Northwest **Power** and **Conservation** Council

July 5, 2017

MEMORANDUM

TO: **Council Members**

FROM: **Jennifer Light and Garrett Herndon**

SUBJECT: **Regional Technical Forum 2016 Annual Report**

BACKGROUND:

Presenter: Jennifer Light

Summary: The Regional Technical Forum (RTF) submits its 2016 Annual Report to the Council as a means to inform Council members of the activities undertaken by the RTF over the course of the previous year, and to provide an update of ongoing work to date in the current calendar year. In 2016, the RTF continued to evolve and improve upon its core competencies of developing energy efficiency measures, thereby providing increased opportunities for achieving cost-effective conservation in the region, and potentially deeper energy savings. Additionally, in 2016, the RTF initiated a variety of cross-cutting activities to support its analysis, such as the Market Analysis Subcommittee. This Subcommittee was convened as a vehicle to review market research being conducted in the region in order to provide added rigor and credibility. This research is critical to informing RTF work products, as well as work throughout the region, as we seek to understand where markets are today, and what efficiency improvements are occurring outside of program intervention.

As 2016 marked the first year of implementation for the Seventh Power Plan, the RTF launched several efforts in support the Action Items in the Plan. First, the RTF updated its cost-effectiveness assumptions consistent

with the Plan analysis for each of its measures. This work highlighted those measures that provide benefit to the power grid at the regional system peak. In relation to this, the RTF launched a project to determine the quality of its capacity savings from energy efficiency estimates and inform future end use load research in the region. Going forward, the RTF looks to build upon this work and continue to act as a valuable resource to stakeholders across the region.

Relevance: The RTF is an advisory committee to the Council, funded by Bonneville, Energy Trust of Oregon, regional utilities, and Council in-kind support.

Workplan: A.1.4. Conservation, Continue to lead the Regional Technical Forum and engage in the development and approval of measure savings estimates and protocols.

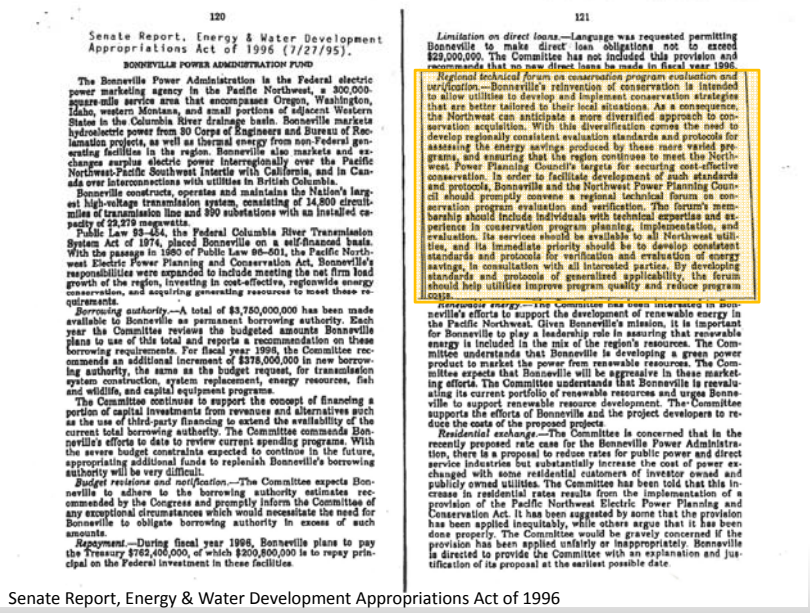
Background: Per its charter, the RTF is required to publish an Annual Report by mid-year. The 2016 Annual Report provides work highlights and financials for the 2016 calendar year. It also provides a preview of progress made to date in 2017. The annual report will be provided to the Council at its July meeting and made available on the RTF website.

Regional Technical Forum 2016 Annual Report

July 2017 Council Meeting

Vancouver, Washington

Northwest Power and Conservation Council



120

Senate Report, Energy & Water Development Appropriations Act of 1996 (7/27/95).

BONNEVILLE POWER ADMINISTRATION FUND

The Bonneville Power Administration is the Federal electric power marketing agency in the Pacific Northwest, a 300,000-square-mile service area that encompasses Oregon, Washington, Idaho, western Montana, and small portions of adjacent Western States in the Columbia River drainage basin. Bonneville markets hydroelectric power from 30 Corps of Engineers and Bureau of Reclamation projects, as well as thermal energy from non-Federal generating facilities in the region. Bonneville also markets and exchanges surplus electric power interregionally over the Pacific Northwest-Pacific Southwest Intertie with California, and in Canada over interconnections with utilities in British Columbia.

Bonneville constructs, operates and maintains the Nation's largest high-voltage transmission system, consisting of 14,800 circuit-miles of transmission line and 390 substations with an installed capacity of 22,279 megawatts.

Public Law 93-454, the Federal Columbia River Transmission System Act of 1974, placed Bonneville on a self-financed basis. With the passage in 1980 of Public Law 96-501, the Pacific Northwest Electric Power Planning and Conservation Act, Bonneville's responsibilities were expanded to include meeting the net firm load growth of the region, investing in cost-effective, regionwide energy conservation, and acquiring generating resources to meet these requirements.

Borrowing authority.—A total of $3,750,000,000 has been made available to Bonneville as permanent borrowing authority. Each year the Committee reviews the budgeted amounts Bonneville plans to use of this total and reports a recommendation on these borrowing requirements. For fiscal year 1996, the Committee recommends an additional increment of $378,000,000 in new borrowing authority, the same as the budget request, for transmission system construction, system replacement, energy resources, fish and wildlife, and capital equipment programs.

The Committee continues to support the concept of financing a portion of capital investments from revenues and alternatives such as the use of third-party financing to extend the availability of the current total borrowing authority. The Committee commends Bonneville's efforts to date to review current spending programs. With the severe budget constraints expected to continue in the future, appropriating additional funds to replenish Bonneville's borrowing authority will be very difficult.

Budget revisions and notification.—The Committee expects Bonneville to adhere to the borrowing authority estimates recommended by the Congress and promptly inform the Committee of any exceptional circumstances which would necessitate the need for Bonneville to obligate borrowing authority in excess of such amounts.

Repayment.—During fiscal year 1996, Bonneville plans to pay the Treasury $762,400,000, of which $200,800,000 is to repay principal on the Federal investment in these facilities.

121

Limitation on direct loans.—Language was requested permitting Bonneville to make direct loan obligations not to exceed $29,000,000. The Committee has not included this provision and recommends that no new direct loans be made in fiscal year 1996.

