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June 6, 2023

MEMORANDUM

TO: Council Members

FROM: Laura Thomas, RTF Manager

SUBJECT: Regional Technical Forum 2022 Annual Report

BACKGROUND:

Presenter: Laura Thomas, RTF Manager

Summary: The Regional Technical Forum (RTF) submits its 2022 Annual Report to the Council. The intention of this report is to update the Council and stakeholders about the RTF's activities from the previous year and provide a preview of the ongoing work in the current calendar year.

A core function of the RTF is to develop and maintain a portfolio of measures of energy savings estimates for the Northwest region. In 2022, the RTF focused on its key function of ensuring that the current portfolio is based on the best available data and provides reliable energy savings estimates, and that number of measures continues to grow and expand to identify new opportunities adding a total of five new primary work products. Additionally, the RTF spent time advancing the recommendations from the Council's 2021 Power Plan, enhancing tools used for measures, and looking at guiding energy savings beyond the core RTF work products.

At the meeting, staff will present to the Council on the highlights from 2022 as captured in the Annual Report.

Relevance: The RTF is an advisory committee to the Council. It is funded by Bonneville, Energy Trust of Oregon, and regional utilities. The Council also contributes to the RTF through staff and office and meeting space.

Workplan: B.2.8 Continue to manage the Regional Technical Forum, leveraging its data and analysis to expand and enhance the assessment of energy efficiency and demand response potential.

Background: Per its charter, the RTF is required to publish an Annual Report by mid-year. The 2022 Annual Report provides work highlights and financials for the 2022 calendar year, as well as a preview of progress made in 2023.



Regional Technical Forum 2022 Annual Report

Laura Thomas

June 2023 Council Meeting



Northwest **Power** and
Conservation Council

Presentation Overview

- Background on the RTF
- 2022 Highlights
 - Expanded measure library and enhanced existing measures
 - Expanded the portfolio to add new measures
 - Advanced the 2021 Power Plan recommendations
- 2022 Financials



Regional Technical Forum **2022 Annual Report**



An aerial photograph of a large, turquoise-colored lake nestled in a mountain valley. The lake is surrounded by dense evergreen forests on steep, rocky slopes. In the background, several mountain peaks are visible, some with patches of snow or light-colored rock. The sky is filled with heavy, grey clouds, creating a dramatic atmosphere. The text "About the RTF" is overlaid in the center of the image in a white, bold, sans-serif font.

About the RTF

Formation of the RTF

- 1995: BPA shifted responsibility for acquisition of conservation to its utility customers
- 1996: Congress directed Bonneville and Council to convene a Regional Technical Forum* to:
 - Develop standardized protocols for verifying and evaluating conservation savings
 - Ensure region meets Council’s conservation targets
 - Include individuals with appropriate technical expertise
 - Ensure services are available to all NW utilities
- 1998: Northwest Governor's Comprehensive Review expanded the mission
- 1999: Council formed the Regional Technical Forum as an advisory committee to the Council

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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 90 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 Inter tie 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 93-464, 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 1998, 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 1998, 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.

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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 1998.

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 104-120 – Energy and Water Development Appropriations Bill, 1996

Who Actually is the RTF?

- RTF consists of 20-30 individuals representing a range of technical expertise and perspectives
 - Engineers, evaluation experts, program implementers, etc.
 - Public utility, IOUs, national labs, etc.
- Meet monthly to consider analysts' recommendations and make decisions
- Do not represent their organization, but rather individual expertise
- Appointed by the Council every three years



Council Staff



Chair



Manager



Coordinator

- Manage the day to day of the RTF
- Provide a connecting role between the Council, RTF, and RTF PAC
- Chair the RTF
- Provide contracts, administration, finance, and other technical support

Who Supports the RTF?

Contract Analyst Team



- Competitively bid contract positions
- Provide analytical support, work with subcommittees, and develop recommendations for RTF consideration

What Does the RTF Do?



Develops and maintains measure library with savings, lifetime costs, and estimated value to the power system



Analyzes the demand response potential of technologies that also provide energy efficiency



Provides analytical support to the Council in assessing energy efficiency measures, demand response technologies, technology trends, etc.



Has an established process for updating measures and an appeals process for demonstration of different values



Maintains tools that support analysis of energy efficiency and demand response opportunities for RTF/Council work, as well as utility programs and NEEA



Conducts the annual Regional Conservation Progress survey on behalf of the Council to track regional progress against Council goals

Who Uses the RTF Work?

RTF work is publicly available for use by all stakeholders in the NW (and nationally)

- Utility programs use the data to support planning, implementation and evaluators
- Regulators value the wide review and unbiased perspective, and often encourage use of RTF measures where practical
- Evaluators reference RTF measures for understanding analysis assumptions and methods for savings

Open and
transparent

Developed
through peer
review

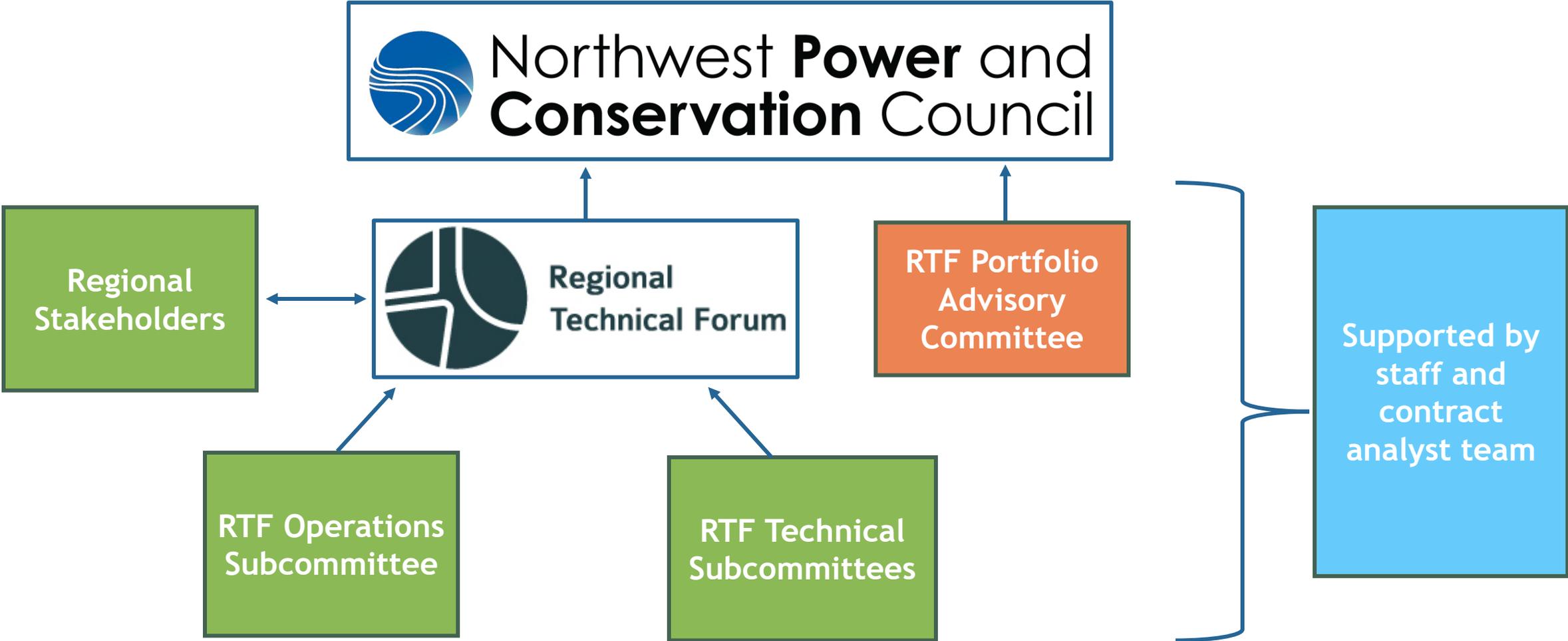
Leverages
economies
of scale

Where Does the Funding Come From?

