under a fixed network. Avista plans to complete its Idaho installations by the end of 2008.
  http://www.smartgridnews.com/artman/publish/article_402.html

- Idaho Power Summary

  Idaho Power Demand Response/Advanced Metering/Load Management Programs

  Advanced Metering Infrastructure

  On August 4, 2008, Idaho Power filed a request with the Idaho Public Utilities Commission (IPUC) for a Certificate of Public Convenience and Necessity that authorizes a plan to install Advanced Metering Infrastructure (AMI) technology throughout the utility's service area.

  The three-year AMI implementation program will convert nearly all of the current power meters in Idaho Power's service area to a technologically advanced model that will allow for both present and future benefits to the company and its customers.

  Those immediate benefits include fully automated meter reading and an improved outage management system. Additionally, the new metering infrastructure provides a foundation for future customer programs and pricing choices. One of the biggest obstacles in transition to a full AMI system is the substantial increase in data collection and data management.

  The company estimates the project will cost up to $71 million over the three-year deployment schedule. However, Idaho Power stressed that the filing does not seek a change in customer rates at this time, but that rate impacts will be addressed in a subsequent proceeding after a deployment plan is approved by the IPUC.

  In 2004, Idaho Power began Phase 1 of this project, installing AMI in the Emmett and McCall regions of the service territory. Results were reported in 2005 and it was determined technically and financially feasible to expand this project to further regions.

  Idaho Power proposes to install AMI throughout its service area through a systematic three-year deployment schedule starting in January 2009 and concluding in 2011. The schedule would start with the company's Capital Region that includes Boise, Meridian, Eagle, Kuna, in 2009. In 2010 customers in the Canyon and Payette Regions, including Nampa, Caldwell, Payette and Ontario will convert to AMI. The project will conclude in 2011 in the Southern and Eastern Regions that are comprised of Twin Falls, Hailey, Jerome, Pocatello and Salmon.

  The actual meter exchanges will take place on a carefully planned schedule that follows meter-reading routes and progresses route-by-route and substation by substation until all of the required hardware is installed throughout the grid system.

  Background
  One of the many interests spawned during the western energy crisis of 2000 and 2001 was the idea that new metering technology, along with time-of-use (TOU) pricing could become part of the solution to future energy concerns.

  As a result, the IPUC ordered Idaho Power to evaluate and subsequently report upon the viability of TOU metering programs and the deployment of Automated Meter Reading (AMR) technology.

  Since that time the term AMR has evolved into the more inclusive term AMI, which includes not only the metering devices, but also the hardware, software, communications equipment,

customer associated systems, and data management software. Although the term has changed, the concept remains the same. On August 31, 2007, the company filed, pursuant to commission order, an AMI implementation plan. Attached is the filing to the Idaho PUC regarding Idaho Power's AMI infrastructure and plans.

Residential Demand Response
"A/C Cool Credit"

Idaho Power's residential demand response program, A/C Cool Credit, is a voluntary summer A/C cycling program offered to customers in certain regions of Idaho Power service territory with central air conditioners during the months of June, July and August. For each month the customer is signed up for the program, they receive a $7 dollar credit on their electricity bill (potentially saving $21 dollars over the entire season). The customer has the opportunity to sign up or drop out of the program at any point during the year, but will only receive a credit for the months they actually participated.

The A/C cycling program uses an installed remote controlled switch which allows Idaho Power to cycle the air conditioner weekdays from 2 PM to 8 PM. The air conditioner is cycled in 15 to 20-minute intervals over a 2-4 hour period. During a cycling event, customers can expect a 1-3 degree increase in their indoor temperature.

The A/C cycling program is designed mainly with the intent of load shifting to reduce peak demand and has minimal effects on actual energy savings as most customers increase off peak load to make up for the rise in temperature from the cycling event.

A/C Cool Credit began as a pilot in 2002 and was implemented as a permanent program in 2004 for certain Treasure Valley customers. Currently, over 21,000 Idaho Power customers are signed up for the program, resulting in a potential demand reduction of 20 MW. Idaho Power hopes to reach their goal of 40,000 customers by the summer of 2010.

Idaho Power also has approximately 150 customers that are in the Emmet Valley who have AMI A/C cycling switches. The AMI switches store a cycling program, which is activated though a signal sent via the AMI power line carrier technology. New cycling routines can be sent to the switches via the same power line carrier technology.

Attached is the 2004 filing to the PUC requesting the authorization to institute the AC Cycling Pilot Program.

Residential Energy Watch Program

The Energy Watch Program provides Idaho Power customers the opportunity to reduce their electric bills by shifting usage off of "critical peak" hours and onto other hours of the day for which the cost to provide energy is lower. The Energy Watch Program is currently available to all residential customers in the Emmett Valley not participating in the A/C Cool Credit program whose energy usage equals or exceeds 300 kWh for each of the most recent 12 consecutive billing periods (or for all billing periods if the customer has less than 12 months of billing history). There are currently about 60 customers participating in the Energy Watch Program.

Idaho Power's AMI system enables the Company to offer this pricing program in the Emmett Valley because of the ability to collect hourly customer usage data via the AMI power line carrier technology.

Under the Energy Watch Program, residential customers are charged a flat energy rate for all kWh used during the summer season with the exception of the kWh used during an Energy Watch period. The standard summer residential rate at Idaho Power is a block with one rate

for 300 kWh or less and a higher rate for all usage over 300 kWh. Energy Watch participants pay the lower block rate for all kWh usage except during the Energy Watch period.

During Energy Watch Periods, energy rates are substantially higher than the energy rate for all other hours. Energy Watch Periods can occur on any weekday from June 15 through August 15, except for Independence Day when it falls on a weekday. Energy Watch Periods are determined by Idaho Power. Program participants are notified of the declared Energy Watch Period by 4:00 PM the day ahead by telephone and email. All Energy Watch periods will be for the hours of 5:00 PM to 9:00 PM and will occur on no more than 10 days from June 15 to August 15, for a total of 40 hours. Participants in the program pay the regular 5.8 cents/kWh during the non-event periods and over 20 cents/kWh during a scheduled Energy Watch event.

Results from the program so far have greatly surpassed expectations, with consistent load reductions of approximately 40 percent during a called event. Although Idaho Power is confident that this program can be successful on a larger scale, further analysis is needed to understand and determine any variables that may have led to this reduction to be much higher than expected. Mainly, the voluntary sign up for this program could have a great impact on the participants understanding and want to drastically reduce load during an event, which data shows are mainly elderly customers on fixed incomes. In addition, Idaho Power is also taking a deeper look into other demographic data of these customers and any geographic impacts that could result from running the program in a small region.

Residential Time-of-Day Program

The Time-of-Day Program provides customers the opportunity to reduce their bills by shifting usage from the "on-peak" period, when the cost to provide energy is highest, to the "off-peak" period, when the cost to provide energy is the lowest. The time-of-day pricing periods are only in effect during the summer season. During the non-summer season, pricing is the normal base rate for residential customers, except those who participate in the A/C Cool Credit program.

Time-of-Day Periods and Rates
Under the Time-of-Day Program, residential customers are provided price signals to encourage them to shift their energy usage to specific periods of the day. The three time-of-day pricing periods for the summer season are defined as:

Time-of-Day (weekdays only)	Summer Energy Time Periods	Rates*
1 PM – 9 PM	On-Peak	8.9 cents per kWh
7 PM – 1 PM	Mid-Peak	6.5 cents per kWh
9 PM – 7 PM	Off-Peak	4.8 cents per kWh

The summer season begins June 1 and ends August 31. Attached is the filing to the Idaho PUC to implement both the residential Energy Watch and Time-of-Day pricing programs.

Similar to the Energy Watch program, collecting hourly usage information via Idaho Power's AMI system enables the company to offer this pricing program. In contrast to the Energy Watch program, it is possible to offer time-of-use pricing with a time-of-use meter with or without AMI. With time-of-use meters, however the pricing blocks are pre-determined and must be programmed into the meter. By using an AMI system, the pricing blocks can be altered at any time because the billing data is based on hourly information.

Irrigation Demand Response
"Irrigation Peak Rewards"

The purpose of this program is to turn off power to selected irrigation pumps during peak weekday hours (Interruption) in the summer months in order to produce a decrease in Idaho Power's system summer peak.

The program is an optional, supplemental service that allows Idaho Power to turn off the power to all specified irrigation equipment behind a customer's metered service point on a regular basis with the use of an electric switch (timer).

In exchange for allowing Idaho Power to turn off power to the specified irrigation equipment, participating customers receive a monthly monetary incentive in the form of a demand credit. This is paid on the basis of the kilowatt reduction as measured by the customer's monthly Billing Demand. Idaho Power began enrolling customers into the program in early 2005 in order to meet program capacity targets for the 2005 irrigation season.

In 2007, the program consisted of 947 service points, which resulted in a maximum demand reduction of 37,441 kW.

- ***Montana***

  Little or no activity on SG/LM programs.

Northwest Publicly-Owned Utilities

- **Milton-Freewater Light & Power (Milton-Freewater, OR)**
  Milton-Freewater Light & Power started a Radio Energy Management System (REMS) in 1986. Using a small radio receiver placed in customers' homes the city can control electric water heaters, electric central heat and air conditioning during times of peak use. REMS is usually operated only three or four days per month. Customers participating in this program receive discounts on their electric bill. The city pays for the installation and materials of the REMS equipment.