Regional technical forum on conservation program evaluation and verification.—Bonneville's reinvention of conservation is intended to allow utilities to develop and implement conservation strategies that are better tailored to their local situations. As a consequence, the Northwest can anticipate a more diversified approach to conservation acquisition. With this diversification comes the need to develop regionally consistent evaluation standards and protocols for assessing the energy savings produced by these more varied programs, and ensuring that the region continues to meet the Northwest Power Planning Council's targets for securing cost-effective conservation. In order to facilitate development of such standards and protocols, Bonneville and the Northwest Power Planning Council should promptly convene a regional technical forum on conservation program evaluation and verification. The forum's membership should include individuals with technical expertise and experience in conservation program planning, implementation, and evaluation. Its services should be available to all Northwest utilities, and its immediate priority should be to develop consistent standards and protocols for verification and evaluation of energy savings, in consultation with all interested parties. By developing standards and protocols of generalized applicability, the forum should help utilities improve program quality and reduce program costs.

Renewable energy.—The Committee has been interested in Bonneville's efforts to support the development of renewable energy in the Pacific Northwest. Given Bonneville's mission, it is important for Bonneville to play a leadership role in assuring that renewable energy is included in the mix of the region's resources. The Committee understands that Bonneville is developing a green power product to market the power from renewable resources. The Committee expects that Bonneville will be aggressive in these marketing efforts. The Committee understands that Bonneville is reevaluating its current portfolio of renewable resources and urges Bonneville to support renewable resource development. The Committee supports the efforts of Bonneville and the project developers to reduce the costs of the proposed projects.

Residential exchange.—The Committee is concerned that in the recently proposed rate case for the Bonneville Power Administration, there is a proposal to reduce rates for public power and direct service industries but substantially increase the cost of power exchanged with some residential customers of investor owned and publicly owned utilities. The Committee has been told that this increase in residential rates results from the implementation of a provision of the Pacific Northwest Electric Power Planning and Conservation Act. It has been suggested by some that the provision has been applied inequitably, while others argue that it has been done properly. The Committee would be gravely concerned if the provision has been applied unfairly or inappropriately. Bonneville is directed to provide the Committee with an explanation and justification of its proposal at the earliest possible date.

Senate Report, Energy & Water Development Appropriations Act of 1996

Northwest Power and Conservation Council

Origins of the RTF

- **Driver:** Bonneville shifted to allowing utilities to develop and implement conservation better tailored to local areas
- **Resulting Need:** Formation of a regional technical forum to develop consistent evaluation standards and protocols for assessing energy savings and ensure region continues to meet Council targets for cost-effective conservation
- **Attributes of RTF**:
  - Composed of individuals with technical expertise in planning, implementation, and evaluation
  - Work developed through a public process available to all Northwest utilities
  - Goal of improving program quality at a reduced cost

Annual Report Overview

Highlights from 2016

- Implementation of the Seventh Plan
- Expanding the RTF measure library
- New faces at the RTF
- Market Analysis Subcommittee
- Enhancing Public Engagement
- Continued role of the Policy Advisory Committee

Progress in 2017

- Refinement of Guidelines for improved analysis
- Additional emphasis on statistical methods
- Continued expansion of the resource library

Implementation of Seventh Plan

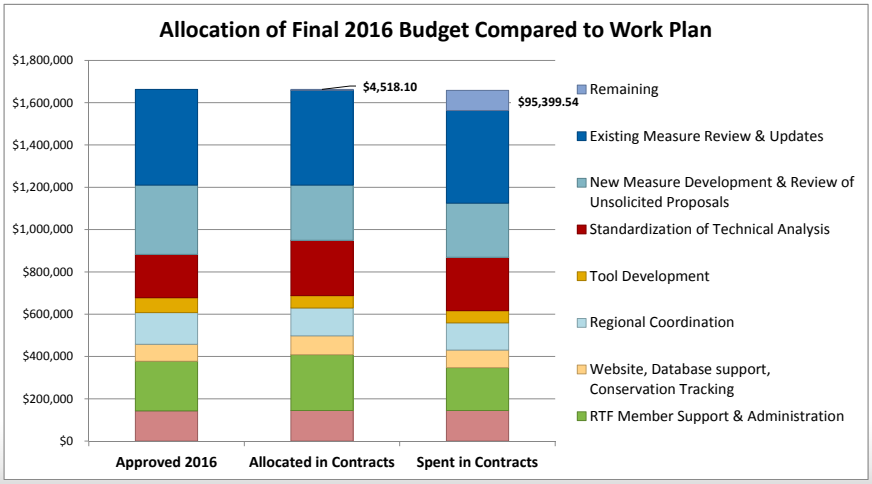
Monitor Council Work	Measure Updates	RCP Enhancements	Guidelines Updates
• Participate in Council forum to identify research needs/gaps in the region • Monitor Council's water/ wastewater study on energy savings potential	• Implementation of 7P cost-effectiveness methodology • Maintaining and updating evaluation guidelines and standards to inform programs going forward	• Capturing in the RCP the contribution of conservation to system peak capacity needs • Capturing in the RCP reporting utility baseline assumptions	• Adding reliability requirements for capacity estimates in Guidelines • Addressing non-energy impacts, through the development of guidelines to identify, quantify (where appropriate), and inform research

Expansion of RTF Library

Continued to explore ways to provides savings estimation methods for more complex measures

- Example 1: Controls
  - Savings often vary due to behavior at each site
  - RTF explored ways of providing a single estimate to support program implementation while being clear on the uncertainty factors driving that
- Example 2: Whole House
  - Deeper savings can come with comprehensive approaches, but vary based on code
  - Leverage standard tools in the industry to allow for improved modeling leading to better savings estimation

