

**THE REGIONAL TECHNICAL FORUM'S RECOMMENDATIONS
TO THE BONNEVILLE POWER ADMINISTRATION REGARDING
CONSERVATION AND RENEWABLE RESOURCES ELIGIBLE
FOR THE CONSERVATION AND RENEWABLE RESOURCES
RATE DISCOUNT AND RELATED MATERS**



**Submitted
September 1, 2000**

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INTRODUCTION

Origin of Bonneville Power Administration's Request

During the spring of 1998 the Northwest Power Planning Council (Council) released an issue paper aimed at defining the role and general structure of a “Regional Technical Forum” (RTF).¹ This effort was in response to direction from Congress and the Comprehensive Review of the Northwest Energy System. It was also in response to the Council’s own interest in finding ways to encourage and facilitate the development of cost-effective conservation and renewable resources in the partially restructured utility environment in which the region finds itself.

Subsequently, the Bonneville Power Administration (Bonneville) initiated a plan to provide a rate discount during the FY 2002 – 2006 rate period to encourage customer (utilities and direct service industries) activities in conservation, renewable resource development and low-income weatherization. In a letter dated February 24, 1999, Bonneville requested that the Council allow the RTF to support the agency's Conservation and Renewable Resources Rate Discount (C&R Discount) efforts. Bonneville asked that the RTF prepare a comprehensive list of energy efficiency measures and renewable resources actions that are predetermined to qualify for the discount for submission to the agency.

Bonneville asked that the list of measures be as extensive as possible, covering a broad range of technologies, projects and activities that qualify for the C&R Discount (*See Appendix A for details*). The agency requested that measures on the RTF recommended conservation list have three components: a) the Definition of the Measure; b) the Definition of the Electricity Savings; and c) the Definition of the Value to the Region (from an electric system standpoint). Bonneville also requested that the RTF conduct periodic energy savings performance evaluations. These evaluations were to be done at the regional level, with appropriate power customer involvement. The primary purpose of these evaluations was to improve savings estimates in order to make future adjustments to the amount credited for measures and program designs. Finally, Bonneville requested that the RTF submit its C&R Discount recommendations by September 2000.

RTF formation and work plan

In response to Bonneville's request the Council issued a revised issue paper that modified the RTF's proposed work scope.² The Council subsequently voted to authorize the RTF and revised its charter to support the C&R Discount on April 7, 1999 (See Appendix B for details). At that time the Council appointed 19 voting members to the RTF. The Council's Manager of Conservation Resources, Tom Eckman and its Senior Resource Analyst (Jeff King) were appointed as Chair and Vice-Chair of the RTF. In addition to the 19 voting members the Council also appointed an additional 10 non-voting corresponding members to broaden the depth of technical expertise that could be tapped by the RTF (See Appendix C for a current list of the RTF's voting members and corresponding members). The Council also committed to providing staff support for the RTF.

The RTF held its first meeting on July 13, 1999. At that time it adopted a work plan to address the specific request for support of the C&R Discount from Bonneville (See Appendix D). Between July of 1999 and August of 2000, the RTF met 11 times to review and discuss each of the major work products requested by Bonneville. In addition to these meeting, the RTF members regularly provided comments to staff draft work products, usually through electronic mail.

¹ Document 98-18, Draft Proposal for Initiating the Regional Technical Forum, Northwest Power Planning Council. July 27, 1998.

² Document 99-1. The Regional Forum and Bonneville's Conservation and Renewable Resources Discount - How Should the RTF be Restructured? Northwest Power Planning Council. February 4, 1999.

RTF public involvement and review process

Bonneville, in its request to the Council, asked that the RTF provide the opportunity for involvement of the region's utilities and other interested parties. In response to this request and in keeping with the Council's responsibilities for public involvement and participation in its decision making under the Northwest Power Act, the RTF established an Internet web page. This page is linked to Bonneville's C&R Discount web site. All of the RTF's meeting agendas and summaries, draft working papers, technical analysis are posted on this page. In addition, the RTF circulated its initial set of screening criteria and list of eligible measures for public comment. This package of materials was mailed to all Bonneville customer utilities, the Direct Service Industries, Native American Tribes, the Council's list of public interest organizations and utility associations and the members of the Northwest Energy Efficiency Council, a trade association representing firms involved in energy efficiency in the region. In all, seventeen individuals and/or organizations provided comments on this initial set of criteria and draft list of eligible measures.