- **Tacoma Power (Tacoma, WA)**
  Tacoma Power's Gateway project is an early example of Smart Grid techniques to merge electric and telecommunication technologies for better service and more cost-effective operations. Approximately 800 miles of fiber and coaxial cable have been constructed providing Tacoma Power with a state-of-the-art telecommunication system with which it supports transmission and distribution operations, advanced metering, and retail and wholesale commercial services. The network consists of a hybrid fiber-optic coaxial (HFC) system, which delivers two-way signals for cable TV, cable modem services, and advanced metering.

  The Gateway project operates advanced meters at residential homes and commercial businesses. Residential and commercial customers can access demand and consumption data collected in one-hour readings to manage energy efficiency. Commercial customers also benefit from information showing phase and power quality attributes that enable them to correct potential problems before they occur.

  Gateway has currently installed 13,000 of a 20,000 residential meter project at a rate of 30 meters per day or 600 meters per month. Older meters nearing end-of-life and areas with overhead construction are being targeted initially so that benefits in outage detection and management can be realized quickly. Gateway is also installing meters in difficult access locations to make field investigations easier. Installations in strategic locations throughout the system area are being planned to maximize outage detection.

  The Gateway meters are remotely read every hour and billed automatically through the SAP system. The residential meters can remotely connect and disconnect main AC power. The meter also is capable of communicating data inside the home using Power Line Carrier (PLC). A simple in-home web browser has been developed to support a Pay As You Go pilot program operated directly from the SAP billing engine.

Regional Organizations and Associations

- **Bonneville Power Administration (BPA)**

  The Olympic Peninsula Project consisted of three inter-related projects:
  1. GridWise Olympic Peninsula Project
  2. GridWise Grid-Friendly Appliance Project
  3. BPA's Non-Wires Solutions Project

  The three projects together utilized demand response, advanced communication systems, and a simulated real-time market to demonstrate the persistent, real-time benefits of GridWise technologies and market constructs. The project demonstrated that local marginal retail price signals, coupled with the project's communications and the market clearing process, successfully managed the bidding and dispatch of loads and accounted quite naturally for wholesale costs, distribution congestion, and customer needs.

  Olympic Peninsula Project
  The Olympic Peninsula Project was a field demonstration wherein residential electric water heaters and thermostats, commercial building space condition, municipal water pump loads, and several distributed generators were coordinated to manage constrained feeder electrical distribution through the two-way communications of load status and electric price signals. The field demonstration took place in Washington and Oregon and was paid for by the US DOE and several NW utilities. Price was found to be an effective control signal for managing transmission or distribution congestion. Real-time signals at 5-minute intervals are shown to shift controlled load in time. The behaviors of customers and their responses under fixed, time-of-use, and real-time price constraints were compared. Peak loads were effectively reduced on the experimental feeder.

  Grid-Friendly Appliance Project
  Fifty residential water heaters and 150 new residential clothes dryers were modified to respond to signals received from under frequency, load-shedding appliance controllers. Each controller monitored the power-grid voltage signal and requested that electrical load be shed by its appliance whenever electric power-grid frequency fell below 59.95 Hz. The controllers and their appliances were installed and monitored for more than a year at residential sites at three locations in Washington and Oregon. The controllers and their appliances responded reliably to each shallow under frequency event—on average of one event per day—and shed their loads for the duration of these events. Appliance owners reported that the appliance responses were unnoticed and caused little or no inconvenience for the homes' occupants.

  Non-Wires Solutions Project
  The Non-Wires Solutions Project sought to cost effectively delay or defer the need to upgrade transmission lines through the use of demand-side management and distributed generation. The program used the Demand Exchange platform to work with five participants contributing a maximum 61 MW of curtailment. Bids were offered on a day-ahead basis.

  Project Conclusions (conclusions are defended in the full project reports at: http://gridwise.pnl.gov/)

  - The project successfully managed a feeder and an imposed feeder constraint for an entire year using these automated technologies
  - Market-based control was shown to be a viable, effective tool for obtaining useful price-based responses from single premises
  - Market-based control was shown to be a viable, effective tool for obtaining useful price-based responses for the entire feeder
  - Peak load reduction was successfully accomplished
  - Internet-based communications performed well for the control of distributed resources
  - Residents eagerly accepted and participated in price-responsive contract options

- Automation was particularly helpful for obtaining consistent responses from both supply and demand resources
- The ease of participation, automation and ability to override controls, or "friendliness" with which the project invited and practiced demand response may be a key to attaining the needed magnitude of resources
- Real-time price contracts were especially effective in shifting thermostatically controlled loads to take advantage of off-peak opportunities
- Municipal water pumps were successfully incorporated into the demand response mix
- While understandably constrained by environmental concerns, the project's real and virtual distributed generators effectively prevented the overloading of a constrained feeder distribution line during peak periods
- Modern portfolio theory was applied to the mix of residential contract types and should prove useful for utility analysis
- Price-market participants responded to incentives offered through a shadow market. The project demonstrated that demand response programs could be designed by establishing debit account incentives without charging the actual energy prices offered by energy providers.

BPA Post-2011 Rates

In 2012, BPA will change its wholesale rate structure to send a stronger demand signal. Currently, BPA's demand charge is low, approximately $2/KW, and has almost no time-of-use differential. Also, BPA charges demand on the unpublished BPA system peak, making it difficult for utilities to manage their demand charges.

In 2012, BPA's demand charge will increase to $6-18/KW, varying seasonally. It will also be charged on the utility's system peak, allowing each utility to have more control in managing their demand charges. The time-of-use differential will still be negligible. To avoid imposing an immediate, huge rate increase, BPA will "grandfather" in a portion of the utility's current demand; however, the demand charge is expected to represent 15-25 percent of the utility's wholesale power bill, an amount on par with other areas of the country.

- **Northwest Power and Conservation Council (NWPCC)**
  - Fifth Power Plan – The Council recommends developing demand response programs or agreements between utilities and customers to reduce demand for power during periods of high prices and limited supply. The Council recommends developing 500 megawatts of demand response between 2005 and 2009 and larger amounts thereafter. Demand response has proven helpful in stabilizing electricity prices and in preventing outages. The Council's analysis shows that although it will probably be used infrequently, demand response reduces both cost and risk compared to developing additional generation. Eight demand response actions were identified.
  - Sixth Power Plan – The Council believes the Sixth Power Plan should address the issue of resource flexibility to meet hourly requirements more comprehensively. The Council has developed a new demand forecasting system that better addresses both short-term and long-term patterns of demand. Some flexible resources such as simple cycle turbines or water storage behind dams are traditional and well understood. However, there are other alternatives that are less well understood and more difficult to assess with traditional models. Some examples include demand response programs, various electricity pricing strategies, plug-in hybrid cars that can be charged or drawn down as needs vary, innovative storage technologies, improved wind forecasting, and ramping controls on wind turbines. There are likely many other approaches to be considered and compared based on cost, risk, and other characteristics.

- **Public Power Council (PPC)**

PPC has not taken any official position on LM/SG initiatives. (Dave Ward spoke with Scott Corwin – he is confirming if PPC ever took any position on SG/LM in the past.)

Other Relevant Information

- Several recent studies have examined the cost effectiveness and/or benefits associated with Smart Grid investments and concluded that, on a lifecycle basis, these investments provide benefits far exceeding their cost [ref: San Diego study].
- Other studies have concluded that AMI and smart meter technology is still maturing and that it is not clear whether the current technology will prove to be cost effective and what the useful life of current AMI technology will be. It may be beneficial to proceed slower, rather than faster, to see what lessons are learned from utilities that are installing these systems. Further, there is concern about the impact that AMI and smart meter technologies will have on low- and limited-income customers, particularly if they are used as platforms for time-of-use and/or critical peak pricing rate designs. *(Advanced Metering Infrastructure, What Regulators Need To Know About Its Value to Residential Customers, National Regulatory Research Institute, Nancy Brockway, February 13, 2008, and Smart Meters, Real Time Pricing, and Demand Response Programs; Implications for Low Income Electric Customers, Barbara Alexander, May 30, 2007)*
- A major component of SG is AMI. Numerous utilities around the country are planning to implement or in the midst of implementing AMI.
- Xcel is engaged in the "Smart Grid City" project in Boulder, Colorado, implementing numerous SG technologies in that medium-sized city.
- Capgemini conducted a survey aimed at developing a national energy perspective among the members of the National Association of Regulatory Utility Commissioners (NARUC). The survey was completed by 42 states. According to the results of the survey, the majority of states believe that energy efficiency is a priority, and 24 states are considering time-of-use (TOU) or other dynamic pricing mechanisms as a tool to encourage efficiency and conservation, while five states have dynamic pricing available, one state has it under review and three states have yet to make a decision. Nine states are not considering dynamic pricing.
- International standards:
  In many ways, Europe is ahead of the US in terms of Smart Grid, DR, and TOU. An example would be Echelon's deployment of 27 million smart meters with Contatore Elettorinico in Italy starting in 2006. Echelon is a Silicon Valley spin-off from Apple.
  http://www.echelon.com/company/press/2006/ltr_enel.htm

  However, Echelon has very few meters deployed in the US market, perhaps less than 1,000 meters including a recent pilot program by Duke Power in North Carolina. The reason is that the meter standards and even the plant design are very different in the US from that in Italy. The two major differences are that in Italy the number of customers behind one transformer is 30 to 40. While in the US, the average is three to four customers. This makes the technology used by Echelon (Lonworks) inefficient in the US market. The second difference is the European IEC standard for meters is very different from the US ANSI standard. The fundamental differences are mechanical, with the European meters looking more like a mailbox and not having the plug-in meter socket used in the US ANSI systems.