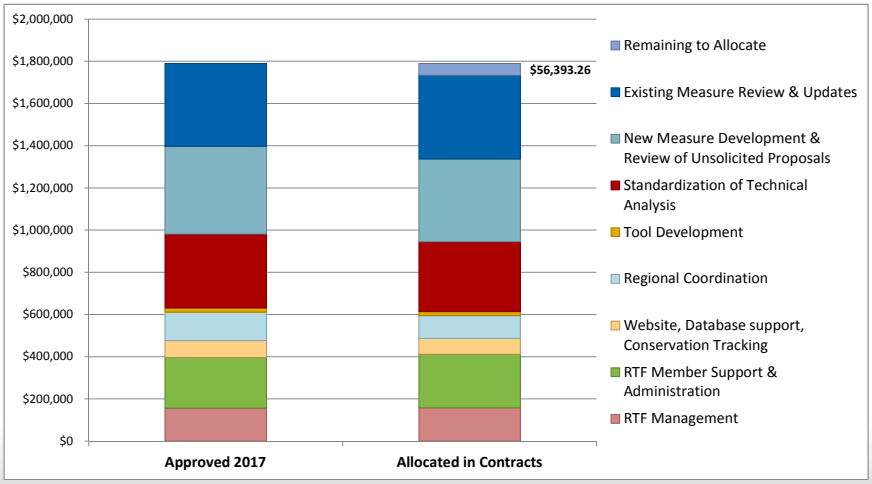
2016 Year End Financials



2017 Work Ongoing

- Several new measures added to the RTF library in 2017
  - Variable speed pool pumps
  - Manufactured home replacement
  - Residential lighting fixtures and pin-based lamps (previously only covered screw in lamps)
  - Circulator pumps
  - Anticipate another several in Q3 and Q4
- Expanding our statistical methods analysis, which will continue to support new measure development for more complex (whole system) and controls measures

2017 Work Plan Status



Northwest Power and Conservation Council

9

Regional Technical Forum
2016 Annual Report

Regional Technical Forum

Northwest **Power** and **Conservation** Council

Letter from Council Chair Henry Lorenzen

For more than 18 years, the Regional Technical Forum has produced valuable, peer-reviewed analyses of energy efficiency measures and products that help Northwest electric utilities, consumers, and businesses pursue an ever more efficient electric energy system.

The Forum provides a model of collaboration among these diverse interests for other regions to observe and emulate.

This Forum's efforts are paying off. Verification of energy savings and exploration of emerging technologies helps the Northwest continue to make progress toward the energy efficiency goals in the Northwest Power and Conservation Council's five-year power plans, now in their seventh iteration. According to a report issued by the Forum in 2016, the region achieved 1,739 average megawatts of energy efficiency in the five years between 2010 and 2015, the first five years of the Sixth Northwest Power Plan. This achievement surpassed the plan's goal for that period by more than 250 average megawatts. The impressive momentum carries on today as we work to achieve the five-year goal in the Seventh Plan (2016) of 1,400 average megawatts by 2021.

In 2016, the Forum continued to build on its reputation for competent and useful analytical work by adopting updates to a number of significant efficiency measures including heat pump water heaters, measures for multifamily new construction, electronic thermostats, and non-residential lighting while at the same time taking steps to make its work products more accessible and comprehensible including a complete redesign of its website. The Forum also approved the first calculator approach for quantifying energy savings from construction of an efficient home above minimum code requirements.

I am pleased to present this annual report, which details ways the Forum evolved while maintaining its core competencies over the past year.

Sincerely,

Henry Lorenzen, Chair
Northwest Power and Conservation Council

Letter from the RTF Chair Jennifer Light

This past year saw a wealth of new beginnings at the RTF, from personnel and membership, to measures, to operations and guidelines.

Some changes have been tangible, such as a number of new faces around the table at RTF meetings, but other changes have been more conceptual, like the evolving face of new measures and subcommittees.

In 2016, I began my first year as Chair of the RTF, a charge which I am thrilled to take on. Also, we welcomed 14 first-time members to the RTF in January who bring with them a diversity of experience not before seen at the Forum. A purposeful effort was made in the selection of this membership class to include increased expertise in statistical analysis and program evaluation, which has already been invaluable to our work. This shift in membership background was done in anticipation of trends pushing the focus of new measure development and program design to "big data" and non-widget based measures. As always, the RTF is evolving to meet the needs of the region, yet our core competencies remain unwavering and resolute, as we continue to diligently update existing measures with the best available data.

In 2016, the Council hired a new dedicated, full-time staff member, RTF Assistant Garrett Herndon, to support the day-to-day activities of the RTF. Garrett has added capacity to the RTF, with particular focus on improved communications of RTF work to our diverse set of stakeholders. The creation of Garrett's position adds organization and solidarity to RTF processes moving forward, as we continue to formalize the RTF's status as a professional body.

2016 also welcomed passage of the Seventh Power Plan, which tasked the RTF with several action items that we have begun implementing. Some of these action items focused on improvements and refinements to the RTF Guidelines. These guidelines exist as the backbone of RTF work and continue to evolve and improve with each passing iteration. The RTF worked in 2016, and will work in 2017 to improve this document and ensure its consistency with the directives of the power plan.

Each year as the RTF blazes trails, adapts, evolves, and improves, we publish this annual report as a means to look back and count the progress we have made internally and in the region. I am pleased to present this annual report of the RTF's progress in 2016, and am unequivocally intrigued by the work we have done, and will do in 2017.

Jennifer Light, Chair/Manager
Regional Technical Forum

Introduction

Since the passage of the landmark Northwest Power Act in 1980, which authorized the states of Idaho, Montana, Oregon, and Washington to form the Northwest Power and Conservation Council, the region has become a model to the rest of the nation for effective and innovative regional power planning. At the heart of that planning is energy efficiency.

The Act defines energy efficiency as a resource and requires the Council to give cost-effective energy efficiency first priority. Over the past three decades, efficiency has become a cornerstone resource in the region, helping to mitigate load growth, while simultaneously saving consumers billions of dollars each year and reducing power sector carbon emissions. The region's success on this front can be attributed to years of cooperation and dedication on the part of utilities, program implementers, and a multitude of other stakeholders.

The Regional Technical Forum was created to further this effort by providing a platform for analysis, discussion, and collaboration aimed at ensuring consistency and reliability of energy savings, while easing the planning and evaluation burden of energy efficiency programs in the region. Since 1999, the RTF has generated increasingly reliable energy savings estimates for program implementers through an analytically stringent and transparent public process, one which is informed by stakeholders across every sector and geographic area of the Pacific Northwest.

For over 18 years, the RTF has continued to be a driving force in the region's energy efficiency ecosystem, producing valuable, peer-reviewed resources for use here in the Northwest and beyond. After nearly two decades of work, the RTF has become a model of collaboration for other regions, engaging people at all levels and geographies to produce these resources, and ensuring every voice has a channel to be heard in the formation of RTF work products. The thoughtfulness and inclusion with which the RTF performs its discussions and analysis remains unrivaled throughout the nation, and the accuracy, reliability, and consistency of its technical assessments is ever-improving.

As another year of RTF activity roars on, staff and members remain dedicated to the effort of providing the most value for stakeholders in the Northwest. RTF resources follow the needs of the region while still producing the same quality transparent technical analyses it is known for. This has allowed the RTF to evolve with the rapidly changing efficiency landscape, both in terms of new technologies and program designs and to extend its function as a facilitator of collaboration into new avenues. In 2016, the RTF continued to build on its reputation of intricate analytical work, while simultaneously taking many steps to increase access and comprehensibility of its work products. The following report details ways the RTF evolved and maintained its core competencies over the past year, and also provides a glimpse of how this work will continue over the course of 2017.