During the closing phase of developing its recommendations to Bonneville, the RTF discussed how best to solicit comments on its "draft final" work. It became apparent in discussions with several utility representatives that the RTF's recommendations were intimately linked to Bonneville's decisions on how the C&R Discount was to be implemented. Utility staff stated that the policies that Bonneville would adopt regarding rate discount credits for administrative, marketing and evaluation costs could significantly impact the amount of the credit received for particular measures or activities. Therefore, they indicated that they would much prefer to comment on the "complete package" rather than on just its technical components. In addition, they stated that with limited resources it would be more efficient to combine the RTF's "public comment" process with Bonneville's comment process on its C&R Discount Implementation Manual. Therefore, the RTF views the following recommendations as a "work-in-progress" subject to modifications resulting from public comments.

RECOMMENDATIONS

General Criteria Used to Screen Measures and Activities

Bonneville requested that the RTF develop a "comprehensive list of energy efficiency measures and renewable resource development actions that are predetermined to qualify" for a rate discount. This list of measures is to be "extensive, covering a broad range of measures, projects and activities." It is to include both conservation measures (as defined by the Northwest Power Act) as well as renewable resources. Bonneville also requested that the RTF establish a subset of measures for which "deemed" savings can be determined, including the appropriate program standards and guidelines associated with these savings.

The RTF used the following general criteria to select measures for inclusion on its list of eligible measures. The RTF recommends that Bonneville adopt these same criteria.

1. The technology or practice must satisfy that Act's definition of conservation and/or renewable resources:
 - a) "Resource" means electric power, including the actual or planned electric power capability of generating facilities, or actual or planned load reduction resulting from direct application of a renewable energy resource by a consumer, or from a conservation measure.
"Conservation" means any reduction in electric power consumption as a result of increases in the efficiency of energy use, production, or distribution.³
 - b) "Renewable Resource" means a resource which utilizes solar, wind, hydro, geothermal, biomass or similar sources of energy and which is either used for electric power generation or will reduce the electric power requirements of a consumer, including by direct application.

³ Reduction in electric power consumption in this context means as measured or otherwise determined on a per unit of output basis, e.g. per pound of steel, per heating-degree day, etc.

2. Documented evidence must exist that the technology or practice improves energy efficiency or produces energy from renewable resources. Such evidence must include at least one of the following: generally accepted engineering calculations, independently reviewed evaluation reports or case studies, prototype testing and/or evaluation, metering results; and/or, peer reviewed scientific research.⁴
3. Magnitude and longevity of electricity savings, or net energy production in the case of renewable resources can be reliably determined through direct measurement; controlled experiment or other generally accepted engineering calculations or evaluation protocols.
4. In the case of customer "contributions" to organizations, the organization must:
 - a) have an explicit objective to increase the use of energy efficiency technologies or practices and/or qualifying renewable resources in the Pacific Northwest,⁵
 - b) demonstrate that it is actively engaged in programs or activities that have or are designed to result in improvements in the energy efficiency of electricity generation, distribution or use, or the actual installation and use of qualifying renewable resources.⁶
5. In the case of renewable resources, the energy from qualifying facilities must directly or indirectly serve or offset the regional consumer loads of Bonneville customer utilities.

Categories of Measures and Activities

The RTF separated measures and activities into three categories:

1. Measures and activities for which it is possible to "deem" per unit energy savings and costs,
2. Measures and activities that are well understood, but the specific conditions of application are variable (e.g. hours of operation for efficient lighting or motors). For these measures and activities the RTF has defined a set of calculations that provide a "deemable" energy savings estimate.
3. Measures and activities for which we have insufficient information to "deem" savings or to specify a calculation method for "deemable" savings. For these measures and activities the RTF has defined a set of evaluation and verification protocols.