  The European standards are also quite different for telecommunications networks. The European data standard ETSI is incompatible with the US standards. The recently developed high-definition television standards are also different and incompatible. The US standard broadcast uses a modulation called 8VSB and the European standard uses OFDM. It is unclear if and when we will see more cooperation and standardization in the US and European markets.

Opportunities for Efficiency Associated with LM/SG

- Lower-cost means for meeting capacity needs, particularly in consideration of avoided transmission and distribution expense
- Better ability to match load to variable, renewable resources such as wind and solar
- Improved utilization and performance of grid components, such as reduced line losses and avoided addition/modification investment
- LM programs and SG investments (particularly in information) can create consumer demand for energy management technologies and services, leading to both peak and energy reduction
- There have been successful LM projects (not related to SG) that use simple communications control (pager, phone, PLC)
- One of the advantages that cannot be underestimated is the amount of customer data that results from a SG or smart meter program. This data can be used to help customers reduce energy usage and help utilities identify energy efficiency opportunities and marketing focus.
- SG can also assist with energy efficiency opportunities on the transmission and distribution system (feeder balancing, efficient feeder and transformer loading, etc.).

Opportunities Associated with Distributed Generation and Storage/SG

- Beginning SG deployment now anticipates integration of plug-in vehicles and distributed generation and allows multi-year program to create capability (see Google's RechargeIT.org).
- Distributed generation causes problems by producing too much at certain times. This can be managed by virtual storage on the grid, or with physical storage.
- Physical storage can be in the form of batteries, flywheels, compressed air, pumped hydro, and potentially operating water heaters to store energy as heat.
- Plug-in electric vehicles can serve as manageable demand and as distributed generators with battery stored energy which can be tapped by a Smart Grid.

Challenges/Issues Associated with LM/SG

- Continuing depressed value of capacity in the NW because of large hydro system
- Evolving and changing technologies for SG; interoperability standards still under development
- Lack of information on cost effectiveness, cost-benefit specific to region or individual NW utilities
- Impacts on low-income and limited-income customers

Other Thoughts

Distributed Energy Generation (DER) and Storage, in the Smart Grid of the Future

The definitions of Demand Response/Smart Grid sometimes exclude or under estimate the potential for the Smart Grid to improve the value of, and thereby accelerate growing diversity and number of, distributed generation applications feeding into the grid. One problem with distributed generation is the possibility of excess generation at a localized site. This can be managed to a much higher level if storage or generation control devices are integrated to accommodate the growth in distributed generation in concert with a Smart Grid. Storage (batteries, pumped hydro, compressed air, flywheels, etc.) is generally assumed to be too expensive. However, there are possibilities that will be commercially available in the near future (see Vehicle to Grid story below), and more is possible, but we must plan for it—make building Smart Grid ready.

Green Buildings need to also be Smart Buildings, a kind of construction that enables current and future Smart Grid integration and thus avoids lost opportunities as current technologies become commercially available. See for example the article on the Boulder, Colorado, Smart Grid demonstration project, which notes storage batteries for residential PV systems, and remote sensing equipment and automated switches on lines and substations. http://minnesota.publicradio.org/display/web/2008/09/26/smart_grid

Hybrid electric vehicles offer the potential to serve as interruptible loads AND scheduled generators; the so-called V2G technology is possible now with a net metering agreement with a utility. RechargeIT.org, a

Goddgle.org Project is promoting a test with their employees to accelerate the adoption of plug-in hybrid electric vehicles with PG&E. http://www.google.org/recharge/overview.html

From Patrick Mazza's blog, June 2007. http://gristmill.grist.org/story/2007/6/8/144854/0193/

> But the more serious long-term implication is that the grid cannot take on the tasks it needs to accomplish to reduce global warming pollution. Look on the grid of today as if it were the old computer network with a mainframe computer at the hub and terminals at the end of the spokes. The "mainframe" of the grid is the central power station. Transmitting power out the spokes to end users is a relatively simple management task compared to a system in which power generators are distributed throughout the network and power flows are many-way. Utility engineers typically resist distributed generation specifically because it makes their management task more complex. Most states have now enacted net metering laws which require utilities to interconnect small-scale distributed generators, but cap the total amount in the system to avoid destabilizing the grid.
>
> So far solar photovoltaic panels, small-scale wind-power generators, fuel cells, and other localized generators have not penetrated far enough into the market to raise much of a challenge. But consider the moment at which breakthroughs are achieved and distributed generation experiences an explosive takeoff, as a number of observers project for solar PV power. Then power distribution systems will have to be automated. In effect, an information internet backbone will automatically route and manage the complex power flows of the energy internet.
>
> Cogeneration is prospectively one of the largest distributed energy sources. Building and industrial heat could be recycled to generate electricity on-site. Interconnection to the grid can make the business case for a cogen unit, providing a market for surplus and a grid backup when the unit is down. But utilities discourage these kind of connections, again, because they pose complex management problems. Smart Grid systems will make cogen far more economically feasible.
>
> In transportation, improvements in battery technology are stirring new interest in electrified options, including plug-in hybrids and pure battery vehicles. Mass-scale electrified transport will require Smart Grid systems. One function will be to match charging times to clean power availability. For example, in many regions wind power tends to be generated at night. A Smart Grid can send real-time signals to plugged-in vehicles alerting them to charge when turbine blades are turning. Another Smart Grid function will be to manage vehicle-to-grid networks in which electrified fleets supply power to the grid as well as receive power from it. Making intermittent renewables into a 24-7 power source requires energy storage, and our cars which generally sit parked 22 hours a day are an ideal match. Smart systems will manage "V2G" networks.
>
> An energy systems revolution is upon us, and the Smart Grid is at its very center. In future installments I will drill down more into the capabilities and potentials of the Smart Grid, as well as the obstacles and challenges along the road there. Meanwhile, for those who want to read up, check out my paper, "Powering Up the Smart Grid" for one of the most complete overviews of the topic.

Potential Policy Recommendations Under Consideration

The team then developed the following "**Draft Potential Policy Recommendations Under Consideration**"

- Value of capacity
  - The region should fully support the NWPCC's efforts to improve assessment of capacity in the Sixth Power Plan
  - Regional IOUs should explicitly address capacity needs in their IRPs, addressing both short-term and long-term costs of capacity and fully including avoidable T&D associated with improved system load factors
  - Pending a better sense of the value of load and energy management going forward, regional utilities should be encouraged and supported in robust experimentation to improve knowledge of the technologies, program designs, and customer preferences regarding load and energy management
  - Load Management/Smart Grid applications may need to be developed that will accommodate both unanticipated increase and decreases in the region's future renewable generation output. As the region meets its RPS and carbon reduction targets with the installation of significant, renewable energy generation capacity future DM/SG applications may be called on to (1) reduce electric demand (traditional demand management); (2) increase electric (the inverse of traditional demand management); or (3) utilize new forms of energy storage (electric transportation fleets stored in "smart garages") as the output from the renewable generation fleet changes with the vagaries of wind speed, sunlight, or tidal/wave forces.

- Establish Regional Load Management/Smart Grid Group
  - Smart Grid technology (including AMI) is still maturing and it is not clear whether the current technology will prove to be cost effective and what the useful life of current AMI technology will be. It may be beneficial to see what lessons are learned from utilities that are installing these systems. This type of group could
    - Track federal legislation and initiatives, assess any impacts to the northwest region and identify funding opportunities for LM/SG applications
    - Review what other utilities have accomplished with successful LM/SG initiatives
    - Review other demand response and load management that may not be linked to SG technology
    - Share information on evaluating/assessing the cost effectiveness of LM/SG activities
    - A cost-benefit analysis study is recommended for the region (Washington, Oregon, Idaho, Montana). The study would address the energy efficiency related to load management and its ultimate integration with the Smart Grid. All benefits including those that benefit society in general should be identified. Such benefits could include reduction in CO_2 emissions, climate change, mitigation of rising energy prices, enabling the broad penetration of renewable resources and their integration with the grid. The study would involve participation of all stakeholders including consumers, state and federal regulators, utilities, energy suppliers and investment entities. To engage all participants in the region, a dedicated website should be launched. Funding for the study could be through private/public partnership.
  - Standards: The region should consider adopting an advisory position that the region supports open technologies and "mix and match" capabilities and those LM/SG technologies its utilities purchase will meet ANSI and any other standards.

- Smart Grid capability
  - As part of IRP, regional utilities should assess the current state of their grids according to the metrics developed by the US DOE Office of Electricity Delivery and Energy Reliability (www.oe.energy.gov/documentsandmedia/Smart_Grid_Workshop_Report_Final_Draft_08_12_08.pdf) and address in their Action Plans any planned activities to change the results of these metrics over time, including the cost effectiveness of any proposed investments.
  - States should consider adopting a requirement that utilities evaluate suitability of SG investments BEFORE deploying any "NON-advanced grid technologies," similar to that in the federal legislation.

- States should investigate regulatory barriers to SG investment by utilities, including timing of investment recovery, handling of assets retired prior to the end of previously set depreciation lives, and effect of SG investment on revenues and whether it is appropriate to address any barriers found with generic policies or utility-specific proposals.

- Tax Exemptions/Permitting Modifications
  - States should consider offering a sales and use tax exemption on the purchase of load management/Smart Grid technologies (material, services, etc.).
  - States should consider offering an income tax incentive for investments for load management/ Smart grid technologies by businesses and households.
  - The states should consider either reducing per-house permit fees or offering utilities bulk rates for demand response or Smart Grid equipment installations. States should also consider a streamlined process for acquiring these permits.