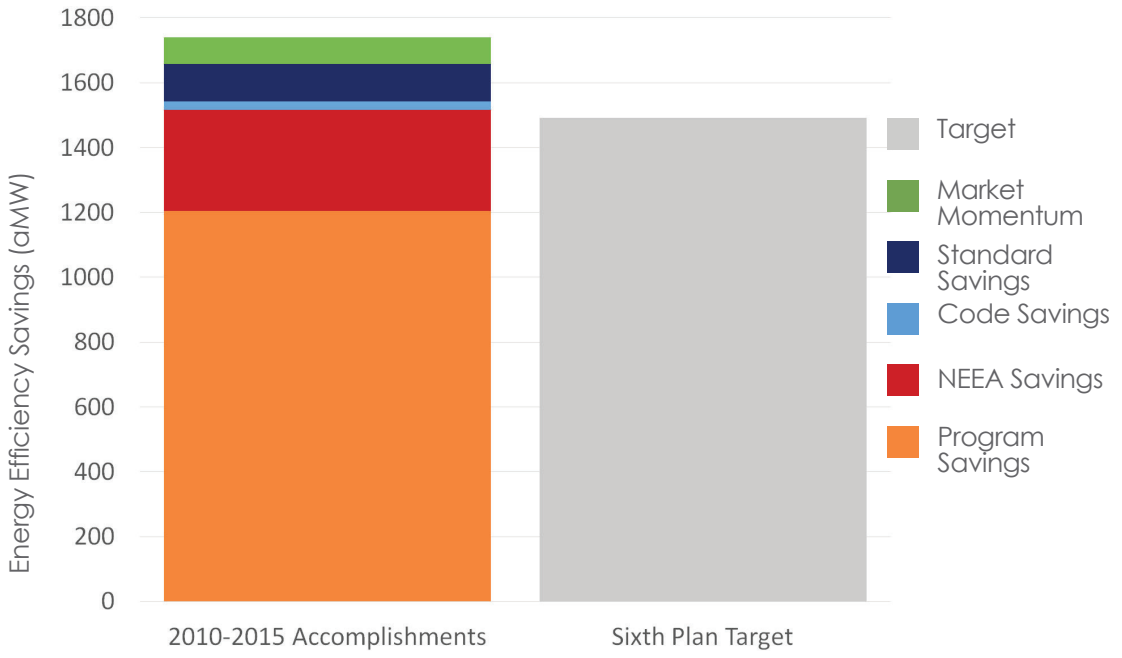
Accomplishments in 2016

Efficiency Excellence Continues in the Region

Since 2000, the RTF has annually surveyed the region's utilities, the Bonneville Power Administration, and systems benefit charge administrators like the Energy Trust of Oregon on their efficiency achievements. These collected data are then compiled into a Regional Conservation Progress (RCP) report and presented to the Council to offer a full picture of the region's progress against the power plan's efficiency goals.

The 2015 RCP report, published in 2016, marked the last year of tracking conservation savings relative to the targets set out by the Council in the Sixth Northwest Power Plan. In the Sixth Plan the Council called on the region to achieve 1,490 average megawatts (aMW) of energy savings from 2010-2015, a target that the 2015 RCP report revealed the region well surpassed. Over the plan period utility programs, NEEA, and Energy Trust of Oregon efforts, savings associated with codes and standards, and market momentum savings (defined below) achieved 1,739 aMW of energy savings, nearly 250 aMW more than the targets set by the plan.

Figure 1: 2010-2015 Regional Efficiency Accomplishments vs Sixth Plan Target



As made evident by the RCP data, the region's success continues to depend largely on the work of utility programs, which make up the majority of savings in the region. In addition to these programmatic savings, the roles of NEEA and market momentum savings continue to grow. Market momentum savings are those that occur somewhat naturally in the market place as customer demand causes retail sales mixes to shift to higher efficiency products. These savings are not attributable to direct program intervention, yet they do rely on many years of successful program intervention that have built momentum in the market. Coupled with savings from codes and standards, these savings are beginning to comprise an ever-increasing share of the conservation occurring in the region.

Further, the market momentum savings included in the 2015 RCP did not include the momentum savings for residential and non-residential lighting, suggesting that the market momentum savings achieved in the region are even greater than conveyed here. The RTF's Market Analysis Subcommittee has been reviewing Bonneville's Residential and Non-Residential Lighting Market models, from which savings numbers for these markets will be derived. The subcommittee found that significant improvements in the residential lighting market occurred outside of utility programs over the course of Sixth Plan implementation.

Each year when conducting the RCP survey, RTF staff continue to work toward improving the granularity and consistency of utility reporting in the region in order to gain the most accurate understanding possible of how utility, Bonneville, NEEA, and ETO investment, coupled with market trends and codes and standards, are shaping annual energy savings trends. From 2010 to 2015, energy savings from the residential and commercial sectors accounted for 43 percent and 35

Figure 2: Total Residential Sector Energy Savings by End Use (2010-2015)