General Criteria Used to Screen "Deemed" Measures and Activities

The RTF used additional criteria for screening conservation technologies or practices and direct application⁷ and unmetered renewable resources for inclusion on its list of eligible measures for which savings or net energy production⁸ are "deemed." The RTF recommends that Bonneville adopt these same criteria.

⁴ Documented evidence" of energy efficiency improvement that is submitted to the RTF or that is required to satisfy the RTF standardized evaluation protocols that is not already in the public domain shall be protected from disclosure.

⁵ This includes the improvement in the energy efficiency of low-income residences in the region.

⁶ See Section entitled "Contributions to Organizations" for the RTF's explicit recommendations on eligible organizations.

⁷ Direct application renewable resource is equipment that reduces the electrical power requirements of a consumer by direct use of energy from renewable sources.

⁸ Net Energy Production is the gross energy production of a generation or direct application facility less station service loads and generation losses.

1. Annual electricity savings or net energy production in the case of direct application and unmetered renewable resources can be reliably predicted with known variance based on prior program evaluations or generally accepted engineering calculations.
2. Diurnal and seasonal energy savings or net energy production in the case of direct application and unmetered renewable resources can be reliably predicted with known variance based on prior program evaluations or generally accepted engineering calculations.
3. Current baseline practice is consistent with practice on which prior savings and/or net energy production estimates were established.
4. Technology or practice will be delivered in a manner consistent with prior program design and/or assumptions used in engineering calculations (e.g. hours of operation).
5. The proposed measure, technology, or practice is at least as efficient as that used to establish savings and/or output based on prior program evaluations.

Conservation Measures and Activities Eligible for Bonneville's Conservation and Renewable Resources Rate Discount

The list of activities and measures that the RTF recommends should be eligible for Bonneville's C&R Discount appears in *Appendix E*. Measures are listed in a "Table of Contents" format by general category and then again along with a more detailed description of the eligible measures.⁹

Renewable Resource Measures and Activities Eligible for Bonneville's Conservation and Renewable Resources Rate Discount

The RTF recommends that the following activities relating to the development of renewable resources be eligible for the C&R Discount:

1. Production of energy from qualifying facilities owned by a customer for retail sale to its consumers, or purchases for retail sale to consumers of wholesale energy products partially or wholly provided by metered qualifying generating facilities;
2. Development of unmetered renewable resource generating facilities;
3. Activities to encourage development of qualifying consumer-owned renewable resource generation or direct application facilities; and,
4. Research, development and demonstration (RD&D) activities intended to benefit qualifying renewable resource generation or direct application facilities.
5. Contributions to organizations to the extent the contribution is dedicated to the development of qualifying generation or direct application facilities not otherwise supported by the rate discount, or to RD&D activities intended to benefit qualifying renewable resource generation or direct application facilities.

The list of renewable resource activities that the RTF recommends should be eligible for Bonneville's C&R Discount appears in *Appendix F*. Measures are listed in a "Table of Contents" format by general category and then again along with a more detailed description of the eligible measures and activities.

⁹ The RTF has not developed "deemed" savings estimates for all measures on this list. The RTF's recommendations regarding the protocols to use for estimating savings for non-deemed measures appear in *Appendix P* of this report entitled "*Protocols for Estimating Energy Savings for Non-Deemed Conservation Measures and Activities.*"

Research, Development and Demonstration Activities for Renewable Resources

The RTF recommends that the following categories of activities potentially qualify for the C&R Discount as research, development and demonstration activities. Qualification should be determined on a case-by-case basis using the criteria following this list of activities.

1. Assessment of the supply, location or quality of qualifying renewable resources.
2. General assessment (i.e. not in sole support of a specific project) of renewable resource development potential.
3. General preparations (i.e. not in sole support of a specific project) for the development of renewable resource areas. These efforts may include identification and resolution of technical, environmental and institutional issues potentially affecting resource development.
4. Research and development regarding technology, environmental or other issues affecting the development and operation of renewable resources. These may be undertaken at a specific project providing that the results will significantly benefit other projects.
5. Development or demonstration of new technologies with potentially significant application to the use of qualifying renewable resources.
6. Demonstration of novel applications of established technologies using qualifying renewable resources.
7. Provision of information useful for the evaluation, siting, design or operation of facilities using qualifying renewable resources.