- Low-Income and Limited-Income Customers
  - Implementation of LM/SG initiatives may adversely impact low-income and limited-income customers. Utilities should consider reviewing assistance programs to ensure they are in alignment with any new utility plan.
  - Additionally, in order to fully realize the full energy efficiency and demand management potential of the Smart Grid, utilities and policy makers need to ensure that low- and limited-income customers' dwellings are up to modern energy efficiency standards and that customers possess the necessary equipment, end-use device infrastructure and knowledge to fully utilize Smart Grid potential. These customers represent 20 to 30 percent of the total residential customer base. The residential sector will underperform against its full energy efficiency, demand management, and carbon reduction potential if such a large proportion of the sector are living in energy inefficient dwellings and utilizing appliances that do not have the capability of effectively interfacing with the Smart Grid. The regional goal should be that all residential customers are fully participating in meeting the region's energy efficiency and greenhouse reduction goals.

Final Recommendation

Foster Regional Load Management/Smart Grid (LM/SG) Cooperation/Coordination

Action Recommended

Form a group of interested persons from the region's utilities, governance, and non-profit sectors to (1) share information and experience about emerging technology and practices in the areas of load management and Smart Grid; (2) lead regional efforts on analysis and research value of capacity, reliability, and energy efficiency associated with LM/SG; (3) assess and monitor the state of applicable LM/SG regulations and legislations; and (4) assemble and share information of the impacts that (LM/SG) technologies and applications will have on low- and limited-income households.

Background and Rationale

- More analysis and research is needed to evaluate the potential amount of energy efficiency that may be accomplished through LM/SG activities.
- The grid must contain significantly more "intelligence" than currently as we transition to a two-way flow of power, support customers in developing strong energy management practices that enable them to reach their financial and environmental goals, and strive for the high reliability the system will require for increasingly sensitive electrical applications.
- Load management is already important in parts of the country that have faced capacity constraints far earlier than the Northwest. As the Northwest adds additional intermittent resources, however, and the hydroelectric system reaches the limit of its ability to provide large amounts of on-demand and extended capacity, load management will become increasingly important in the Northwest as well.
- Individual utilities and personnel within various government agencies and non-profits are currently engaged in research, experiments, and projects pertaining to both LM/SG.
- Significant activity is occurring at the federal level and in several national groups, the activities of all of which are time-consuming but important to follow.
- The residential sector cannot meet its full energy efficiency, demand management, and carbon reduction potential if such a large proportion of the sector are living in energy inefficient dwellings and utilizing appliances that do not have the capability of effectively interfacing with the Smart Grid; effective evaluation and assessment needs to occur regionally.
- The Energy Independence and Security Act of 2007 already requires that state commissions consider some Smart Grid. Close monitoring of regulatory activity and effective communication to the region would be beneficial. It could also lead to coordinated lobbying activities.
- While the capability of the NW hydro system has not yet been exhausted, it seems inevitable that the region will need new ways to cover peak loads and ancillary services in the foreseeable future. Completion of the Sixth Power Plan by the NWPCC is intended to give us a better understanding of this situation. The assessment of costs should include both the short-term and long-term perspectives. More analysis and research is needed to evaluate the potential value of meeting these capacity needs with LM/SG activities.

Answers to EC Questions

What is the value added to the region of the recommendation? Why is it important?

- More analysis and research is needed to evaluate the potential amount of energy efficiency that may be accomplished through LM/SG activities.
- Coordination and cooperation could significantly speed the region's realization of benefits/risks from load management and adoption of Smart Grid components, as well as lessen the chance of costly mistakes.
- Such efforts depend on the continued willingness of regional entities to provide in-house resources and potentially funding. If managed effectively, this group could lead to more effective use of funds and may better position the region (through BPA) to secure grants.

What is not occurring now that we should be doing?

- The region has no process or forum through which it can coordinate efforts, particularly with respect to research and experimentation, share learnings, or cooperatively design and fund major work that would advance the region's understanding of benefits, risks (e.g. impacts on low/limited-income customers) and costs associated with both LM/SG.

Is there a way to do things more efficiently than what we are doing today?

- Coordination and cooperation could significantly speed the region's realization of benefits from load management, impacts on low/limited-income customers and adoption of Smart Grid components, as well as lessen the chance of costly mistakes.

How would you suggest that your recommendations be implemented? Who and how?

A group sponsored/supported by NWPPC, NEEA and BPA, and having NWPCC act as facilitator, may be the best approach for this group, using an informal letter of intent to guide its formation and include a date certain by which the region will assess the effectiveness of the group. Participation from regional IOU utilities, publicly owned utilities, regional stakeholders (e.g. low/limited-income representatives), national labs, universities, large business, technology centers (e.g. NCAT) to attend meetings and staff projects identified by the group would provide diverse viewpoints and broader acceptance. The group could agree on simple cost sharing for work beyond the time or experience capabilities of the in-house resources, such as detailed cost-benefit studies. Governing bodies, such as the state public utility commissions, public utility boards and member organizations, and other state government agencies should request that the group provide an annual report of its activities, findings, and plans for the following year.

Further, we suggest this group have a defined life (e.g. three years) and an obligation to poll whether it should continue thereafter before going further. In essence, the groups above would re-up to their roles.

Is there strong support within your Workgroup for the priority recommendations?

Yes – if managed effectively and efficiently, with clear goals and purpose defined.

APPENDIX F-3
WORK GROUP 6: DIRECT APPLICATION RENEWABLES SUB-GROUP REPORT

Participants and Process

The final participants in the DAR Subgroup were: Todd Currier, Tim Scanlon, Katherine Rossokha, Grant Ringel, Eugene Rosolie, Bill Drummond, Tom O'Connor, Tim Stearn and Dave Robertson. Participants were primarily utility and agency representatives.

We met 5 times via phone conferences to discuss the Phase 1 question from the Executive Committee, ie, to share information about the treatment of DAR within various types of energy efficiency programs, with a focus on the policies underlying these. **It was determined that there are no significant policy barriers which prevent the coordinated delivery of DAR with conservation, although in actual practice the application of cost-effectiveness tests at the measure level dampens this opportunity.**

This dialogue quickly progressed into a more foundational question, which is whether the NW wants to encourage customer-sited renewables. **All participants on the subgroup were in favor of increasing the deployment of small-scale customer-sited renewables as a way to reduce grid energy consumption in the region.**

We discussed the effect of greater of renewables on energy efficiency and concluded that energy efficiency stood to benefit from coordinated delivery of conservation and renewables to customers. The problem statement and recommendations developed represent this viewpoint. Throughout August and September, DAR participants provided information, performed research and collaborated on writing sections of the workgroup documents including the recommendations.

Findings of Phase 1 research and recommendations were presented at full Workgroup 6 meetings and at the October 3rd Executive Committee meeting and comments were taken, considered and addressed. In addition, the priority recommendations were reviewed, discussed and decided to be moved forward by the full Workgroup 6 prior to submission to the Executive Committee.

Harmonization of Policies and Program Structure with Market Trends, Technical Best Practices, Emerging Technologies

Problem Statement

The rise of the green building and integrated design movements along with the availability of emerging technology and growing public awareness of the societal and individual impacts and costs of energy are creating widespread public interest in deploying clean distributed generation.

This interest is sparking an unprecedented investment of private capital in comprehensive energy projects in buildings which cross the lines of conservation, efficiency and renewable generation. From the perspective of the end user, these measures all have initial capital cost and all reduce their electricity or gas bills. From the perspective of many in the design community and some policy makers promoting or mandating zero energy building goals, these energy efficient buildings of the future will include distributed renewable generation whenever possible.

Simultaneously, the commercialization status and relatively low current deployment of direct application renewables (DAR) creates questions and challenges around best practices in system integration and performance in buildings. and on-going concerns about cost-effectiveness.

We lack current and accurate information about what is most cost-effective to the consumer, the utility and the system. In addition, conservation funding standards such as the Total Resource Cost test applied at the measure level hurt DAR in the same way that they disadvantage some other conservation measures which are more costly but feasible from the customer's perspective.

Harmonized policies, incentives and regulation should encourage everyone to innovate and get to a common goal—energy services that minimize costs to individuals, the environment, utility, system. **By continuing to create policies and programs which are difficult to navigate or which actually dis-incentivize customer investment in comprehensive approaches to achieving energy savings, the energy policy community fails to serve customer demand or to capitalize on these occurring market forces to meet public policy goals.**

[Recommendations: See "NEET Workgroup 6 Recommendations"]

NEET Workgroup 6
Direct Application Renewables Sub-Group Phase 1 Assignment

Question from Executive Committee: *"To what extent are direct application renewables in the residential, commercial, industrial and agricultural sectors considered energy efficiency and funded through energy efficiency programs?"*

Definitions:

Direct Application Renewables is defined differently in various places. Although the term is not common, when used it is most often associated with distributed generation, specifically in grid interconnected or islanded customer-sited renewable energy systems which are sized primarily to serve load at the site. (multiple sources, including Assessment of the Potential for the Direct Application of Renewable Resources. Staff Issue Paper, NWPC, 1989 and the US DOE).

In SB 1149, Oregon appears to be using the term DAR to mean thermal applications only. There is a sense that thermal systems fall through the cracks of most renewable energy incentive structures and so should be covered in conservation programs. Renewable thermal energy is typically not eligible for incentives through RPS or Net Metering.