- RTF is funded by BPA, Energy Trust of Oregon, and regional utilities
 - Council also supports RTF through staff, office/meeting space, etc.
- RTF Policy Advisory Committee consists of funders and other key organizations to advise the Council on policy and scope considerations around the RTF
- Committee also is responsible for securing funding for RTF



Organization of RTF and RTF PAC



An aerial photograph of a large, turquoise-colored lake nestled in a mountain valley. The lake is surrounded by dense, dark green coniferous forests. In the background, rugged, rocky mountain peaks rise against a sky filled with heavy, grey clouds. The water in the lake has a vibrant, milky turquoise hue. Several small, forested islands are scattered across the lake. The overall scene is a dramatic and scenic landscape.

Highlights from 2022

Enhancing Existing Measure Portfolio

- Utilizing new data and insight to update existing measures that are important to the region:
 - Residential lighting
 - New homes



Expanding the RTF Measure Library



Demand Control
Kitchen Ventilation



Irrigation Pressure
Reduction



Commercial
Refrigeration Floating
Pressure Controls



Residential Gas
Fireplace



Commercial Unitary
Heat Pump Water
Heaters

Advancing the 2021 Power Plan Recommendations

- The Council's 2021 Power Plan directed the RTF to:
 - Explore the mutual benefits of energy efficiency and demand response in providing grid flexibility
 - Use the End Use Load Research to create load shapes for efficiency measures that can be used by the region's utilities to understand the timing of energy efficiency savings
 - Increase the rigor of its measure cost analysis to support improved comparison with alternative resources in future resource planning
 - Investigate methods for quantifying the value of flexibility and resilience for energy efficiency measures

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Explore the mutual benefits of energy efficiency and demand response in providing grid flexibility

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Increase the rigor of its measure cost analysis to support improved comparison with alternative resources in future resource planning

Investigate methods for quantifying the value of flexibility and resilience for energy efficiency measures

Advancing the 2021 Power Plan Recommendations

Explore the mutual benefits of energy efficiency and demand response in providing grid flexibility

Use the End Use Load Research to create load shapes for efficiency measures that can be used by the region's utilities to understand the timing of energy efficiency savings

Increase the rigor of its measure cost analysis to support improved comparison with alternative resources in future resource planning

Investigate methods for quantifying the value of flexibility and resilience for energy efficiency measures

Measure Cost Analysis:
Review all current RTF measures' incremental cost estimates and methodologies to determine rigor, accuracy, and consistency with RTF Guidelines

Value of Resilience:
Identified resilience can be quantified using a cost-based valuation approach and developed an initial tool for the RTF and Council

Interactive Benefits of DR and EE:
Developed a framework for the RTF to improve its modeling by comprehensively considering measures that provide both energy savings and demand response

Other RTF Focus Areas in 2022

Enhancing Tools

Developing a Residential Demand Response and Energy Efficiency Modeling tool to use for simulation modeling that will demonstrate how energy savings and consumption.

Updating representative weather stations for modeling and mapping climate zones and understanding the savings impact from extreme weather events

Beyond the Unit Energy Savings Measure

To continue to ensure consistent and reliable estimation of energy savings across the region, the RTF adopted guidance for residential behavior and approved a proposed scope and direction for deep energy interventions in existing and new commercial whole buildings.

Looking Ahead

- Continued work on the Power Plan recommendations, including expanding demand response and energy efficiency interaction in measure work, as well as continuing to improve measure load profiles.
- Exploring electric vehicles by performing a market characterization to determine the opportunity for a measure for efficient EVs.



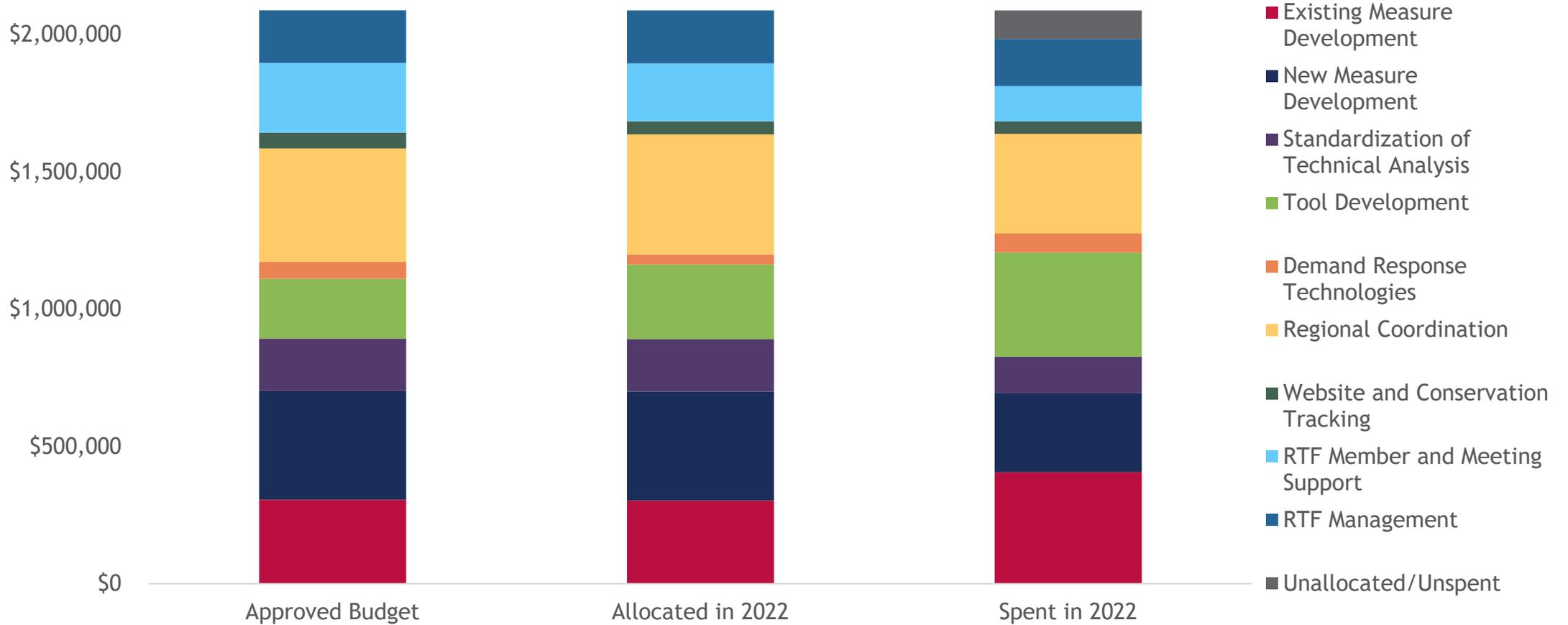
An aerial photograph of a large, turquoise-colored lake nestled in a valley. The lake is surrounded by dense evergreen forests on steep, rocky slopes. In the background, a prominent mountain peak rises above a layer of clouds. The sky is filled with heavy, grey clouds, creating a dramatic atmosphere. The text "2022 Financials" is overlaid in the center of the image in a white, bold, sans-serif font.

2022 Financials

Current Funding for the RTF

- In 2019, the RTF Policy Advisory Committee secured new five-year funding commitments for the RTF
- Added new funding sources:
 - Two new electric utilities
 - Natural gas efficiency programs
 - Portland General for DR activities
- Budget levels were developed based on ensuring core needs of library maintenance and addition of a few projects intended to support regional programs
- Funders agreed to managing the funding as a 5-year budget, allowing unspent funds to rollover to future years within this cycle

2022 Year End Financials



Questions





Regional Technical Forum **2022 Annual Report**



Regional
Technical Forum



Northwest **Power** and
Conservation Council



Letter from the Council Chair

We know our regional power system is quickly transitioning to a very different composition. As increasing amounts of wind and solar resources are added to the grid, the ability to accommodate the ups and downs of their generation will be key to ensuring the reliability of our power supply.