Criteria for the Evaluation of Proposed Renewable Resource Research, Development and Demonstration Activities

Bonneville has indicated that it may request the RTF to recommend whether, and to what extent a proposed renewable resource research, development and demonstration activity should qualify for the C&R Discount. The RTF will use following criteria to evaluate proposed RD&D activities:

1. The research objectives, approach, tasks, timeline, budget and reporting of the proposed activity shall be clearly set forth in a written proposal. The proposal should also include a section addressing the criteria set forth here, as applicable.
2. The activity may be implemented by the Bonneville customer or by a separate organization funded in whole or in part by the customer.
3. The activity should have a high probability of expanding the use of qualifying renewable resources in the Northwest.
4. The activity should have a high probability of achieving one or more of the following objectives: reduced resource development or operating costs, improved technology performance (reliability, conversion efficiency, etc.), reduced environmental impact, improved project development characteristics (e.g., lead time), improved forecasts of cost, performance, development timeline or environmental impact.
5. Preferably, activities should address resources promising low or declining costs, abundant quantity, modest or beneficial environmental effects and favorable development characteristics, including short

lead time and modularity.

6. The activity should focus on resolution of problems specific to the Northwest. Emphasis should be given to addressing regional problems because it is less likely that national organizations or organizations operating outside the region will support work on these problems.
7. If feasible, the activity should be designed to achieve multiple objectives and widespread benefits.
8. While a RD&D activity may be undertaken in conjunction with the development of a specific commercial project, the cost of the activity should not include the costs of developing or operating a proven application. Commercial technologies may benefit from the C&R Discount on the basis of energy production.
9. Efforts to lower costs through increased production or mass purchase of commercial technologies are not considered to be research, development or demonstration. Commercial technologies may benefit from the C&R Discount on the basis of commercial energy production.
10. The activity should foster the development of qualifying resources in general, as distinguished from primarily supporting the development of a specific commercial project. The latter may benefit from the C&R Discount on the basis of commercial energy production. For example, assessment of the spatial extent, and general turbulence and wind shear characteristics of a wind resource area could be considered a qualifying RD&D activity, whereas studies leading to the placement of individual wind turbines are a responsibility of the commercial developer.
11. Because of the cost and risk associated with large-scale generating projects, research objectives should be addressed, unless unfeasible, by means other than development of a commercial-scale project unless there is conclusive evidence that the project will be economically viable.
12. Information resulting from the activity relating to the stated research objectives shall be made public within a reasonable period for data compilation, analysis and publication.
13. Credit is limited to RD&D costs incurred during the period of the C&R Discount.
14. Electricity production obtained as a result of a RD&D activity will not qualify for C&R Discount credits.
15. Preferably, projects should be co-funded by regional or national organizations responsible for promoting renewable resources, such as the U.S. Department of Energy. Co-funded amounts are excluded from the C&R Discount credit.

Research, Development and Demonstration Activities for Conservation Resources

The RTF recommends the following categories of activities potentially qualify for the C&R Discount as research, development and demonstration activities. Qualification should be determined on a case-by-case basis using the criteria following this list of activities.

1. Assessment of the supply or quality of qualifying measures.
2. General assessment (i.e. not in sole support of a specific project) of conservation potential.
3. Research and development regarding technology, environmental or other issues affecting the development and performance of conservation measures. These may be undertaken at a specific project providing that the results will significantly benefit other projects.
4. Development or demonstration of potentially significant new conservation measures.

5. Demonstration of novel applications of established conservation technologies.
6. Provision of information useful for the evaluation, design or operation of facilities using qualifying conservation measures.