Renewable Energy is defined with some variation in most state RPS' due to the unique availability of resources and political and economic interests in states. The renewable quality is always derived from the characteristics of the "fuel" or resource, not from the type or efficiency of conversion or application/ use of energy. It is this quality which is separated from the electricity produced in an "unbundled" REC. Regardless of state definitions via RPS, there is a hierarchy of desirability of various renewable fuels which is reflected in tiered incentives and in the value and demand for RECs in the voluntary markets. RECs are not available for renewable thermal energy that is not used to produce electricity, such as solar hot water or the useful heat recovered in a biomass chp system.

Issues for Consideration:

Harmonization of Policies and Program Structure with Market Trends, Technical Best Practices

The rise of the green building and integrated design movements along with the availability of emerging technology and growing public awareness of the societal and individual impacts and costs of energy are creating widespread interest and action in deploying clean distributed generation. This interest is sparking an unprecedented investment of private capital in comprehensive energy projects in buildings which cross the lines of conservation, efficiency, demand response and renewable generation. By continuing to create policies and programs which dis-incentivize comprehensive approaches to decreasing the negative impacts of power generation, the energy policy community fails to serve customer demand or to capitalize on these occurring market forces to meet public policy goals.

Renewable CHP bridges the RE and EE definitions

Biomass and biogas cogeneration systems in institutional, municipal, agricultural and industrial applications are common and still increasing sources of renewable energy. The systems provide both renewable electricity and offset a tremendous amount of steam or hot water, and therefore clearly provide conservation benefits. Most renewable energy incentives do not account for the benefits of this conservation, although it appears that Oregon is trying to bridge this gap through organizational cooperation between EE and RE program administrators at the Energy Trust.

Impacts of RE Incentives: RPS, Net Metering and Tax Credits

RPS: Given RECs as the compliance mechanism, RPS typically does not include well-designed ways for customer-sited renewables to participate. Customer sited systems are

small and so is the value of unbundled RECs, so the cost of participation may not be compelling to owners. Aggregators may step in to fill this gap, but smaller systems (< 1 MW) will probably not be compelling for aggregators either. This dynamic removes a key incentive for utilities to support customer-sited renewables, as they will probably not be able to use these projects to comply with aggressive RPS mandates.

Net Metering: Although funded and administered through a rate mechanism, net metering fills the incentive gap for smaller customer sited renewable electricity systems and also provides a levelization from the site perspective of intermittent resources such as solar and wind. Net metering provisions also create much more complexity in considering what is behind the meter and what is entering the grid. This dynamic creates a lot of complexity when considering RE as conservation or EE at a site, but is not dissimilar to considering demand response. Typically, net metering provides a very compelling boost to project economics.

Tax Credits: Federal and state, flat amount or % of costs, may be applicable on a project by project basis. Most production tax credits such as the federal solar and wind PTCs do not apply to customer sited systems who are serving their own loads but only apply to merchant generators. Many tax credits provide both customer-sited RE and EE incentives.

Regional Status of DAR as EE

	Reference	Type of energy efficiency program	DAR as Conservation?	Subject to Conservation Cost-effectiveness test?
BPA	CRC Implementation Manual, Section 9, April 2008	Incentive program	DAR was just moved from conservation to separate renewables option in 2008.	No
WA	RCW 54.16.280, RCW 35.92.360	Low interest loan program administered by public utilities	Specifically calls our customer-sited renewables as a type of conservation.	Yes
OR	SB 1149, Section 3	Systems benefit charge, administered by ETO in separate conservation and renewables incentives programs.	Establishes systems benefits charges, allocates 63% to conservation, 19% to renewable resources. Renewables generating electricity considered renewable resources. Renewables in thermal applications considered conservation. Biomass chp considered both and allocated to separate programs according to power/ heat ratio of system.	Yes for thermal renewables. No for electric generators.
OR	BETC	State tax credit	Both RE and EE funded together	Yes
OR	SELP	Low interest loan program	Both RE and EE funded together	Yes
ID	Idaho Office of Energy Resources		No. Regulatory treatment of EE and renewables are different, as EE has been made revenue neutral for utilities while RE is considered a generating resource.	No
MT	MT DEQ		No. Universal Systems Benefit Charge funds both separately.	No
BC	2007 BC Energy Plan	Conservation Goal – 50% of new capacity	Yes, clean distributed generation is included under "conservation"	N/A

Region

Northwest Power and Conservation Act

The 1980 Pacific Northwest Electric Power Planning and Conservation Act's section 839 (d) Conservation Measures: Resources16 says that "The Administrator shall aquire such resources through conservation, implement all such conservation measures and aquire such renewable resources which are installed by a residential or small commercial consumer to reduce load". (839d (a) (1)) . There are a number of other supporting references to customer sited renewables as conservation resources throughout section 839d.

BPA Conservation Rate Credit

The Conservation Rate Credit's treatment of DAR recently changed when solar thermal and solar PV were clearly included within the list of eligible projects in the renewables option (CRC-CAA Implementation Manual, Section 9, April 2008). These had formerly been included within the conservation program. This change is expected to be unfavorable for these DAR systems, as they are now in competition with more cost-effective, larger scale renewable power projects for a much more limited amount of total available funding. The exclusion of these measures in the conservation section also creates a challenge in program delivery, as home owners and businesses are asked to rework integrated energy efficiency project packages to back out the energy savings associated with DAR elements.

Washington

RCW 54.16.280 and RCW 35.92.360

Energy conservation plan — Financing authorized for energy conservation projects in structures or equipment — Limitations.

Findings -- Intent -- 2002 c 276: "The legislature finds that energy conservation can take many useful and cost-effective forms, and that the types of conservation projects available to utilities and customers evolve with time as technologies are developed and market conditions change. In some cases, electricity conservation projects are most cost-effective when they reduce the total amount of electricity consumed by an individual customer, and in other cases they can be cost-effective by reducing the amount of electricity a customer needs to purchase from an electric utility.

The legislature intends to encourage and support a broad array of cost-effective energy conservation by electric utilities and customers alike by clarifying that public utilities may assist in the financing of projects that allow customers to generate their own electricity from renewable resources that do not depend on commercial sources of fuel

[16] Northwest Power Act, 6 (e)(1). 94 Stat. 2714

thereby reducing the amount of electricity a public utility needs to generate or acquire on their customers' behalf." [2002 c 276 § 1.]

Substitute Senate Bill 5101

In 2005, the Washington State legislature passed Substitute Senate Bill 5101, which outlines an incentive program for solar, wind and anaerobic digesters. The bill provides a tax break (dollar for dollar) for incentive payments made by electric utilities that are in accordance with the provisions of the bill. The qualifying incentive payments, which are capped at $2,000 per year per utility customer installation are based on the measured output of the energy system. It is a true production incentive - the amount of incentive in any given year is the actual measured system output for that year in KWH multiplied by fifteen cents. That fifteen cent rate adjusts higher and lower depending on whether the system that produces the energy is made with qualifying Washington State-produced components. Payment will not be made for power generated after June 30, 2014, but systems put in today qualify for the payment each year until 2014. Therefore, a system that began producing energy on July 1, of this year will be able to receive the payments for six full years (which could be as much as $12,000, depending on the output of the system), but those who wait will receive their payments for a shorter period of time.

Utilities are not required to offer incentives under the program. However, each dollar they spend on the incentives is credited against their utility tax to the state, so the cost of the incentives themselves is passed on to the taxpayers of the state. The utility still has to cover its own administrative and marketing costs, which can range from relatively modest to significant, depending on the approach the utility takes to implementing the effort. Many utilities are offering the program, and over 650 systems have been reviewed under the effort to date. A large majority of those systems are solar PV systems.

A quick review of the numbers suggests that the incentive, because it is capped at $2,000 per year, will probably not induce people to develop anaerobic digesters, large solar or large wind systems - it just isn't enough to induce larger projects. For that reason, there have been efforts to either move the cap up from $2,000 per year or develop an alternative incentive for larger renewable energy systems. So far, none of these efforts has been successful.

Oregon

SB 1149

Section 3, regarding establishment of Public Purpose Funds, allocates 63% of funds to be used for conservation and market transformation and 19% of funds to be used for new rewnewable energy resources. The law defines renewable resources as any renewable energy system which generates electricity. Although not explicitly called out in the law, renewable energy which does not involve the generation of electricity, specifically

thermal applications, are considered conservation and funded as such by the Energy Trust. For renewable applications which provide both electricity and useful thermal energy, as in biomass or anaerobic digester gas cogeneration, an analysis of proportions of electrical and thermal generation from the system is performed and incentive funding/ program support is divided according to these proportions.

Idaho

There is currently no specific policy or statutory language in Idaho regarding direct application renewable or customer –sited renewables as energy efficiency or conservation. They are treated different regulatorily in Idaho – conservation has been made revenue neutral for utilities, while renewable are considered generation resources. The focus is on utility scale renewables.

One interesting sidebar comment was that the paradigm shift they're experiencing in Idaho is in looking at EE as a generating resource for purposes of IRPs etc, rather than considering RE as conservation. The consideration of EE as a resource brings up major concerns for them in M&V of EE resources for purposes of power planning.

Montana

Renewables are considered supply and not conservation in MT. The Universal Systems Benefits Charge funds separate programs for renewables and conservation. The cost-effectiveness criteria for EE presents a barrier to the consideration of customer sited renewables as EE.