Our task at the Council is to ensure the reliability and affordability of the system, even as it evolves. The work ahead for the Regional Technical Forum, the group that has played such an important role in the region's success in acquiring energy efficiency, will be to help us meet this challenge.

As the annual report points out, the energy system is growing more complex, and energy efficiency along with it. The RTF's areas of focus now include questions about the ability of efficiency to provide capacity to the system; how demand response—lower consumer energy use at peak times—interacts with energy efficiency to improve reliability; and opportunities for efficiency in natural gas use.

The Northwest has seen over 7,500 average megawatts in savings from energy efficiency since 1978, enabling the region to avoid more than 24 million metric tons of CO₂—equivalent to the annual energy consumption of approximately 5.5 million homes.

These are the tangible products of the RTF's work, in concert with its regional partners, and it is a tremendous foundation to build on. I commend the RTF for its steadfast commitment to helping build what we've called in the past our energy efficiency "stealth power plant," and I look forward to working with them to achieve the goals set forth in the Council's 2021 Power Plan.

Jeff Allen, Council Chair

A handwritten signature in black ink that reads "Jeff Allen". The signature is written in a cursive, flowing style with a long horizontal stroke at the end.



Jennifer Light, RTF Chair

Letter from the RTF Chair

As I look back on 2022, it was another exciting year for the RTF with many accomplishments, some new faces, and finally getting a chance to see some faces in person. We kicked off the year welcoming a new class of members who will serve on the RTF through 2024. This group, as their predecessors, hit the ground running using their expertise to ensure the current measure library is accurate and effective. They considered opportunities beyond the traditional RTF work product and advanced the 2021 Power Plan directives in person after two full years of meeting virtually.

The RTF focused a good portion of the year on laying the groundwork for the key directives from the 2021 Power Plan, not only reviewing the rigor of cost assumptions in all RTF measures, but also developing the first method in the country to value the benefit of energy efficiency for building resilience. Additionally, the RTF continued to advance demand response and energy efficiency by developing a residential tool to model them. As always, the RTF continued its work of updating and developing conservation measures, including improving long standing measures like residential lighting; creating standard protocols to capture more precise savings for demand control kitchen ventilation; and adding another suite of applications to the heat pump water heater measure.

At the publishing of this report, the RTF's 2023 year is already in full swing. The RTF member class is in its second year and is focused on developing and updating measures and improving its analysis on the interaction of energy efficiency and demand response. The RTF will continue to look beyond the traditional work products and delve into new efficiency opportunities, including efficient electric vehicles. Additionally, the RTF will look to expand the natural gas analysis in the portfolio by considering commercial heating efficiency opportunities.

Over the following pages of this annual report, we'll review and celebrate everything the RTF accomplished over 2022 and look forward to what we can do in 2023.

Introduction

In 1980, Congress passed the landmark Northwest Power Act, which formed the Northwest Power and Conservation Council, an interstate compact among Washington, Oregon, Idaho, and Montana. The Act charges the Council with ensuring that the region has an adequate, efficient, economical, and reliable power system. It does this by developing a 20-year power plan, reviewed every five years. This regional collaboration has become a model to the rest of the nation for meaningful, effective power planning.

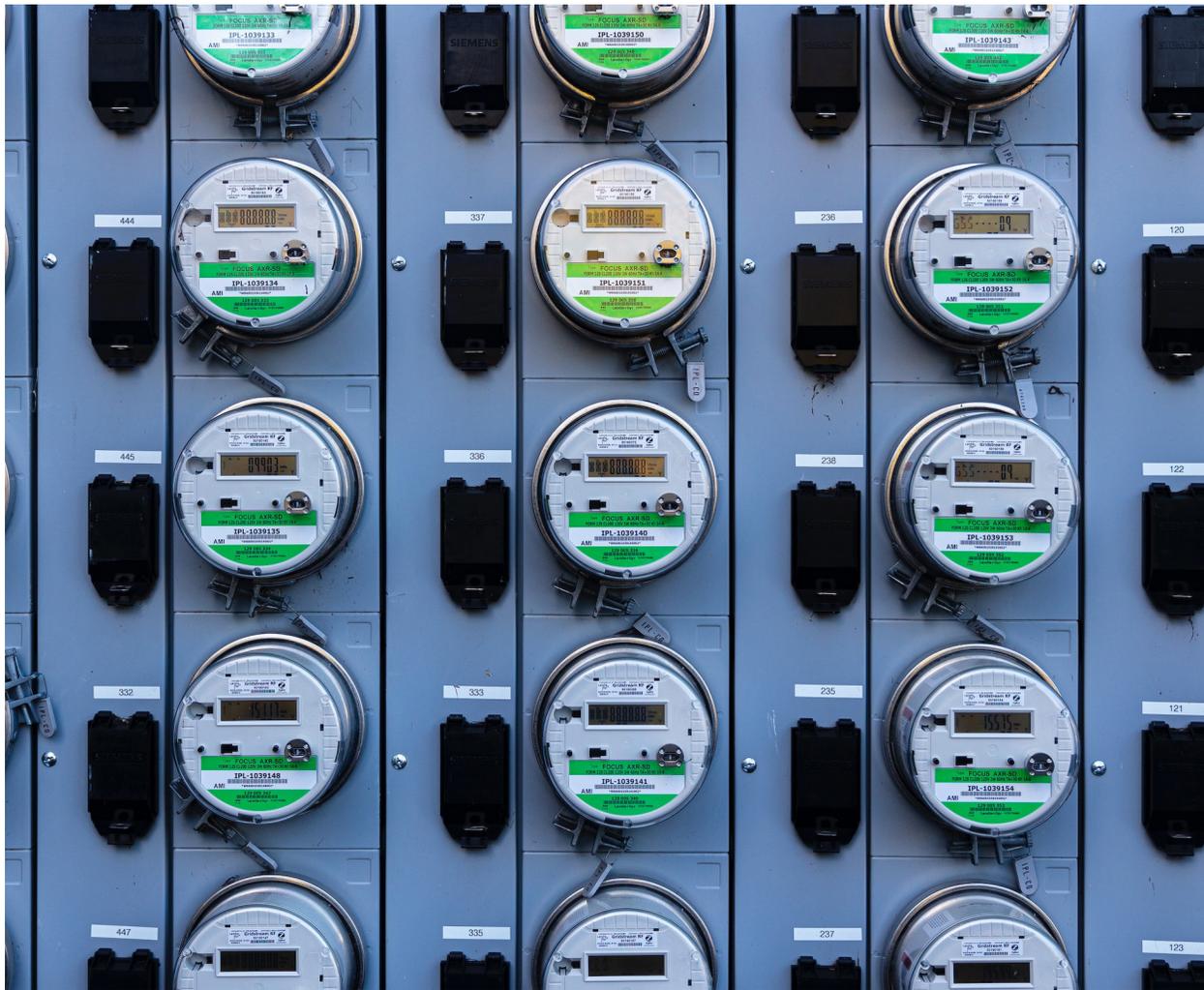
Energy efficiency has been a cornerstone of the Council's work since its inception. The Act defines energy efficiency as a resource and requires the Council to prioritize cost-effective conservation over all other resources in its power planning. Due to this emphasis on energy efficiency, it is now the region's second largest resource after hydropower. Over the past four decades, utilities, program implementers, and countless other engaged stakeholders have been integral to this success, utilizing energy efficiency's potential to help meet regional load, reduce customer costs, cut power sector carbon emissions, and improve system reliability.