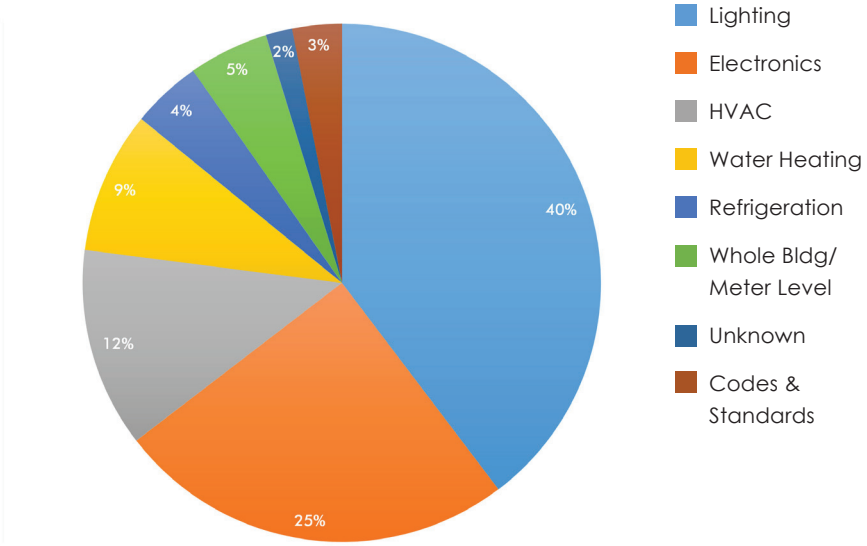
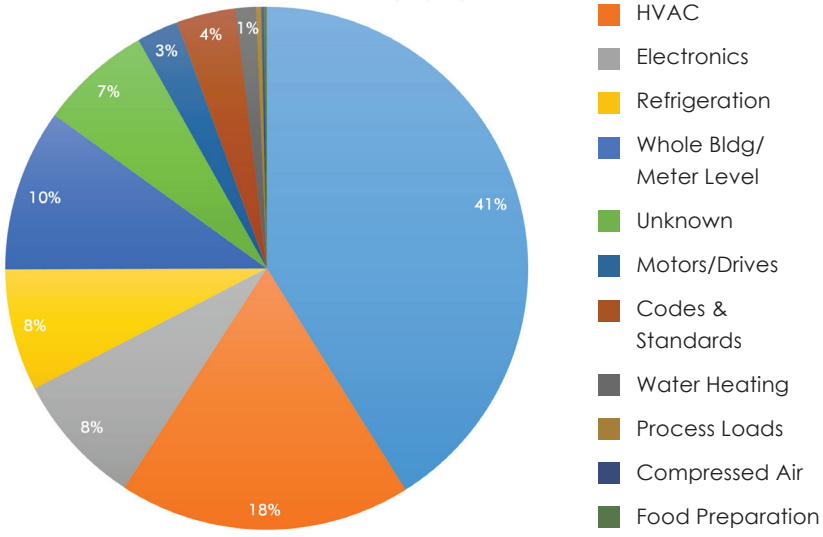


Figure 3: Total Commercial Sector Energy Savings by End Use (2010-2015)



These two charts show that lighting savings continue to account for the lion's share of savings for both the commercial and residential sectors. However, as lighting markets become saturated with efficient technologies, programs will have to look elsewhere for investment opportunities to secure energy savings. By continuing to monitor the source of savings through the RCP, the RTF will be able to help inform program decisions for years to come.

percent of total energy savings respectively. The RCP survey was able to collect data on what types of measures accounted for those savings, as exhibited in figures 2 and 3.

Maintaining and Expanding the RTF's Resource Library

Throughout the years, the RTF has developed a substantial library of unit energy savings (UES) measures and standard protocols. The distinction between these two work products is that UES measures represent consistent energy savings values per installed unit that programs can use to either inform program planning and expected energy savings or evaluate energy savings from delivered widgets after the fact. Standard Protocols are developed by the RTF in cases where the energy savings from a measure tend to be more specific to an individual site or set of sites, and not as generalizable. One of the core competencies of the RTF is to maintain and expand these work product libraries of UES measures and Standard Protocols as new data come to light, new standards and codes take effect, and new emerging technologies come to market.

In 2016, the RTF continued to refresh and update existing measures to ensure consistency and accuracy across RTF work products. Due to the flexibility of the RTF's annual work plan, the Forum has the opportunity to operate in a responsive manner and address existing measure updates as needed. This past year, the RTF exercised this capacity for timeliness and adopted updates to a number of significant UES measures, including heat pump water heaters, a suite of measures for multifamily new construction, electronic thermostats, and exterior non-residential lighting.

Built into each year's annual work plan for the RTF are the necessary time and resources for new measure development. This ensures that the Forum is able to cater to the needs of regional stakeholders while also tracking evolving efficiency practices and technologies and not losing ground on regular RTF activities and measure updates. In 2016, the RTF chose to allocate resources to several new measures, thereby expanding the work products it can offer to the region in its resource library.

One new offering for 2016 was the scoping of a UES measure for connected thermostats. Connected thermostats have become one of the most exciting products in the efficiency marketplace in recent years, allowing homeowners a new level of control over heating and cooling systems with attractively designed products. These products allow consumers to interact with home heating and cooling devices remotely and also provide utilities with a new avenue for demand response. However, creating a UES measure for these products has proven difficult as connected thermostats derive savings from the more efficient control or operation of an HVAC system. These systems can vary widely in terms of consistency and reliability based on the specifics of product software algorithms and customer preference and behavior. Currently, the RTF has approved a savings range estimate for this measure based on existing research but is seeking more supporting research before developing an estimate that is sufficiently reliable when applied across all technologies and program offerings of this kind.

Along with the approval of savings estimates for connected thermostats, the RTF also approved a new measure for efficient pumps, which can apply to the commercial, industrial, and agricultural sectors. This was an exciting measure at the RTF, in some part due to the fact that historically the RTF has had fewer offerings for industrial and agricultural programs. This measure was created in response to a new federal standard and test procedure for pumps that provided the RTF with more information and a better standing to develop an accurate energy savings analysis.

In the realm of standard protocols, the RTF approved the New Homes Standard Protocol in 2016, which offers the region the first calculator approach for quantifying the energy savings associated with the construction of an efficient home above minimum code requirements. This tool leverages a common tool used in the new residential construction industry (REMRate) and, when used per the protocol, provides savings estimates that programs can use for implementation and evaluation. It also

provides guidance on additional research and evaluation that will support enhanced estimates.

Seventh Power Plan Implementation Underway

In February 2016, the Northwest Power and Conservation Council approved its Seventh Northwest Power Plan, which contained eight action items that affect the RTF. This past year the RTF began work on several of these Seventh Plan action items, first by aligning all of its measure cost-effectiveness calculations with the inputs used in the Seventh Plan. These changes were accompanied by formatting changes to workbooks to ensure consistency across all measures, as well as a robust quality control effort performed by a team of third-party contractors. This process of updating RTF inputs to align with the Power Plan is a regular occurrence after the adoption of a new plan.

Additionally, the Seventh Plan includes a finding that a key benefit of developing energy efficiency resources in the region is support for capacity needs. Capacity refers to the maximum amount of electricity that can be delivered to end-users at any given time. The Northwest traditionally had an excess of capacity resources and a need for energy resources; however the Seventh Plan indicates this may be beginning to change. The Plan finds a clear need for energy efficiency investment in the region as a valuable benefit to system capacity. This finding has led to an adjustment in the cost-effectiveness calculation to explicitly call out the capacity benefit that efficiency measures provide to the regional system peak. Those measures that save energy at peak get an advantage in the Plan's cost-effectiveness calculations verses those that do not. Because the RTF's capacity benefits estimations are important drivers for cost-effectiveness calculations and energy efficiency development, the Council wants to ensure they are sufficiently reliable. Thus, the Plan directs the RTF to develop and describe in the Operative Guidelines a methodology for determining the rigor behind these estimates.