British Columbia

Renewables are considered supply by BC Hydro. BC Hydro is currently developing a distributed generation strategy for direct application (customer-sited) renewables, but at this time does not have any incentive-based programs for direct application renewables. BC Hydro currently has net-metering provisions in the Tariff. However the uptake of it has been slow mainly due to high cost at the customer side and other barriers. Among other barriers to customer-sited renewables, particularly for municipalities, is the issue of concurrent authority, whereby municipalities in BC cannot require measures above the provincial building code (i.e. similar to a Merton Rule in the UK). Another policy barrier is related biomass projects and is due to a provincial requirement to have a certified power technician 27/7 to monitor the boiler, even if it can be monitored remotely (which is how many biomass projects operate in Europe).

2007 BC Energy Plan

http://www.energyplan.gov.bc.ca/PDF/BC_Energy_Plan_Conservation.pdf

1. Set an ambitious conservation target, to acquire 50 per cent of BC Hydro's incremental resource needs through conservation by 2020.

Government has set a goal to reduce the growth in electricity demand so that, by 2020, 10,000 GWh of currently forecast needs will be met through demand reduction measures. This may include energy efficiency, conservation, and other demand side solutions like load displacement, fuel switching (e.g. solar hot water heating) and small distributed generation (e.g. net metering.) To put this goal in context, it represents about 20 per cent of the 52,000 GWh of electricity BC Hydro required in 2006 to meet the needs of British Columbians.

This conservation target will be accomplished through BC Hydro aggressively pursuing and then exceeding its existing target to meet one-third of its forecast increase in requirements through demand reduction. In addition, new government policies and programs will support BC Hydro and other electricity and natural gas utilities in further reducing demand growth. This may involve clarifying the criteria the British Columbia Utilities Commission uses in its oversight of utility rates and other utility efforts designed to promote conservation. BC Hydro developed a plan to do so, and this plan is currently undergoing the regulatory review. DG is not a significant source of savings.

2. Establish a standing offer for clean electricity projects up to 10 megawatts.

The Province wants to facilitate the development of distributed clean electricity generating projects in British Columbia to support its goal of self-sufficiency and help promote B.C. innovation. The Province is concerned about the size of the administrative burden for small project proponents to bid on BC Hydro calls. For this reason, this policy directs BC Hydro to develop a program, in consultation with stakeholders, to purchase, continuously or in regular offer windows, electricity from projects with a capacity of 10 MW or less. The Standing Offer will allow small projects to sell power to BC Hydro at a fixed price and with standard contract terms and conditions. A Standing Offer Program would be in addition to planned Calls for Power from larger projects. The Program design will be subject to the review and approval of the BCUC.
http://www.energyplan.gov.bc.ca/PDF/BC_Energy_Plan_Electricity.pdf

BC Hydro developed such program for 0.05-10MW:
http://www.bchydro.com/info/ipp/ipp51323.html. (In this case DG suppliers are mostly Independent Power Producers who have developed at least three generation plans, rather than customers.)

Appendix 1: A Quick Sample of WA Resources for DAR

Beyond Waste - state's direction for waste - cradle to cradle

http://www.ecy.wa.gov/beyondwaste/

King County EnviroStars

http://www.envirostars.com/ <http://www.envirostars.com/>

Northwest Pollution Prevention Resource Center

http://pprc.org/about/ <http://pprc.org/about/>

By Product synergy

http://www.nbis.org/

http://www.nbis.org/documents/NewsUpdate.doc

King County Materials Exchange

http://www.govlink.org/hazwaste/business/imex/

http://www.evergreenrecycling.com/

David Lahaie is one of the world leaders in turning waste to wealth.

Technical Resources for Engineering Efficiency
http://www.ecy.wa.gov/programs/hwtr/tree/index.html

TA for small companies

Saving Water Partnership - rebates

http://www.savingwater.org/

Energy Star Northwest - rebates - design http://www.northwestenergystar.com/

Better Bricks - design assistance for new buildings http://www.betterbricks.com/

Other resources

http://www.ecy.wa.gov/programs/hwtr/tree/resource.html

APPENDIX F-4
WORK GROUP 6: DECOUPLING SUB-GROUP REPORT

There is a vast literature on "decoupling." We recommend in particular *Aligning Utility Incentives with Investment in Energy Efficiency, a Resource of the National Action Plan for Energy Efficiency, November 2007,* and *Decoupling For Electric & Gas Utilities; Frequently Asked Questions, National Association of Regulatory Utility Commissioners, September 2007.* This extensive literature reflects that "decoupling" is not a new regulatory issue, but has been debated for decades. It remains divisive and is currently a litigated issue in utility rate proceedings in the Northwest. In this context, the Subcommittee was unable to reach consensus recommendations on central questions.

Questions

1. Do current state statutory/regulatory structures for acquiring cost-effective energy efficiency and conservation ("conservation") strike the right balance between utility/shareholder interests and customer interests (or align these interests to the extent they do not conflict)?
2. Should state regulators and utility boards remove any remaining linkages between utilities' financial condition and energy consumption and, if so, can these linkages be broken without adversely affecting customers' financial incentives to reduce their energy use and without either shifting risk between or increasing risk to either the utility or customers?
3. Should state regulators provide investor-owned utilities with an opportunity to earn a return on conservation investment and/or income related to an increase in customers' energy efficiency and should utility boards adopt financial and recognition incentives for the utility managers and employees to reward achievement of energy efficiency goals?

While There Is Disagreement on the Recommendations, the Members of the Subcommittee Substantially Agreed on the Following Points:

Under many current regulatory practices, utilities charge rates in which a substantial portion of fixed costs are recovered in rate charges that are a function of consumption. If conservation measures within a rate period reduce consumption, then the fixed costs recovered in rates during that rate period may fall short of the authorized fixed costs. Absent other regulatory constraints, this risk may create a disincentive for the utility to support and implement cost-effective conservation measures and an incentive to increase consumption.

Utility conservation activities may go beyond utility-sponsored conservation measures, and include outreach and support for customer-financed conservation and distributed renewables; legislative support or opposition for changes in codes, equipment and appliance standards; support for public awareness and education campaigns; collaboration and support for NEEA and/or the Oregon Energy Trust; research and

development; support for rate designs that can have an impact on customers' usage and conservation efforts, etc.

There is an additional potential disincentive in the regulatory treatment of utility expenditures for conservation as compared to utility investment in generation, if the utility is unable to recover its prudently incurred costs for conservation or to earn a return on such investments.

The states and local entities with jurisdiction over utilities in the Northwest have not taken a uniform approach to address the utility's "disincentive" to support conservation. For example, in Oregon, the Energy Trust is funded by ratepayers and assumes the responsibility for marketing, funding incentives, and verifying conservation. In Washington, under I-937, most utilities have an obligation to obtain all cost-effective conservation or pay penalties. Therefore, each utility faces varied incentives and disincentives with regard to its support for conservation activities, depending upon its current regulatory treatment.

To Frame the Discussion of Potential Regulatory Responses to the Utility "Disincentive," the Subcommittee Identified the Respective Interests of the Utilities/Shareholders and Customers. These Interests Are In Some Cases Stated Broadly, i.e. Interests Beyond Those Affected Only by the Conservation "Disincentive" Issues. This Reflects that Many Issues – Not Just Conservation – Enter into the Regulatory Balance Between Utility/Shareholders and Customers.

Utility/Shareholder Interests

1. Timely recovery of all costs prudently incurred to help customers conserve and manage energy and increase the energy efficiency of their structures, equipment, processes, and appliances, including customer education and programs that provide incentives for specific, cost-effective customer energy efficiency investments.
2. An opportunity to recover the costs incurred in providing utility service that the utility has an obligation to provide to all customers within its service territory, through billing determinants that provide a fair (even risk of achieving or not) chance of such recovery. Ideally, the billing determinants should align with, rather than run counter to, public policy as it exists from time to time. Moreover, if public policy changes increase the risk that load will not be as forecasted in ratemaking process (e.g., such as frequent increases in the stringency of building codes), recognition of that increased risk to return to a fair chance of cost recovery.
3. For investor-owned utilities, an opportunity to earn income, such that they can continue to obtain capital on attractive terms. If public policy favors investment in demand-side, in addition to supply- side and delivery investment, investor-owned utilities would like an opportunity to earn income related to such demand-side investments.

4. For publicly-owned utilities, utility management and personnel may benefit from financial and recognition incentives associated with successfully obtaining demand-side resources, which may cause rates to rise even as bills fall.

5. Customers that are partners, rather than adversaries, in public policy forums regarding energy efficiency and distributed generation on the customer side of the meter.

Customer Interests

1. Low rates and bills – Conservation should be evaluated in the utility's Integrated Resources Plan (IRP) and to the extent that the IRP shows that conservation is the lowest-cost "resource" option, then it should be acquired. Ratepayers need verification that ratepayer funds have produced MWH savings.

2. Rate structures – Customers should be rewarded for reduced usage due to its conservation efforts.

3. Regulatory changes must be specific to the problem – Regulatory changes that would guarantee recovery of fixed costs if utility-sponsored conservation causes actual sales to fall below forecasted sales should not be a vehicle for shifting other costs and/or risks to customers.

4. Fair rate of return – To the extent that the utility is guaranteed fixed cost recovery due to actual sales differing from forecasted sales without regard to the cause (i.e. beyond just conservation), then there should be a corresponding adjustment in its return.

5. Surplus Sales - Utility revenues on surplus sales – including any utility share of benefits under an adjustment clause – must be addressed in any "decoupling" mechanism.