The Regional Technical Forum was created as an advisory committee to the Council in 1999 to support these regional efforts by developing and maintaining a list of eligible energy efficiency resources. A primary goal was to create a library of energy efficiency opportunities that outline reliable and consistent ways of estimating energy savings. This is intended to ease the planning and evaluation burden of energy efficiency programs in the region, while allowing flexibility for utilities to pursue those cost-effective efficiency measures that made the most sense for their consumers.

As a technical body, the RTF can objectively generate peer-reviewed energy savings estimates through robust and unbiased analysis in a public forum. The RTF engages stakeholders from across the Pacific Northwest, and from all sectors of the energy efficiency industry, to ensure that the work they produce speaks directly to the region's needs. This commitment to collaboration informs all the RTF's work and results in widely respected technical analysis that is looked to for its accuracy, reliability, and consistency.

The following report details the RTF's many accomplishments in 2022. This includes maintaining and updating its measure library; expanding the measure library and its natural gas analysis; and looking for opportunities to provide new value to the region beyond the traditional energy savings by unit. With the adoption of the Council's [2021 Power Plan](#), the RTF spent much of the

year supporting that work and advancing its recommendations. The plan indicated that the energy system is growing more complex, and energy efficiency along with it. In response to these ongoing developments, the RTF is committed to evolving to continue to fulfil its role of supporting the region's conservation ecosystem.



Accomplishments in 2022

A core function of the RTF is to develop and maintain a portfolio of measures of energy savings estimates for the Northwest region. In 2022, the RTF continued to ensure that the current portfolio is based on the best available data and information, provides reliable energy savings estimates, and that measures continue to expand, identifying new opportunities. This year, the RTF advanced the recommendations from the

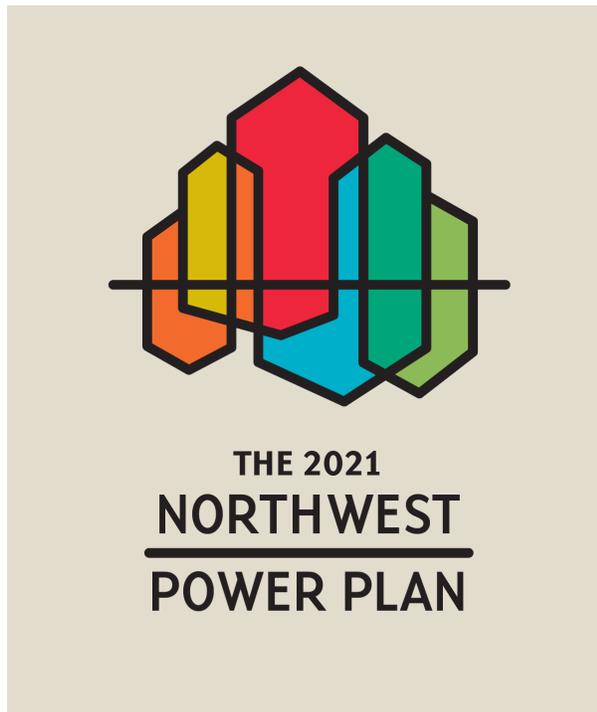
Northwest Power and Conservation Council's 2021 Power Plan, enhanced tools used for measures, and guided energy savings beyond the core RTF work products.

Existing Portfolio Enhancement

To ensure that the portfolio of measures is reliable and relevant, the RTF regularly reviews and updates the existing measures on a defined timeline. In 2022, the RTF reviewed 15 measures and three standard protocols, including Residential Lighting and Residential Duct Sealing unit energy saving (UES) measures detailed below..

Residential Lighting

The Residential Lighting UES measure is one of the oldest active measures at the Regional Technical Forum and has been maintained for over 13 years. Not only have lighting measures been an area with lots of engagement and discussion at the RTF, but historically, these measures have played an important role for the region in achieving



energy savings. This measure is no exception, saving the region 31.7 average megawatts in 2021.

This measure covers fixtures and lamps, specifically LED pin-based and screw-base lamps, that are delivered by energy efficiency programs either through retail purchases or direct install. During this revision, the RTF focused on aligning the measure to incorporate the new U.S. Department of Energy Federal Minimum Standard that went into effect in July 2022 for general purpose lamps. Because the federal standard now requires screw-in lamps to be efficient, this measure was limited to those applications where programs are directly replacing inefficient lamps. Additionally, the RTF determined that the measure should now be reviewed in one year to consider deactivation of this lamp type.

While energy savings from screw-base lamps are diminishing as technology improves, the RTF is encouraged by regional support for energy efficiency and strengthened codes. Nonetheless, it's clear that opportunities are shifting and declining compared to previous power plans.

In the 2021 Power Plan, the estimated regional potential for residential lighting in the 20-year plan period will be 94 average megawatts, with a significant growth in energy savings coming from integral LED fixture that are an important part of the cost-effective potential.

New Homes Standard Protocol

The New Homes Standard Protocol was first adopted by the RTF in December 2016 with the intention of promoting consistent, yet flexible, opportunities for energy efficiency measures above code in new homes. The protocol provides the region with consistent quality standards and baseline definitions, while creating flexibility for programs by providing a range of different home designs and code requirements. Savings from the protocol are achieved through improving the homes shell and upgrading equipment, including water heaters, clothes washers, and lighting.

In the 2022 revision of the protocol, the RTF updated the equipment requirements and assumptions for refrigerators, clothes washers, clothes dryers, heat pump water heaters, and gas water heating. In addition, the RTF aligned the baseline assumptions to the new energy codes in Oregon, Montana, Idaho, and Washington for new construction housing.

While codes push new construction homes to meet higher energy efficiency requirements, there are usually opportunities to go beyond the minimum efficiency. For example, in Washington state code for new constructions, home builders have to meet a total number of energy credits per home with options to meet a minimum number of credits. One path for these credits is to install a heat pump water heater that meets NEEA Tier 3 requirements,



but builders could achieve even more energy savings by installing a NEEA Tier 4 heat pump water heater. By using the New Home Standard Protocol, programs can encourage and capture energy savings in the residential new construction market.

Expanding the Portfolio

The RTF regularly considers proposals for measures and standard protocols that have support from energy efficiency programs in the region. In 2022, the RTF adopted three standard protocols and two UES measures to the portfolio, some of which are highlighted in this section.

Demand Control Kitchen Ventilation

In July, the RTF adopted new Standard Protocol for Demand Controlled Kitchen Ventilation (DCKV). Commercial kitchen ventilation is used to reduce excess cooking heat and remove vapors and odors to create a cleaner and more pleasant working environment. Traditional kitchen ventilation has only an on/off switch, meaning the system is removing conditioned air from the kitchen space consistently throughout all operating hours and new conditioned air needs to be introduced by the HVAC system at a higher rate.

DCKV systems add sensors and controls to kitchen ventilation to vary the rate at which air is removed. This means that the speed of the fan is reduced when not cooking, saving



energy and reducing the demand on the HVAC system. Additionally, DCKV systems can improve worker comfort by reducing the fan noise in the kitchen.

The energy savings from DCKV can vary significantly due to cooking equipment and cooking schedules, for example, making it impractical for a UES measure at this time. Additionally, the protocol expands energy savings potential by considering both the fan motor and tempering the make-up air.

Commercial Unitary Heat Pump Water Heaters

The RTF added to its measures for heat pump water heaters (HPWHs) by adopting a UES for commercial unitary equipment, in addition to the existing consumer unitary and split HPWHs measures. These units are larger than the standard consumer water heaters that are typically less than 120 gallons and are typically installed in commercial buildings with large water heating demand like restaurants or grocery stores. This equipment

has an estimated regional savings potential of up to 30 average megawatts.