Criteria for the Evaluation of Proposed Conservation Resource Research, Development and Demonstration Activities

Bonneville has indicated that it may request the RTF to recommend whether, and to what extent a proposed conservation research, development and demonstration activity should qualify for the C&R Discount. The RTF will use following criteria to evaluate proposed RD&D activities:

1. The research objectives, approach, tasks, timeline, budget and reporting of the proposed activity shall be clearly set forth in a written proposal. The proposal should also include a section addressing the criteria set forth here, as applicable.
2. The activity may be implemented by the Bonneville customer or by a separate organization funded in whole or in part by the customer.
3. The activity should have a high probability of expanding the use of conservation measures in the Northwest.
4. The activity should have a high probability of achieving one or more of the following objectives: reduced measure costs, improved technology performance (reliability, efficiency, etc.), reduced environmental impact, increased non-energy benefits, or improved forecasts of cost, performance, or environmental impact.
5. Preferably, activities should address conservation measures promising low or declining costs, abundant quantity, non-energy benefits and modest or beneficial environmental effects.
6. The activity should focus on resolution of problems specific to the Northwest. Emphasis should be given to addressing regional problems because it is less likely that national organizations or organizations operating outside the region will support work on these problems.
7. If feasible, the activity should be designed to achieve multiple objectives and widespread benefits.
8. While a RD&D activity may be undertaken in conjunction with the development of a specific commercial project, the cost of the activity should not include the costs of developing or operating a proven application. Commercial technologies may benefit from the C&R Discount on the basis of energy conservation benefits.
9. Efforts to lower costs through increased production or mass purchase of commercial technologies are not considered to be research, development or demonstration. Commercial technologies may benefit from the C&R Discount on the basis of energy conservation benefits.
10. The activity should foster the development of qualifying measures in general, as distinguished from primarily supporting a specific project. The latter may benefit from the C&R Discount on the basis of its energy conservation benefits. For example, assessment of the energy efficiency improvement gained from testing a new or modified industrial process in a single production line could be considered a qualifying RD & D activity. However, retrofitting the remainder of production lines in the facility would be considered a commercial application eligible for C&R Discounts based on energy savings.

11. Because of the cost and risk associated with large-scale installation of conservation measures, research objectives should be addressed, unless unfeasible, by means of smaller scale installations, unless there is conclusive evidence that a large scale installation will be economically viable.
12. Information resulting from the activity relating to the stated research objectives shall be made public within a reasonable period for data compilation, analysis and publication.
13. Credit is limited to RD&D costs incurred during the period of the C&R Discount.
14. Electricity conservation savings obtained as a result of a RD&D activity should not qualify for C&R Discount credits.
15. Preferably, projects should be co-funded by regional or national organizations responsible for promoting conservation, such as the U.S. Department of Energy or the Northwest Energy Efficiency Alliance. Co-funded amounts are excluded from the C&R Discount credit.

CONTRIBUTIONS TO ORGANIZATIONS

Unlimited

1. The RTF recommends that Bonneville customer contributions to the following organizations be categorically eligible up to the limit of its C&R Discount. These organizations were chosen because of their track record and because they offer the opportunity for others to propose conservation and renewable resource projects for funding. In general, these organizations are engaged in activities that would be eligible for the C&R Discount had an individual Bonneville customer carried them out. However, these organizations have the ability to better leverage their investments due to their regional scope and/or shared administrative systems.
 2. Bonneville Environmental Foundation for renewable resources,
 3. Northwest Energy Efficiency Alliance for market transformation; and,
 4. US Department of Energy Low-Income Weatherization "subgrantees" for low-income weatherization.

Limited

In addition to the above organizations, the RTF recommends that limited contributions to two other types of organizations be permitted.

Contributions to non-profit organizations, such as the Energy Outreach Center in Olympia and the Lane County Oregon Energy Outlet, that are engaged in activities (e.g., consumer education) that are not designed to directly result in energy efficiency improvements or the installation of renewable resources should also be eligible. Contributions to these organizations should have a maximum C&R Discount dollar limit or be limited to a maximum percent of an eligible customer's C&R Discount. The RTF believes that the size of this limit is a non-technical matter and, therefore, should be set by Bonneville in consultation with its customers.

Contributions to public agencies primarily engaged in activities to promote the use of measures, technologies and/or the adoption of practices on the RTF's list of qualifying measures and activities should be permitted up to a limit of 20 percent of a customer's C&R Discount.