Actual/Potential Statutory/Regulatory Approaches

As noted, there are a variety of methods currently in place or under consideration to increase conservation.

IRP. Requires utilities to identify and include all cost-effective conservation in their IRPs and, if necessary, to seek authority from PUC to acquire such conservation – e.g., Oregon SB 838 for residential and commercial conservation not expected to be captured under the current funding level of the public purpose charge.

Mandate. Require utilities to acquire all cost-effective conservation identified or pay a penalty (e.g. Washington I-937).

Independent Third Party. Ratepayers fund a third party to provide financial incentives and promote conservation, with the utilities excused from separately funding the conservation measures or allowed to continue conservation efforts as a "partner" with the third party (e.g. Oregon public purpose charge and Energy Trust with SB 838 changes).

Rate Design. Recover all fixed costs in a "customer charge" – which are not a function of usage – so fixed cost recovery is assured without regard to sales volumes; Inverted Block Rates that provide greater incentives (savings) to customers for reduced usage.

Recovery of "lost margin" due to utility-sponsored conservation. Authorize PUC to establish a true-up limited to lost fixed cost revenues due to utility-sponsored conservation (and not other factors such as weather or economic conditions). MWH savings and revenue "losses" must be verified.

Fully "decouple" revenues from sales. Actual fixed cost recovery trued up to the authorized level used in setting rates at forecasted sales level, without regard to whether the cause was "lost" sales due to conservation or other factors.

Recovery of Costs. Authorize collection of all prudently incurred costs for cost-effective conservation expenditures by the utility on a contemporaneous basis through a tariff rider mechanism. I-937 in Washington explicitly states that an IOU "is entitled to recover all prudently incurred costs associated with compliance" with the conservation mandate.

Capitalize Conservation Costs. Authorize the utility to capitalize costs of conservation measures rather than expense them.

ROE on Conservation "Investments". Allow utilities a return on efficiency and conservation investment – not just expensed as a cost – like a supply-side investment.

"Incentive" ROE. Allow PUC to authorize an "incentive" ROE for conservation investment.

Shared Savings Mechanisms. Allocate net savings from cost-effective energy efficiency programs equitably among utilities and their customers.

Recommendations

The Subgroup members are able to support one recommendation and to outline two additional proposals, as alternatives for further discussion. The outlines include a statement of Pros and Cons, largely drafted by the proponents on each side of the proposals.

Consensus Recommendation #1 – A Voluntary Decoupling Pilot for a Publicly-Owned Utility

Proponents of decoupling for publicly-owned utilities believe that decoupling would reduce their financing costs, yielding savings that could be passed through immediately to customers, while at the same time protecting against any adverse short-term financial effects from aggressive energy efficiency initiatives. We recommend that the Task Force offer to assist the Northwest public power community in testing one or more decoupling

mechanisms to determine whether such savings can be achieved, following consultations with the financial community and other interested parties.

Value Added. To our knowledge, decoupling has not been implemented by any publicly-owned utility in the Northwest. As non-profits and, in some cases customer-owned, the application of decoupling to publicly-owned utilities may present different issues and benefits than application of decoupling to IOUs. A pilot potentially could inform for future decisions by other publicly-owned utilities.

Implementation. The pilot would be designed and implemented by a self-selected, voluntary publicly-owned utility.

Support. Broad support as a voluntary pilot.

Alternative Proposal #2A – "Full" Decoupling (The advocates for "full" decoupling did not elect to propose "partial" decoupling as an alternative.)

This proposal is that utilities and their regulators consider whether full decoupling is necessary to achieve all cost-effective conservation and is an appropriate balance of utility and customer interests.

A "full" decoupling mechanism is a periodic rate adjustment to a rate class up or down in an amount that is calculated to recover the utility's authorized fixed charges from that class that are recovered through volumetric rates. The adjustment is used to true up fixed cost recovery due to differences in the class' aggregate per-customer usage for any reason, including utility- and non-utility sponsored conservation, changes in codes and standards, change in usage patterns, weather or economic conditions, etc., that were not anticipated in the initial rate setting process. Decoupling does not provide an incentive for the utility to promote conservation, but it removes the disincentive.

The mechanism may or may not include an adjustment for new customers, depending upon a judgment of whether new customers' per-customer usage and incremental fixed cost is significantly different than existing customers' usage and embedded fixed cost. Another option is to treat new customers as a separate class.

The adjustment can be made annually, except for the case where weather is included. Changes in per-customer usage due to weather can be normalized out and not included in the adjustment. If usage changes due to weather are included, it is best to adjust rates the concurrent month, in real time, so to speak, as is done by NW Natural. If the adjustment is not concurrent, a warm period followed by a cold one can have the unintended consequence of increasing bill volatility. Concurrent monthly adjustments take a somewhat sophisticated billing system that some utilities do not yet have, however.

Pros

- In response to higher generation and fuel costs and potential CO2 regulation, the Northwest needs to increase its efforts to capture conservation. To be assured that

the utility has no disincentive and a positive financial incentive to capture all conservation, regulation must change to assure timely recovery of conservation costs, removal of financial disincentives, and an earnings opportunity on conservation investments.

- Full decoupling eliminates under-recovery and over-recovery of a utility's authorized fixed costs; thus removing much of the incentive to increase per-customer loads. It does not alter any incentive to hook up new customers. It makes the utility neutral toward free riders and conservation due to tighter codes and equipment and appliance standards.
- With full decoupling, a utility can promote conservation, energy management, energy efficiency and distributed generation – whether through its own or a third party's programs or through codes, standards, and education – without concern of failing to fully recover its commission-authorized fixed costs.
- The utility can adopt different and new rate designs to increase the rate of return customers investing in energy efficiency receive – inverted rates, for example – without concern that the designs either will reduce consumption or be more difficult from which to produce an accurate load forecast.
- Reduces utility risk and revenue volatility, so may result in better credit ratings and a reduced cost of capital that will benefit customers.
- Including the weather adjustment is an important way to reduce, by swapping, both the utility's risk of mild weather and the customers' risk of severe weather.

Cons

- Shifts non-conservation-related risks to customers. Those include the risk of changes in usage due to weather, technology and economic conditions.
- "Full" decoupling is too blunt a tool to address the concern of a revenue shortfall within the rate period due to conservation. "Full" decoupling – by its terms – insulates the utility from under-recovery of fixed costs due to causes beyond conservation – including economic downturns. This is a fundamental shift in regulatory policy far beyond what is needed or justified by the utility "disincentive" to implement or support conservation.
- There are other means to address the "disincentive". In addition to the Oregon Energy Trust or I-937's mandate, "partial" decoupling would true-up fixed cost recovery for any within rate period losses due to utility-sponsored conservation. This measure is targeted at the "problem" and does not overreach.
- The advocates for "full" decoupling contend that "partial" decoupling is not workable because it is difficult to administer and difficult to verify usage reductions and energy savings. But the ETO administers and measures the savings of its programs. Moreover, if the savings are not measurable and verifiable, how can the commission determine whether the conservation expenditures were prudent?
- "Decoupling" does not separate a utility's financial interests from customer consumption. Because decoupling only operates within a rate period, the utility still benefits from long-term load growth.
- "Decoupling" could exacerbate economic downturns. For example, there have been recent industrial plant closures/reductions on PGE's system due to the

economic downturn. Full decoupling within this limited rate class would shift the cost of under-recovery to other businesses already struggling under the economic downturn.

Value Added. Proponents believe that full decoupling is necessary – even in jurisdictions with other measures such as ETO and I-937 – to capture all cost-effective conservation. Proponents believe that the potential value of implementing decoupling outweighs any risks to customers and that the region cannot afford to continue to debate this issue but must act in response to higher supply-side generation costs and CO2 costs.

Implementation. Proponents believe there is authority for state PUCs and publicly-owned utility Boards to adopt full decoupling. A uniform approach would require state legislation.

Support. There are differing views on the value of decoupling within the current regulatory framework and its impact on the balance of utility and customer interests beyond conservation issues. For these reasons, there will be strong support for and opposition to this proposal.

While no vote was taken, an apparent majority of the Subgroup members supported this proposal. However, membership in the Subgroup was self-selecting and the make-up may or may not reflect the relative levels of support or opposition to this proposal in the legislative, PUC or Board forums.

Alternative Proposal 2B– Evaluate Currently Evolving Mechanisms

This proposal acknowledges that, in principle, decoupling can change the incentives for utilities regarding conservation and efficiency. It also acknowledges that decoupling shifts risks from the utility to customers; decoupling is not the only means to address the utility "disincentive" issues; and in the Pacific Northwest there are already many public policies in place and evolving that provide incentives for utilities or third parties to achieve conservation. In this context, it is unclear what decoupling would add. Decoupling, if imposed, must complement the policies already in place.

Generally, under this proposal, the Council would analyze how much more conservation could be achieved with expected changes in cost-effectiveness levels, with mandates under I-937 in Washington, pilot programs in Idaho and elsewhere, and other factors.

Pros

- The current incentive structure includes:
  - I-937 in Washington which requires the largest utilities with almost 90% of the statewide load to acquire all cost-effective conservation. The covered utilities must develop a conservation plan by January 1, 2010 that explains how they compute their conservation potential and what actions they will take to realize it. IOU plans must be approved by the WUTC and IOUs are granted cost recovery for expenditures related to these conservation acquisitions. Utilities that do not reach their targets may be fined.