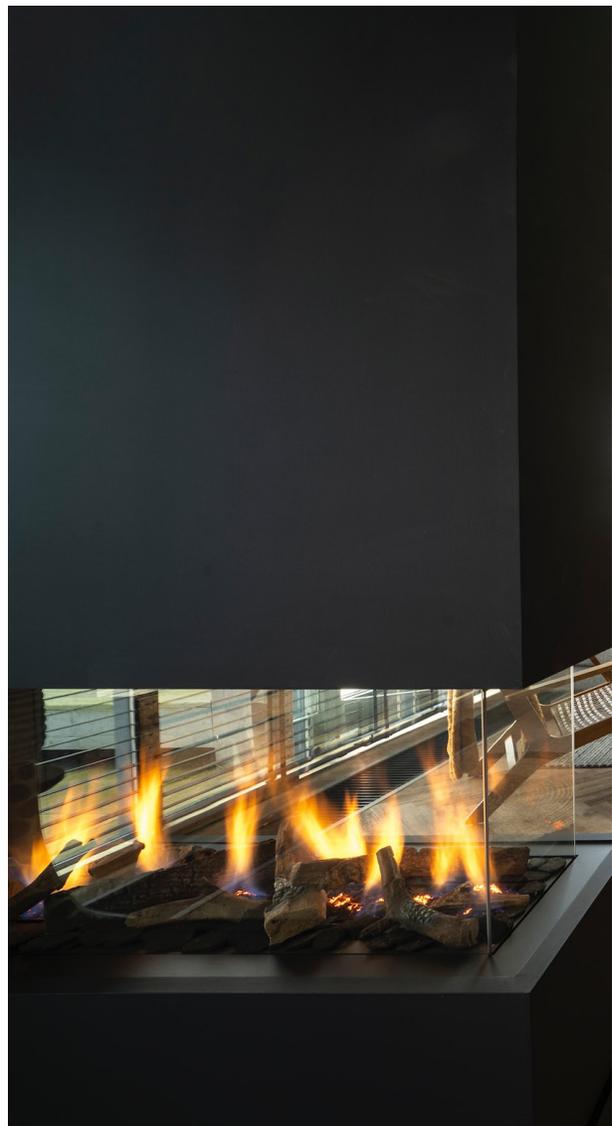
This measure aligns efficiency criteria with the U.S. Environmental Protection Agency's ENERGY STAR® program, which labels eligible equipment for easy identification for buyers, contractors, and distributors. Unitary HPWHs with an integrated tank are eligible in both new construction and existing structures, as long as they are not already required by code. At the time of adoption, product availability was limited to one unit, but new manufacturers were expected to launch equipment within the year.

With the adoption of this measure, the RTF is close to completing its commercial HPWH suite of measures. The RTF expects to work on completing the suite in the next few years.

Residential Gas Fireplaces

The RTF expanded its scope to include analysis of natural gas in 2020, and since this time has launched five new measures, the most recent being for residential gas fireplaces in 2022. This measure is intended to encourage the installation of a more efficient gas fireplace when the consumer already decided to purchase this type of equipment. Gas fireplaces can be found in both new and existing single-family, multi-family, and manufactured homes and the measure applies to units that are self-contained, decorative, or heating certified.

By purchasing higher efficiency equipment, which are units with a fireplace efficiency equal to or greater than 70 percent, the region has the potential to save over 17 million therms in existing homes and 14 million therms in new homes, which is equivalent to one year's worth of energy for more than 20 thousand homes.



Other RTF Focus Areas

Outside of the measure portfolio, the RTF spent time on three key areas, advancing the Council's 2021 Power Plan recommendations and exploring energy savings opportunities outside of measures and standard protocols. There were a number of accomplishments in each of these areas in 2022, which are detailed in the remainder of this section.

Advancing the 2021 Power Plan Recommendations

The Council's 2021 Power Plan directed the RTF to:

- Explore the mutual benefits of energy efficiency and demand response in providing grid flexibility
- Use the End Use Load Research to create load shapes for efficiency measures that can be used by the region's utilities to understand the timing of energy efficiency savings
- Increase the rigor of its measure cost analysis to support improved comparison with alternative resources in future resource planning
- Investigate methods for quantifying the value of flexibility and resilience for energy efficiency measures

In 2022, the RTF made significant progress in each of these areas to build a foundation

continued work leading up to the next power plan:

Rigor of Measure Cost Analysis

The RTF hired an outside contractor to review all current measures' incremental cost estimates and methodologies to determine their rigor, accuracy, and consistency with the RTF Guidelines. The review determined that the majority of the measures were compliant and rigorous. Of the 87 measures reviewed, the contractor identified nine high-priority measures to address before the sunset date. The RTF reviewed the contractors' recommendations, determined next steps to address the highest priority measures and expectations to ensure costs estimates and methodologies continue to be rigorous and transparent.

Valuation of Resilience

The 2021 Power Plan found that some energy efficiency measures provide value to the grid beyond energy savings not currently captured in modeling. One of these values is from measures like weatherization, where increasing insulation and sealing of a structure can help it maintain a conditioned temperature for longer periods of time than non-weatherized structures, maintaining safe temperatures for occupants during extended extreme weather or power outages.

In 2022, the RTF worked with a contractor to see if quantifying the value of energy efficiency measures for building resilience

was feasible. The contractor, Apex Analytics, determined it could be quantified using a cost-based valuation approach and also developed a tool to incorporate a resilience value into RTF measures. The Council and RTF will be working in the coming years to further this work, but a solid foundation was developed through the study.



Interactive Benefits of Demand Response and Energy Efficiency

Historically, the RTF has considered demand response and energy efficiency separately. As technology and data availability has changed, it has become more evident that understanding the interaction of these two resources is critical for understanding the overall potential and costs. The Council recognized this in the 2021 Power Plan and directed the RTF to explore and potentially value this interconnection. The RTF worked with a contractor to review the existing work on this topic and develop a framework to improve its modeling by comprehensively considering measures that provide both energy efficiency and demand response.

Enhancing Tools

Building and enhancing the RTF's current tools was an important part of work in 2022. There were three tools and resources

that the RTF focused on this year: updating representative weather stations and mapping climate zones; exploring weather and climate data sets; and building a new residential modeling tool to account for demand response and energy efficiency:

Residential Demand Response and Energy Efficiency Modeling

For some residential measures, the RTF uses a simulation modeling tool to demonstrate how energy savings and consumption vary for individual homes in certain climate zones. Historically, the RTF has used the Simple Energy Enthalpy Model (SEEM) tool for this modeling, but as more granular data has become available and the need to model demand response has increased, SEEM is no longer meeting the needs of the RTF.

After a thorough review of alternative modeling tools, the RTF determined that it would develop its own tool for modeling

Subcommittees

Subcommittees play an integral role in supporting the RTF's work throughout the year; they provide insight, deep technical expertise, and guidance on all aspects of the work. Subcommittee feedback prior to these meetings guide the recommendations that the RTF considers at monthly meetings. In 2022, the following subcommittees convened to support this year's work (also see rtf.nwcouncil.org/subcommittees):

- Agricultural Irrigation
- Air Source Heat Pumps
- Compressed Air
- Duct Sealing
- Implementers Group
- Market Analysis: Residential Lighting
- New Homes Standard Protocol
- Non-Residential Lighting
- Operations Committee
- Research and Evaluation
- Behavior
- Small and Rural Utilities
- Whole Buildings

residential demand response and energy efficiency (REEDR). Building a tool in-house allows the RTF to customize the inputs and outputs; build features and functionality to better meet current needs; and increases transparency around the assumptions and data. Additionally, REEDR will model demand response in residential buildings, supporting the Council's directive to consider how energy efficiency and demand response interact in measures. The tool will launch in early 2023 and will be used for modeling within the year.

Updating Representative Weather Stations for Modeling & Mapping Climate Zones

Weather data plays an important role in many RTF measures, particularly for heating and cooling measures where the seasonal HVAC demand, and resulting energy savings, can vary based on building location. To ensure that the weather data and climate zones used in the measures is accurate, the RTF periodically reviews to ensure the calculation methodology and representative cities capture the Pacific Northwest's climate.