In response, the RTF began a two-phase project in the third quarter of 2016. The first phase was completed in late 2016, with findings presented to the RTF at the January 2017 meeting. This phase included conducting a survey of current practices and quality standards for determining the capacity impacts of efficiency, a review of the current load profiles used by the RTF, and a description of the sources of uncertainty affecting those profiles. A need for capacity resources is nothing new in other regions of the United States, and some created capacity markets that utilities can bid their efficiency into. While a review of these regions' practices did yield some knowledge to inform best practices on calculating the capacity benefits of efficiency, no quality standards currently exist on the underlying assumptions used in these calculations, primarily the hourly load profiles. Therefore, in 2017 the RTF has begun phase two of this project, which mainly deals with creating those quality standards.

New Faces at the RTF Welcomes a New Member Class

2016 was a time of big change in personnel at the RTF. At the beginning of the year the RTF said goodbye to the first RTF Chair, Tom Eckman, as he retired, and welcomed new RTF Chair Jennifer Light. Further, the start of 2016 welcomed a new member class to the RTF that will serve a three year-term ending in 2018. This new group of RTF voting and corresponding members was selected by the Council in 2015 from a pool of highly qualified applicants who bring a wide range of skills and backgrounds. Half of the new members are beginning their first term on the RTF. Most have been involved in RTF activities in some way as non-members, whether through meetings or in subcommittees.

The Council made an effort to select new members with increased professional experience in statistical analysis and program evaluation, two areas of expertise the RTF needs as the efficiency landscape, technologies, and programs evolve. Through 2016, the new RTF membership helped immensely to advance the work of the RTF into new competencies, while simultaneously

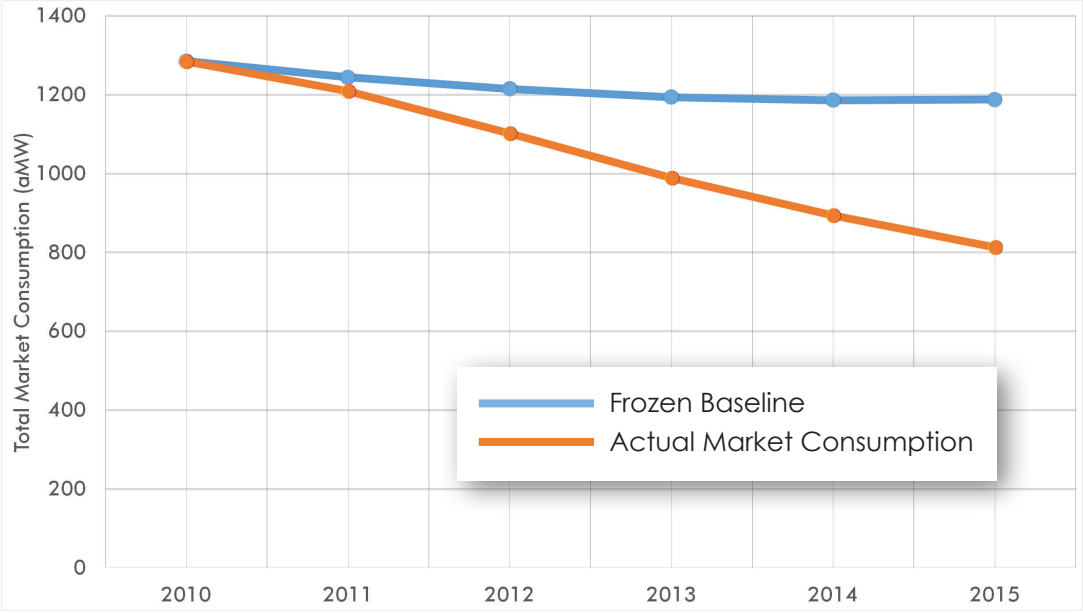
reinforcing existing ones. As the RTF begins to investigate a role in new measures that are not the traditional widget-based energy efficiency technologies, the collective experience of the new members will continue to add value to the organization.

Market Analysis Subcommittee

The 2015, the RCP showed that an increasing amount of energy savings in the region are occurring outside of traditional utility programs. Codes and standards and market momentum savings are contributing more each year to regional conservation goals. Rapid changes to the consumer markets for efficient products are driving the growth of these savings in many cases, as the purchasing habits of increasingly efficiency-savvy consumers shift to new products and services. Understanding these markets -- where they are today, how they are changing, and the impacts codes and standards have on them -- is critical for understanding what efficiency potential remains and how to steer programs accordingly. Given this, the RTF has developed the Market Analysis Subcommittee to support the review and to add credibility and rigor to existing market research.

Beginning in June of 2016, the Market Analysis Subcommittee's first task was the review of the Bonneville Power Administration's residential lighting market model. This market was of high interest to many in the region due to the relatively fast speed at which this market has changed over the past several years, mainly attributable to the proliferation of affordable LED lighting. The subcommittee met five times throughout the year to provide feedback to Bonneville on model assumptions, methodologies, and results. The expertise provided by the subcommittee was integral in generating a robust model. The findings show that actual residential lighting market consumption decreased by about 37 percent from 2010-2015, driven largely by an increase in market share by high efficiency lamps (See figure 4).

Figure 4: Actual Market Consumption vs. Frozen Baseline Consumption Residential Lighting Market



Going forward, it will be essential to continue monitoring fast-moving markets such as residential lighting, as well as expand research into similarly evolving markets. As that research is carried out, this subcommittee will continue to provide a venue for robust review and vetting.

Enhancing Public Engagement

The RTF has worked diligently to improve its ability to engage with stakeholders over the last several years. Beginning in the second half of 2016, the RTF turned the focus of these efforts toward redesigning the RTF's website, which serves as the primary means of conveying all ongoing and archived RTF analytical work to the public. The RTF contracted with Portland-based web design firm OMBU for the redesign and launched the finished product in October.. The new website has a streamlined design and includes features to make it easy to use. RTF staff will continue to work to enhance the website with an emphasis on finding the easiest way to translate RTF complexities for stakeholders.

Policy Advisory Committee Continues to Play an Important Role

The RTF Policy Advisory Committee (PAC) was formed in 2011 as an advisory committee to the Council. The PAC advises the Council on the policy and funding considerations of the RTF. In 2014, the PAC established five-year funding commitments for the RTF, which provided increased stability to RTF work planning though that period. The PAC has a role in continuing to guide the direction of the RTF work through its annual participation in work planning development and advising on important scoping questions for the RTF.