Conservation Program Standards and Guidelines for Deemed Measures

In the development of the RTF's "deemed savings" estimates used the results of prior program evaluations and metering research conducted throughout the Northwest over the past 20 years. The savings estimates derived from these program evaluations and research projects are directly related to the standards and quality assurance processes embodied in these prior programs. Therefore, the RTF recommends that Bonneville accept claims for C&R Discount credits from its customers who use the "deemed savings" values only if they follow the applicable program standards and guidelines described below. These standards and guidelines should not bind those customers claiming C&R Discount credits based on the evaluation protocols recommended by the RTF.

RESIDENTIAL

WeatherWise - The RTF recommends that Bonneville accept the "deemed" savings measures claims of customers for weatherization of existing single family, multifamily and manufactured homes only on the condition that these residences have been retrofitted in compliance with the most recent WeatherWise program specifications.

Long Term Super GOOD CENTS - The RTF recommends that Bonneville accept the "deemed" savings measures claims of customers for energy efficiency upgrades to new single family and multifamily homes only on the condition that these residences have been design and constructed in compliance with the most recent Long Term *Super GOOD CENTS*® program specifications.

Northwest Energy Efficient Manufactured Housing Program (*Super GOOD CENTS*® for Manufactured Housing) - The RTF recommends that Bonneville accept the "deemed" savings measures claims of customers for energy efficiency upgrades to new manufactured homes only on the condition that these residences have been designed, constructed and certified in compliance with the most recent Northwest Energy Efficient Manufactured Housing Program and *Super GOOD CENTS*® Manufactured Housing program specifications.

Performance Tested Comfort Systems - The RTF recommends that Bonneville accept the "deemed" savings measures claims of customers for energy efficiency upgrades to the heating systems, including air distribution systems, heat pump installation and servicing and of new or existing single family and multifamily homes only on the condition that these residences have been certified under the Performance Tested Comfort Systems™ specifications. In addition, home installing or replacing air source and ground source heat pumps must meet the requirements set forth below for these systems.

Heat Pump and Central Conditioning Specifications - Air Source - The RTF recommends that Bonneville accept the "deemed" savings measures claims of customers for the installation of air source heat pumps in existing residences built prior to 1992 only on the condition that these residences have been fully retrofitted in accordance with *WeatherWise* program specifications.¹⁰ In addition, the RTF recommends that Bonneville accept the "deemed" savings measure claims of customers for the installation of air source heat pumps in residences regardless of date of construction only on the condition that such residences have had their duct systems certified under the *Performance Tested Comfort Systems*® specifications and are installed in accordance with the specifications in *Appendix H "Air Source Heat Pump Installation Specifications."*

Heat Pump Specifications - Ground/Water Source - The RTF recommends that Bonneville accept the "deemed" savings measures claims of customers for the installation of ground/water source heat pumps in existing residences built prior to 1992 only the condition that these residences have been fully retrofitted in accordance with *WeatherWise* program specifications. In addition, the RTF recommends that Bonneville

¹⁰ "Fully retrofitted" means that the house has all recommended thermal shell and air tightening measures installed.

accept the "deemed" savings measure claims of customers for the installation of ground/water source heat pumps in any residence regardless of date of construction on the condition that such residences have had their duct systems certified under the *Performance Tested Comfort Systems* \hat{O} specifications and are installed in accordance with the specifications in *Appendix I "Ground/Water Source Heat Pump Installation Specifications."*

Energy Star® Appliances & Lighting - The RTF recommends that Bonneville accept the "deemed" savings measures claims of customers for energy efficiency upgrades to new clothes washers, room air conditioners, compact fluorescent lamps and fixtures only on the condition that these appliances, lamps and fixtures comply with the minimum specifications of the national Energy Star® program.

COMMERCIAL

Energy Smart Design - The RTF recommends that Bonneville accept the "deemed" savings and evaluation protocol based estimates of savings claims of customers for energy efficiency upgrades to new or existing commercial buildings only on the condition that these building have been designed, constructed and certified in compliance with the most recent Energy Smart Design program specifications.

INDUSTRIAL

Energy Savings Plan - The RTF recommends that Bonneville accept the savings "deemed" savings and evaluation protocol based estimates of savings claims of customers for energy efficiency upgrades to new or existing industrial facilities only on the condition that these facilities have been designed, constructed and inspected in compliance with the most recent Energy Savings Plan program specifications.