In 2022, the RTF adopted a TMYx data format that uses new weather data sets for the region and selected new representative cities for the region's nine heating and cooling zones. These sets are based on more recent weather data and more accurately reflect current weather. The updated methodology continues to align with past iterations and selects the most representative weather cities using National Oceanic and Atmospheric Administration data.

The RTF also examined the savings impact from building resilience in extreme weather events. For this effort, the RTF worked to determine a method to create extreme weather files and data sources to use for modeling these events. The RTF will continue to support the Council in understanding these potential savings.



Beyond the UES Measure

Energy efficiency programs and standards have seen great success in moving particular markets or end-use equipment, like residential dishwashers and commercial lamps, toward substantially lower energy consumption.

The RTF had a clear role in supporting these types of programs by developing unit energy savings measures that focus on end-use equipment and standard protocols that are more complex, but specific to a system

As these opportunities diminish, program managers are looking at more complicated savings that consider behavior, commissioning, and whole buildings. These types of programs have been around for decades, but have typically been custom designed. To meet growing savings goals, however, a more uniform approach is necessary. This means the RTF needs to look beyond the UES measure and standard protocols to find new work products to guide the region.

The RTF strives to ensure consistent and reliable estimates of energy savings across the region. In 2022, the RTF considered two areas: Adopting guidance for residential behavior and approving a proposed scope and direction for deep energy interventions in existing and new commercial whole buildings.

Regional Conservation Achievements

The RTF tracks the region's progress toward the Council's power plan targets by surveying Bonneville Power Administration, NEEA, utilities, and system benefit charge administrators on their efficiency achievements each year. The data from the survey are presented in the Regional Conservation Progress Report and the results are presented to the Council.

From 2016-2021, the Northwest achieved 1,305 average megawatts in energy efficiency savings. Due to missing the milestones in both 2020 and 2021, the region missed the Council's Seventh Power Plan target of 1,400 average megawatts to be achieved in the first six years of the plan (2016-2021). Budgets over the past six years have remained relatively flat or declined over the past six years. This decrease is likely one of the key drivers in the savings shortfall, but Covid-19 restrictions and subsequent supply chain challenges also probably had some impacts as well.

Nonetheless, energy efficiency continues to provide significant savings for the region, saving over 7,500 average megawatts since 1978—17 percent of this just in the last six years. These savings have helped the region avoid more than 24 million metric tons of CO₂ emissions and saved the annual equivalent

energy consumption of 5.5 million homes —that would be all the homes in Oregon, Washington, and Montana. Energy efficiency program savings continue to be the primary driver for these regional savings, but NEEA’s market transformation programs and state codes combined represent almost 25 percent of the savings.

that are more challenging to penetrate, the capacity this resource provides the region is substantial. The RTF is interested in identifying opportunities to capture these savings by fine tuning and building the portfolio of measures and resources.

Although energy efficiency programs are getting more complex and expensive as the region transitions to programs and markets

Figure 1. Regional Energy Efficiency Accomplishments Compared to Plan Target (2016-2021)

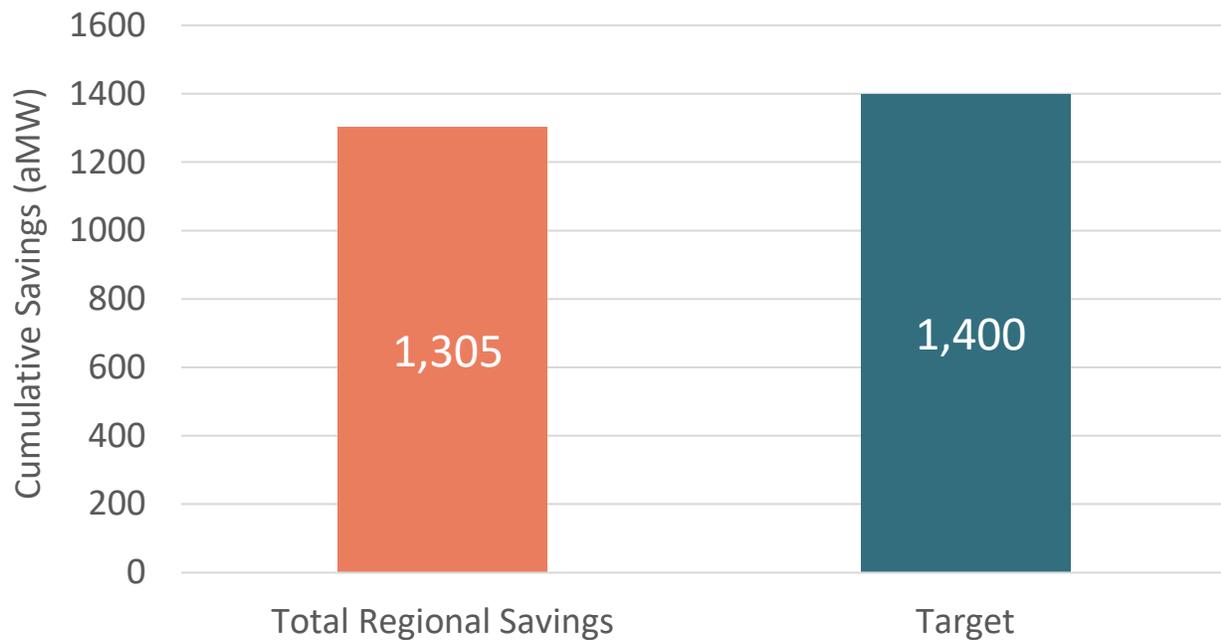


Figure 2. Total Regional Savings Compared to Plan Milestones (2016-2021)



Figure 3. Annual Regional Savings (Energy and Capacity)