  - The latest Puget Sound Energy rate case provides for rate incentives for meeting current (pre-I-937) targets.
  - The Oregon Energy Trust structure separates utility spending from program implementation. Because the utility money is turned over to the ETO for implementation of conservation programs, the incentive to under-perform is removed from the utility while the ETO is evaluated in a public oversight process.
  - BPA provides a rate credit and program support for its customer utilities.
  - There are decoupling pilots under way by Idaho Power and gas utilities in other states.
- The "status quo" is dynamic; as generation costs increase – due to fuel costs, carbon restrictions, etc. – the amount of conservation that is cost-effective will increase and amounts captured under the current measures will increase.
- According the NW Power Council, as a region we are exceeding its targets for cost-effective conservation for each of the last several years.
- While promoting/requiring greater cost-effective conservation is broadly recognized as necessary, there is a diversity of approaches among the jurisdictions. This regulatory diversity has value.

Cons

- This approach simply maintains the status quo and is not an adequate response to the need to increase our efforts to capture conservation.
- Utilities that are not required to achieve high levels of conservation under current law (I-937, Oregon Trust, etc.) will continue to have a disincentive to invest in energy efficiency as each kWh or therm saved will result in under-recovery of the utility's fixed costs. The parts of the region that are not required to achieve high levels of conservation may continue to achieve the level of energy efficiency that it has historically achieved, given that much of this time, utility revenues and financial health remained linked to energy consumption but will not achieve more. Electricity loads will continue to grow in those parts of the region that are not already required to achieve high levels of conservation, pushing those parts of the region into ever more expensive supply side resource, transmission and distribution investments.

Value Added. Proponents believe that regulatory diversity has value and there are many current measures addressing the utility "disincentive". Full decoupling would fundamentally change the regulatory balance between the utility and customers and is promoted – in part – not to address conservation issues but as a vehicle to assure full fixed cost recovery without regard to the cause of any shortfall.

Implementation. Allow each state, PUC and public-owned utility Board to address the utility's "disincentive" in an appropriate manner consistent with existing legislative and local concerns.

Support. There are differing views on the value of decoupling within the current regulatory framework and its impact on the balance utility and customer interests beyond

conservation issues. For these reasons, there will be strong support for and opposition to this proposal.

Cost Recovery/Earnings Opportunity

The Subcommittee discussed but did not make any specific recommendations on the cost recovery/earning opportunity for conservation expenditures.

Capitalize utility investment in energy efficiency – "Earnings Equivalence": Under this approach, an investor-owned utility would capitalize the cost associated with incentive programs for structural, equipment, appliance and process efficiency improvements and amortize those over some period of years, earning its cost of capital on the unamortized balance. As a variation, the Commission could allow the utility a higher cost of capital than that allowed for supply-side investments.

Pros

- Treats utility investment in demand-side resources in a manner equivalent to supply-side resources.
- Can condition the level of recovery based on level of kWh or therm savings achieved.

Cons

- Rewards expenditures, not results, unless energy savings are verified and are in line with forecasted results.
- Incentive return would increase costs to customers.

Offer utilities an incentive keyed around specific achievements: Under this approach, the Commission for investor-owned utilities and Boards for publicly-owned utilities would design an incentive to reward achievement of specific goals, such as verified energy savings goals reached and/or total net benefit created through the combination of savings achieved and cost to achieve them (often called shared savings). For investor-owned utilities, this approach could be incentive only or incentive/penalty, with penalties arising for failure to meet certain baseline levels of savings or net benefits. For the manager and employees of publicly owned utilities, it would be unlikely to include penalties.

Pros

- Rewards results not expenditures.

Cons

- May be administratively burdensome; with contentious proceedings on such issues as the level of verified savings.

APPENDIX F-5
WORK GROUP 6: DECOUPLING SUB-GROUP STATE SUMMARY

IDAHO

The pilot decoupling proceedings in Idaho involved the Idaho Power Company, and resulted in March 2007 orders by the Idaho Public Utilities Commission. The new decoupling mechanism extends through December 2009 and applies to all residential and small commercial customers. The mechanism leaves rate design undisturbed, calculates allowed revenues with a true-up mechanism (based on dollars per customer), puts the differences between actual and allowed revenues in a balancing account, and regularly refunds or surcharges customers the amount in the balancing account.

In the Idaho Commission's words, "[p]romotion of cost-effective energy efficiency and demand-side management (DSM), we find, is an integral part of least-cost electric service . . . Making the company indifferent to reduced energy consumption and demand is but one half of the quid pro quo agreed to by the stipulating parties. In return for the FCA, the Company is expected to demonstrate an enhanced commitment to energy efficiency and DSM. Evidence of enhanced commitment will include, but not be limited to, . . . efforts to improve and enforce state building codes and appliance efficiency standards, as well as expansions and improvements to its load efficiency, load management and DSM programs."[1]

The Commission also granted Idaho Power its requested "authority to implement a DSM incentive mechanism that would allow the Company to retain a portion of the cost-reducing benefits accruing from a DSM program operated by the Company. The incentive would be earned only if the Company has done an exceptional job in implementing the DSM program. The incentive mechanism would also allow for a "penalty" payment by the Company if Idaho Power's performance falls below previously agreed-upon goals."[2]

WASHINGTON

The Washington Utilities and Transportation Commission approved Avista's decoupling pilot program on February 1, 2007, with an effective date of January 1, 2007 (Order Number 4, Docket UG-060518). The three-year pilot program was the product of a multi-party settlement that included Avista, Northwest Industrial Gas Users Association and the Northwest Energy Coalition. The mechanism applies to all residential and small commercial customers and defers 90% of the margin difference, positive or negative, for later recovery or rebate. Recovery of deferred costs is subject to an earnings test that ensures the company cannot earn more than its allowed 9.11% rate of return. The

[1] Idaho Public Utilities Commission, Case No. IPC-E-06-32, Order No. 30267, pp. 13-14.
[2] Order No. 30268, p. 1.

recovery level is also based on Avista achieving certain Demand Side Management targets. Any annual rate adjustments are limited to 2%.
The WUTC also approved a mechanism for Puget Sound Power and Light Company (now Puget Sound Energy) in 1990 that lasted four years. That mechanism divided the company's costs into "base costs" and "resource costs." Both sets of costs were adjusted annually: base costs on a per-customer basis; and resource costs on actual power supply costs (*Revenue Decoupling Standards and Criteria*, The Regulatory Assistance Project, June 30, 2008).

OREGON

The Northwest Public Utilities Commission approved a per-customer decoupling mechanism for Northwest Natural in 2002. An independent evaluation of the program was conducted in 2005 (as described in the SWEEP statement), and the program was extended with some recommended adjustments until 2009. The 2002 mechanism allowed for recovery of 90% of margin reductions caused by lower sales. This was changed in the 2005 order to allow for recovery of 100% of margin reductions. The OPUC approved a settlement with Cascade Natural Gas in 2006 that institutes a similar revenue-per-customer decoupling mechanism. As part of the agreement, Cascade agreed to donate 0.75% of revenues to the Energy Trust of Oregon for investment in energy efficiency programs.

For electric utilities, the Commission approved a decoupling program for PacifiCorp in 1998 (Order No. 98-191) that was in place through 2001. The program resulted in 15 true-ups during that period including eight surcharges and seven refunds to customers. The largest rate increase as a result of the mechanism was 1.9%, and the largest reduction was 0.8% (Cavanagh Rebuttal Testimony, UE 197, OPUC, p. 9, source: Paul Wrigley, PacifiCorp). The OPUC also considered and rejected a proposed decoupling mechanism for Portland General Electric in 2001 (Order No. 02-633, UE 126), and is considering another proposal in the utility's pending general rate case, UE 197.

CALIFORNIA

California has a much longer history with decoupling mechanisms, having approved one for gas utilities in 1978 (CPUC Decision 88835) and for electric utilities in 1982. The commission went on to establish adjustment mechanisms subsequent to those years for both gas and electric utilities. When industry restructuring intervened temporarily in the 1990s, these mechanisms were suspended for the electric utilities; the Commission adopted a revenue-per-customer indexing mechanism for SoCalGas in 1997 (D.97-07-054) that included allowances for inflation, changes in customer counts and productivity. On the electric side, the energy crisis of 2001 resulted in Assembly Bill 29X, which required the CPUC to remove the link between utility revenues and sales at electric IOUs. Since that time, Southern California Edison (2003), Pacific Gas & Electric (2003) and San Diego Gas and Electric (2002) have implemented new decoupling mechanisms. SoCalGas also modified and extended its decoupling mechanism through 2009. In 2007,

the Commission supplemented the decoupling mechanisms with performance-based earnings opportunities for all three major investor-owned utilities.

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[1] Energy Efficiency Services Workforce Assessment. January 2008. Chuck Goldman LBNL, Report to National Action Plan for Energy Efficiency Leadership Group.

[2] Renewable Energy and Energy Efficiency: Economic Drivers for the 21st Century. 2007 Roger Bezdek, Management Information Services, The American Solar Energy Society

[3] Greener Pathways: Jobs and Workforce Development in the Clean Energy Economy. 2008 Sarah White and Jason Walsh, Center on Wisconsin Energy, The Workforce Alliance, The Apollo Alliance.

[4] Workforce Survey of Electric Sector Employers in Washington and Oregon. January 2008. Alan Hardcastle, Washington State University Energy Extension Program.

[5] Analysis of Clean Energy Workforce Needs and Programs in Oregon. May 2008 3E Strategies, Sustainable Oregon Workforce Initiative.