In 2016, the PAC engaged in discussions around the RTF's role in a variety of topics ranging from supporting the RTF's implementation of the Seventh Power Plan priorities to providing policy guidance around addressing market challenges, to exploring a potential role for the RTF to address issues related to the intersection of energy efficiency and demand response. By having the PAC to provide guidance on these and other topics, the RTF is better positioned to focus on what it does best: providing robust technical analysis.

Financial Information

Financial Information

In 2014, the RTF Policy Advisory Committee (PAC) recommended funding commitments starting at $1.67 million for 2015 and increasing to $1.91 million by 2019. The PAC recommended the funding shares from each of the RTF sponsors follow the allocation method developed for the current NEEA funding cycle. Thanks to the diligence of the PAC, the RTF was able to secure letters of agreement with all of its funders for a five-year commitment. This has allowed for a stable, long-term budget, removing the previous uncertainty of year-to-year budgets.

Table 1: Summary of 2016 Budget

Recommended Budget	$1,696,000
Actual Budget*	$1,663,000

*Adjustment for NorthWestern Energy service territory

The RTF's final 2016 budget was $1,663,000. By the end of 2016, the RTF had obligated in contracts over 99 percent of its budget. When the last of the 2016 contracts was completed in March 2017, the RTF had spent a total of $1,536,432, or 94 percent of its budget. The remaining $95,399 unspent in 2016 will be credited toward funders' future contributions.

Thank You Funders!

The work of the RTF is made possible through funding it receives from its sponsors. The RTF would like to thank the following organizations for providing funding for RTF activities in 2016:

Avista Utilities
Bonneville Power Administration
Clark County PUD
Cowlitz County PUD
Energy Trust of Oregon
Eugene Water and Electric Board
Idaho Power
NorthWestern Energy
PacifiCorp
Puget Sound Energy
Seattle City Light
Snohomish County PUD
Tacoma Power

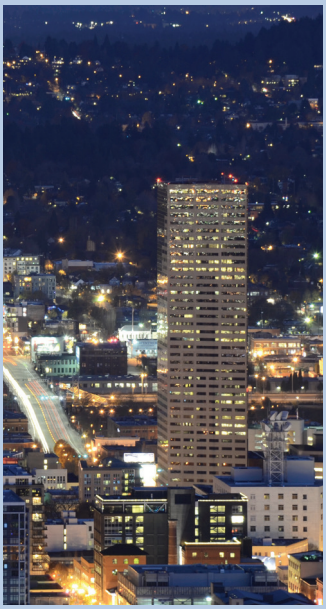


Figure 6: Allocation of Final 2016 Budget Compared to Work Plan

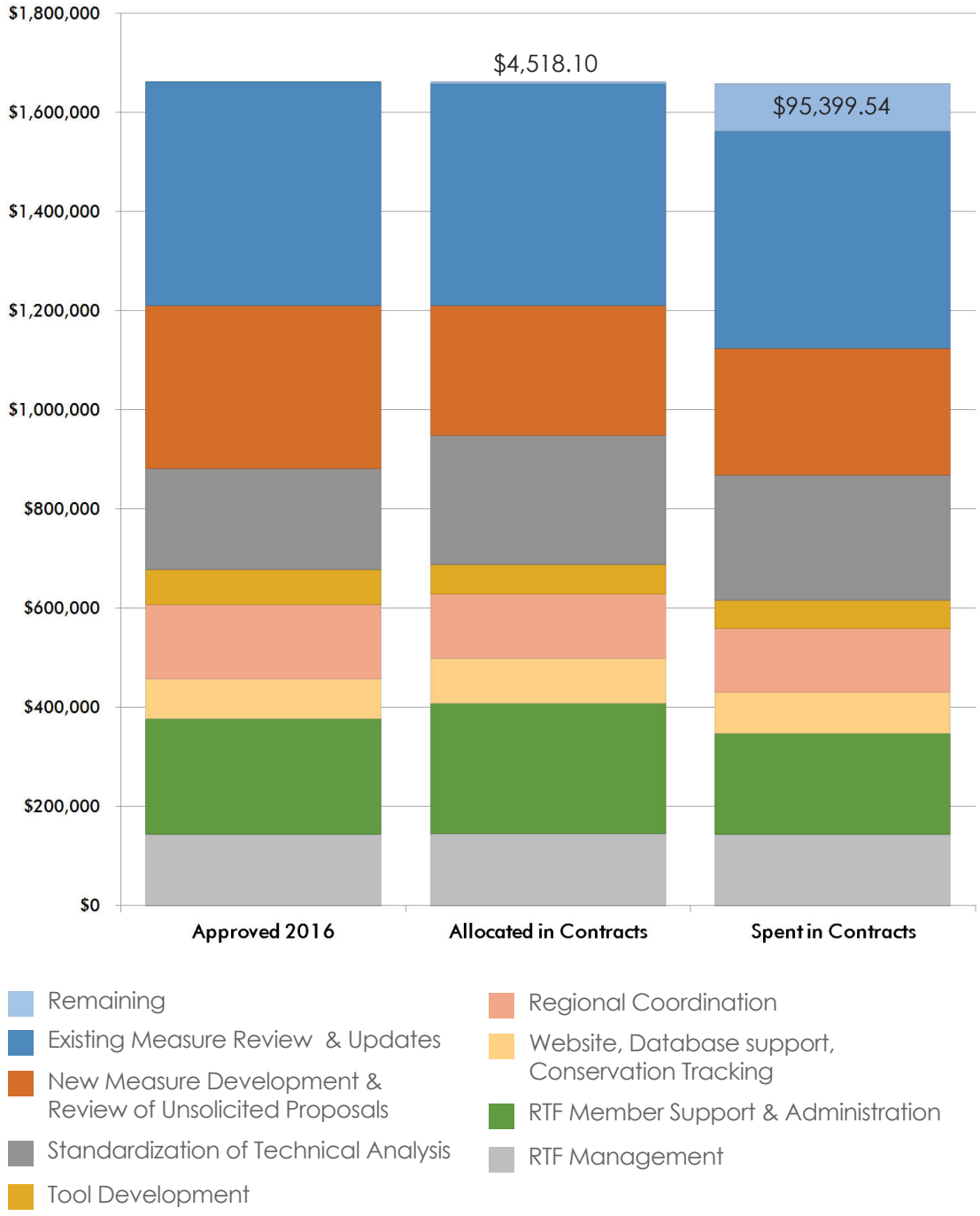


Table 2: The 2016 budget allocated into general categories of the work plan, along with actual funds spent.