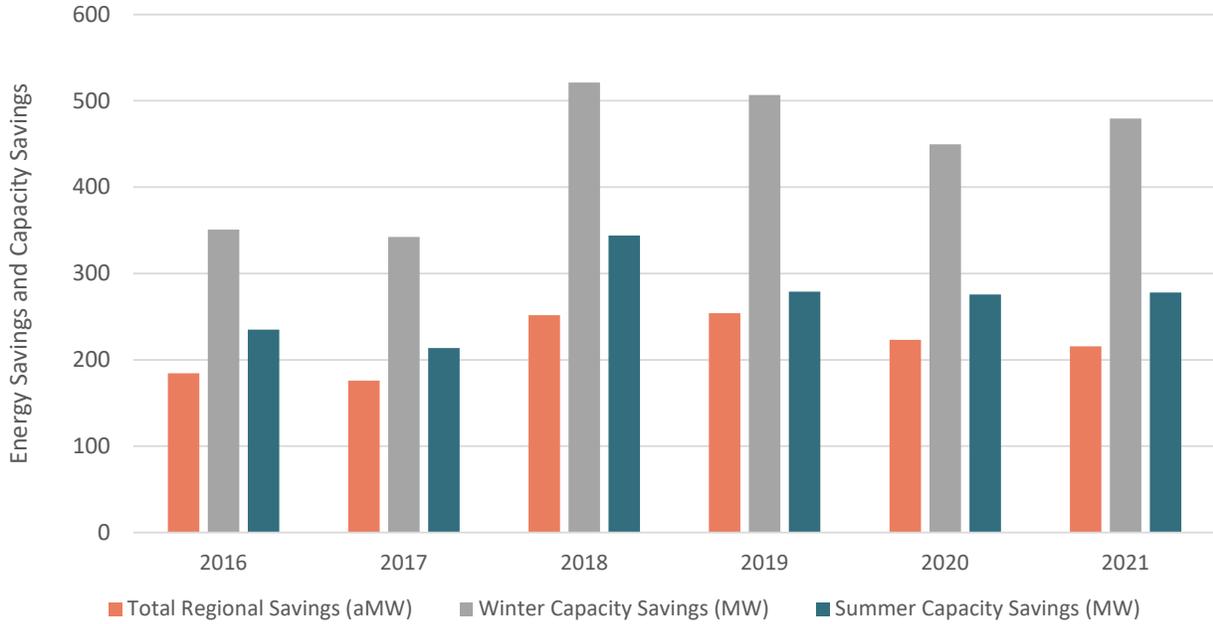
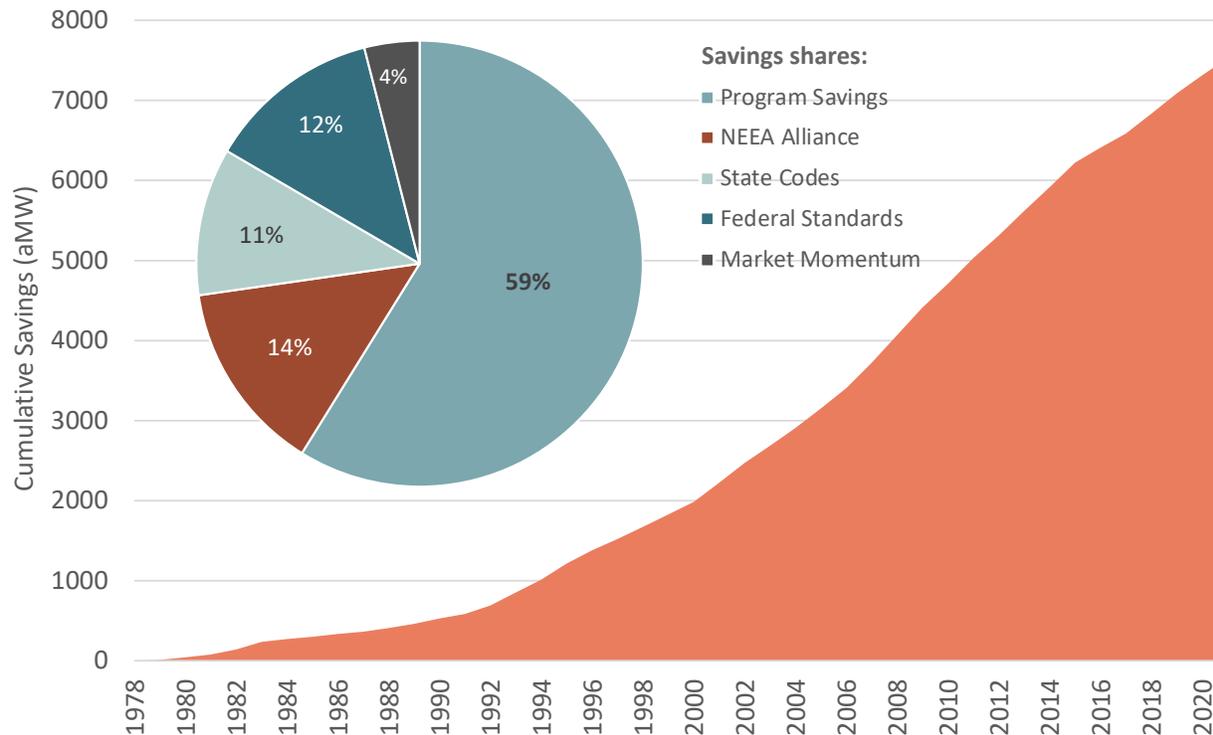


Figure 4. Cumulative Regional Savings, All Mechanisms

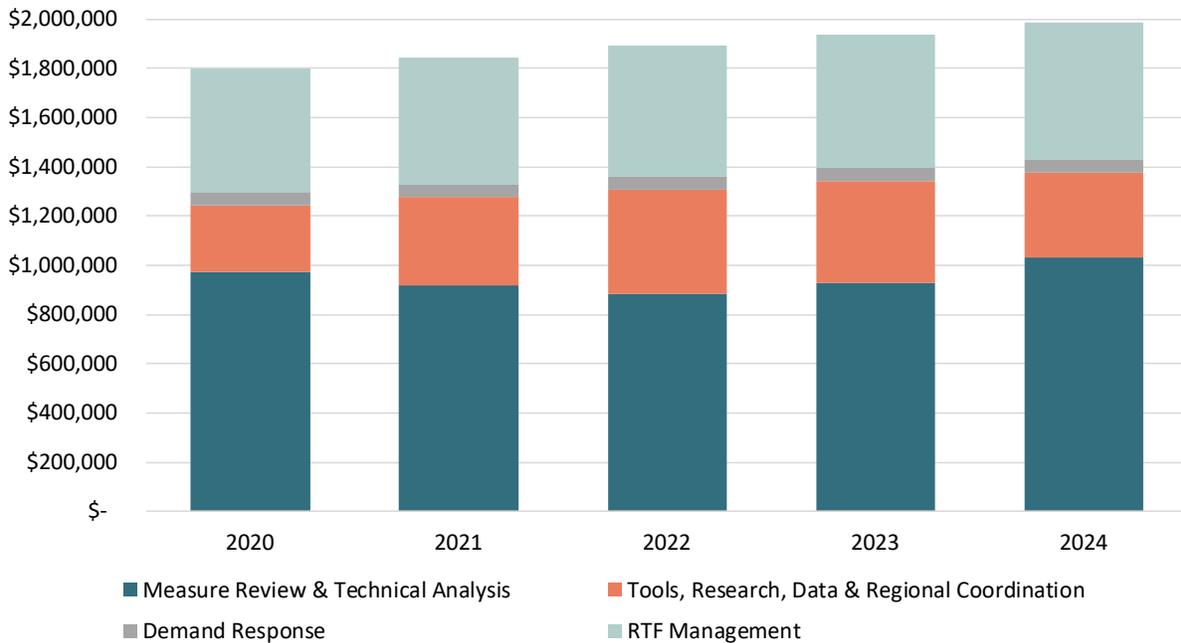


Financial Information

In 2019, the RTF Policy Advisory Committee worked to expand the charter adding funding for natural gas analysis and restructuring the funding of RTF from an annual cycle to a longer-term approach to provide flexibility to the RTF and its funders, while continuing to

meet annual regional needs. The committee secured funding commitments for five years to cover the operations of the RTF in 2020 through 2024, for a total budget of \$9,461,300 starting at \$1.8 million in 2020 and increasing

Figure 5. 2020-2024 RTF Funding Commitments by Category



annually by about 2.5 percent to account for inflation.

The RTF Policy Advisory Committee aligned with previous funding agreements to use the allocation method developed by the Northwest Energy Efficiency Alliance for the new five-year cycle. The RTF Policy Advisory Committee agreed to share the costs of work accordingly:

- Electric ratepayer dollars are allocated to work that is solely intended to support electric demand-side management programs (electric only energy efficiency measures and demand response)
- Gas ratepayer dollars are allocated to work that is solely intended to support natural gas programs (gas only efficiency measures)

- Costs will be shared for work that is intended to support all ratepayers (dual-fuel measures, tool development, and overhead) with 75 percent allocated to electric ratepayer dollars and 25 percent to gas ratepayer dollars