Category	Projected Allocation in Work Plan	Actual Funds Spent	% Spent Compared To Allocated
Existing Measure Review & Updates	$452,500	$438,100.06	97%
New Measure Development & Review of Unsolicited Proposals	$328,000	$255,992.88	78%
Standardization of Technical Analysis	$205,000	$252,341.97	123%
Tool Development	$70,000	$57,206.76	82%
Regional Coordination	$150,000	$128,715.20	86%
Website, Database Support, Conservation Tracking	$80,000	$83,090.91	104%
RTF Member Support & Administration	$234,200	$203,128.04	87%
RTF Management	$143,300	$144,506.54	101%
Total	$1,663,000	$1,563,082.36	94%

An audit of the Council's financial statements at the end of Fiscal Year 2016, conducted by Moss-Adams, is posted on the Council's website here: http://www.nwcouncil.org/reports/financial-reports/2016audit/. The audit did not identify any deficiencies. A brief section on the Regional Technical Forum begins on Page 9.

The Council makes an in-kind contribution to the RTF each year in terms of staff and meeting resources and the RTF webpage. Although the annual RTF work plan attempts to quantify this staff time and associated in-kind funding, it is not included in the budget figures.

Progress Continues in 2017

Statistical Methods Subcommittee

With the rise of "big data" and the increasing importance of statistical analysis in measure assessment and program design, the RTF sought to convene experts in statistics to help resolve questions that arise in the course of RTF work product development. The RTF's Statistical Methods Subcommittee was convened starting in 2017 to handle questions regarding parameters or estimators analysis. The questions brought before the subcommittee concern general methods (new or existing), analysis framework, model types, or properties of estimators. The goal of this subcommittee is to address complex statistical issues contained in measure analyses prior to bringing measures to the RTF. In 2017, the RTF will formalize the role of this subcommittee.

Continuing to Refine and Refresh RTF Operative Guidelines

In 2017, the RTF is working to improve and refine the language contained in its Operative Guidelines in order to add clarity and transparency to its decision making structures with regard to measure analysis and to ensure they remain timely and relevant. The effort to improve the RTF Guidelines is ongoing, as the Guidelines are intended to exist as a living document where new and improved ways to work are incorporated continuously to add consistency to future RTF work products and processes. One main area where the RTF is taking up this effort is the added guidelines on capacity benefits in support of the Seventh Power Plan. Additionally, the Seventh Power Plan contains an action item that directs the RTF to enhance its Guidelines language for identifying and quantifying the non-energy impacts of conservation, where significant. The RTF is currently scoping this effort and seeking stakeholder input and expects to begin discussing this work in the second half of the year.

New Measures under Development

The RTF continues to add new measures to its resource library, generated through stakeholder-submitted new measure proposals and supported by interest from RTF

Subcommittees

The RTF leverages the work of subcommittees to provide deeper technical insight into questions that arise in the course of RTF analysis. The RTF does not convene a subcommittee to support the analysis of every measure, but rather when measure complexities or sensitivities require increased stakeholder involvement to help the RTF Contract Analyst Team provide justifiable recommendations to the RTF. Subcommittees that met in 2016 are listed below. Information on all active and currently suspended RTF subcommittees can be found on the RTF website here: https://rtf.nwcouncil.org/subcommittees

Air Source Heat Pumps
Ductless Heat Pumps
Guidelines
Implementers Group
Market Analysis
New Homes Standard Protocol
Non-Residential Lighting
Operations
Pump Systems
Research and Evaluation
Residential Behavior
Residential Lighting
Small and Rural Utilities
Statistical Methods

member organizations and program implementers. In 2017, the RTF anticipates adding a variety of new measures. These would include emerging technologies representing new savings streams, such as secondary glazing systems for commercial windows, and also new savings estimations to support changes in program design, such as savings estimates for mid-stream measures. Below is a list of measures currently being developed by the RTF.

- Commercial Secondary Glazing Systems
- Variable Speed Pool Pumps
- Advanced Rooftop Unit Controls
- Energy Smart Overwrap technology
- Engine Block Heater Controls
- Heat Pump Water Heaters Mid-Stream
- Non-Residential Lighting Mid-Stream
- Ductless Heat Pumps for Multifamily applications
- Short Duct Run Minisplits
- Manufactured Home Replacement
- Circulator Pumps
- Residential LED Fixtures and Pin-Based Lamps

2016-2018 Regional Technical Forum Members

Voting Members	Affiliation
Rebecca Blanton*	Puget Sound Energy
David Bopp	Flathead Electric
Sarah Castor*	Energy Trust of Oregon
Carrie Cobb*	Bonneville Power Administration
Bob Davis	Ecotope
Jennifer Finnigan*	Snohomish PUD
Michele Friedrich**	Independent
Lauren Gage	Bonneville Power Administration
Kevin Geraghty*	Independent
Charlie Grist	Northwest Power and Conservation Council
Jeff Harris	Northwest Energy Efficiency Alliance
Jennifer Huckett*	Cadmus
Mark Jerome	CLEAResult
Don Jones Jr.	PacifiCorp
Josh Keeling*	Portland General Electric
Greg Kelleher	Eugene Water and Electric Board
Rick Knori	Lower Valley Electric
Bill Koran	SBW Consulting
Tom Lienhard	Avista Utilities
Jennifer Light*	Northwest Power and Conservation Council
Cheryn Metzger*	Pacific Northwest National Lab
Eric Miller*	Benton REA
Peter Miller	Natural Resources Defense Council
David Nightingale+	WA Utilities and Transportation Commission
Brendan O'Donnell*	Seattle City Light
Graham Parker	Pacific Northwest National Lab
Janice Peterson*	Bonneville Power Administration
Cory Read*	Idaho Power
Jes Rivas*	Navigant
Robert Weber*	Bonneville Power Administration
Bill Welch	Independent

* New Member
** Resigned from the RTF in 2016
\+ Ex officio, non-voting, member

RTF Staff

The RTF is an advisory committee to the Northwest Power and Conservation Council and shares several staff members. The asterisks in the list below indicate Council-funded staff members who play a major role in the RTF.

Jennifer Light, Chair/RTF Manager
Charlie Grist, Vice Chair*
Garrett Herndon, RTF Assistant*

The RTF also contracts a team of contract analysts who provide dedicated support throughout the year. The 2016 contract analysts include:

Christian Douglass
Ryan Firestone
Adam Hadley
Josh Rushton
Mohit Singh-Chhabra

In addition to RTF staff, several members provide operational and administrative leadership to the Forum by serving on the Operations Subcommittee. For 2016, those members are: Lauren Gage, Tom Lienhard, David Nightingale, Eugene Rosolie, and Bill Welch.

Regional
Technical Forum