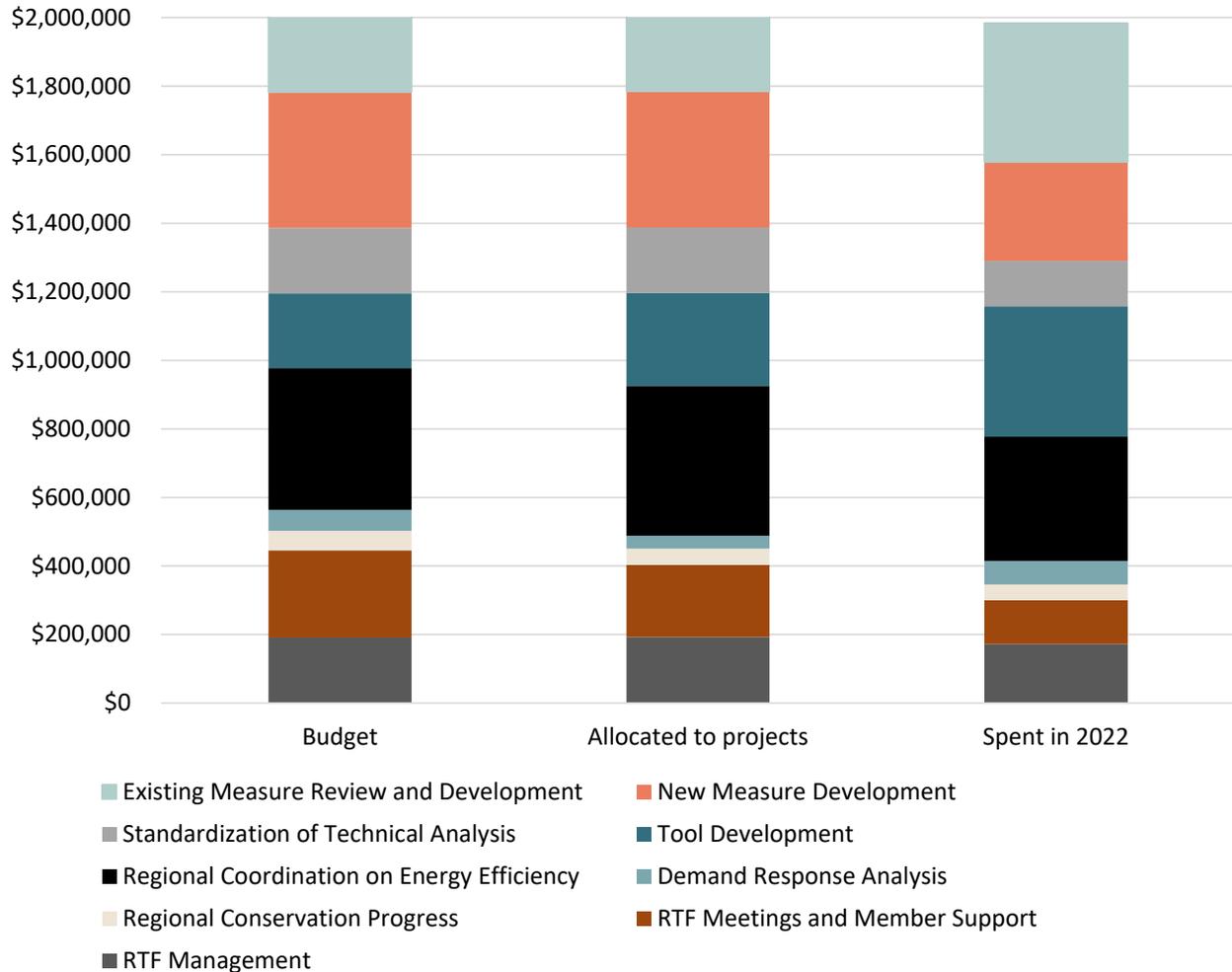
2022 Budget and Spending

For 2022, the total approved budget was \$2.088 million, and nearly 100 percent of the budget was allocated to contracts. Of this budget, the RTF spent approximately 95 percent of its funding, with only about \$103,000 unspent. The underspend was primarily due to less member support needed than anticipated; transition of the RTF manager position; and less contract analyst time to meet work plan objectives. The

The RTF thanks these sponsor organizations for providing funding:

Avista Utilities	Energy Trust of Oregon	Portland General Electric
Bonneville Power Administration	Eugene Water and Electric Board	Puget Sound Energy
Cascade Natural Gas	Idaho Power	Rocky Mountain Power
Chelan County PUD	NorthWestern Energy	Seattle City Light
Clark County PUD	NW Natural	Snohomish County PUD
Cowlitz County PUD	Pacific Power	Tacoma Power

Figure 6. 2022 Workplan and Spending



underspent funds will be allocated to future work in 2023 and 2024, including projects in 2023 for savings shape development and efficient electric vehicle scoping.

Approximately 42 percent of the budget in 2022 was focused on measure development and standardizing technical analysis, including updates to existing measures that required RTF review due to sunset dates this year and for developing new measures to expand the portfolio. Tool development

in 2022 was also a large focus for the RTF, with 19 percent of the budget spent in this area. The RTF worked to develop a new tool, Residential Energy Efficiency and Demand Response Tool (REEDR) that will support residential building energy model using EnergyPlus. This tool will support the RTF’s modeling for residential measures, with expanded capability to model demand response.

A Look Ahead

Work for 2023 is underway at the RTF, and as always, the work plan this year focuses on maintaining and developing energy efficiency savings estimates and methodologies to support the region. The RTF will also focus on the recommendations in the Council's 2021 Power Plan, including expanding demand response and energy efficiency interaction in measure work; ensuring that the measure cost analysis is rigorous and meets RTF guidelines; updating the RTF guidelines; and continuing to improve measure load profiles. In addition, the RTF will be exploring the impact of electric vehicles by performing a market characterization to determine the potential for a future efficient EVs measure



RTF Staff

The RTF is an advisory committee to the Northwest Power and Conservation Council and shares several staff members, and 2022 saw some staff transitions.

- Jennifer Light was appointed as the Council's Power Division director in April 2022, having previously served as the RTF manager for eight years. She continued to support the RTF throughout 2022 as the RTF chair, a role she will maintain throughout the current membership cycle.
- Annika Roberts transitioned to the Council's resource policy analyst in October 2022 after serving as the RTF assistant for four years.
- Kevin Smit served as interim RTF manager from April - November 2022

The RTF appreciates the dedication, innovation, leadership, and support provided by Jennifer and Annika throughout their years of service. The RTF also values the support and leadership provided as the interim RTF Manager. At the end of 2022, the RTF welcomed Chad Madron who assumed RTF coordination responsibilities, in addition to his current responsibilities

at the Council in the Power Division. In December, Laura Thomas joined the Council as the new RTF Manager.

In addition to RTF staff, several members provide operational and administrative leadership to the forum by serving on the operations subcommittee, and in 2022 those members included:

- Rebecca Blanton
- Jackie Goss
- Mark Jerome
- Phillip Kelsven
- Eric Miler

The RTF also contracts a team of analysts who provide dedicated support throughout the year. The 2022 contract analysts include:

- David Bopp
- Gregory Brown
- Christian Douglass
- Ryan Firestone
- Josh Rushton
- Paul Sklar

2022 – 2024 Regional Technical Forum Members

Name	Organization
Jennifer Light (RTF Chair)	Northwest Power and Conservation Council
Mark Jerome (RTF Vice-Chair)	CLEAResult
Jamie Anthony	Bonneville Power Administration
Dave Baylon	Independent
Rebecca Blanton	Independent
Bob Davis	Ecotope
Joe Fernandi	Seattle City Light
Kevin Geraghty	Independent
Pace Goodman	Illume Advising
Jackie Goss	Energy Trust of Oregon
Mitt Jones	Cadmus
Josh Keeling	GENERAC Grid Services
Phillip Kelsven	Bonneville Power Administration
Rick Knori	Lower Valley Energy
Mark Lensen	Puget Sound Energy
Eric Miller	Benton REA
Eric Mullendore	Bonneville Power Administration
Alex Novie	Energy Trust of Oregon
Nick O’Neil	Energy 350
Brian Owens	CLEAResult
Andy Paul	Avista Utilities
Laney Ralph	NW Natural
Mark Rehley	Northwest Energy Efficiency Alliance
Sam Rosenberg	Pacific Northwest National Laboratory
Peter Schaffer	PacifiCorp
Blake Shelide	Oregon Department of Energy
Kevin Watier	Snohomish County PUD
Jim White	Chelan County PUD
Sarah Widder	Cadeo Group
Kathy Yi	Idaho Power



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