IRRIGATED AGRICULTURE

WaterWise - The RTF recommends that Bonneville accept the savings "deemed" savings and evaluation protocol based estimates of savings claims of customers for energy efficiency upgrades to new or existing irrigation systems and water management only on the condition that these facilities have been designed, constructed and inspected in compliance with the most recent *WaterWise* program specifications.

Quality Control Criteria for Customer-Side Photovoltaics and Direct Application Renewable Resources

Customer-side solar photovoltaic systems - Eligible photovoltaic systems must meet the following requirements:

1. Photovoltaic modules and inverters must be certified by the California Energy Commission (CEC). The lists of CEC-certified modules and inverters are posted on the California Energy Commission website¹¹
2. The system must be installed by a licensed contractor, unless installed by the purchaser, and be installed in conformance with the system manufacturer's specifications and with applicable electrical codes and standards.
3. Photovoltaic modules must be listed by a nationally recognized testing laboratory as meeting the requirements of the Underwriters Laboratory Standard 1703. Inverters must be listed by a nationally recognized testing laboratory for safe operation. Further, all grid-connected inverter-based systems must meet the Institute of Electrical and Electronic Engineers Standard 929-2000. In the absence of a

¹¹ Certified modules are posted at http://www.energy.ca.gov/greengrid/certified_pv_modules.html. Certified Inverters are posted at http://www.energy.ca.gov/greengrid/certified_inverters.

recognized testing standard, manufacturers of concentrator photovoltaic systems must provide acceptable evidence of one year of reliable operation of that model of equipment.

4. Photovoltaic systems credited under the C&RD program must have a minimum full five-year warranty to the purchaser against breakdown or degradation of output. The warranty must cover all of the components of the generating system against breakdown or degradation in electrical output of more than ten percent from their originally rated electrical output in the first five years. The warranty shall cover the full cost of repair or replacement of defective components or systems. Where the system is professionally assembled and installed, the warranty shall also include the labor to remove and reinstall defective components or systems.

Solar Domestic Water Heaters - Eligible solar domestic water heating systems must be designed, installed and inspected in accordance with the most recent version of the Eugene Water and Electric Board's (EWEB) "*Solar Water Heater Program - General and Technical Specifications*." These program specifications are available for use by utilities under licensing agreement with EWEB.

Process for Resolving Differences and Modifying the Qualifying Measures and Activities List

The RTF believes that due to a wide variety of factors (e.g., unique local climatic conditions, changes in technology or costs, local codes or standards) parties may wish to propose modifications to its recommendations and findings. Such proposals for change might include a desire to add new measures to the RTF's list, or a request for modification of an evaluation protocol or the assumptions used for calculating a measure's savings or regional value. The RTF will consider proposals from entities eligible for the C&R Discount, or proposals from other parties if they have a C&R Discount eligible entity as a co-sponsor. This following describes the process the RTF has adopted to bring such issues to it for consideration.

Initiation of Process - Parties may initiate the process by contacting the chair of the RTF either in writing or via electronic mail. The party making the proposal should explain the change proposed. If a new measure is being proposed, the proposal should cite the RTF criteria under which the measure qualifies for inclusion in the RTF's list. If a change in evaluation methodology is being proposed, the proposal should include the rationale for the change. For example, in the case of a proposed change in protocol, the proposal should explain why the change would improve the analytical quality of the protocol. In the case of a proposed changed assumption, the proposal should present evidence that the changed assumption more closely reflects the real world. A standard form will be made available which will set forth the minimum level of information needed to file the proposal.

Response - The Council staff assigned to support the RTF will first assess the completeness of the proposal. If the proposal includes all the necessary information, the staff will assess the validity of supporting arguments and evidence, and make a recommendation to the RTF as to its acceptance or rejection. RTF members will receive copies of all information provided by the appealing party in support of their proposal.

If the staff assessment is that the proposal should be accepted, or that the proposal is sufficient to merit more discussion by the RTF, the proposal will be put on the agenda for discussion at the next RTF meeting. If the staff assessment is that the proposal has no merit, the staff will assign the proposal to a consent agenda for rejection. If any RTF member disagrees with the assignment, it will be moved from the consent agenda to a place on the discussion agenda.

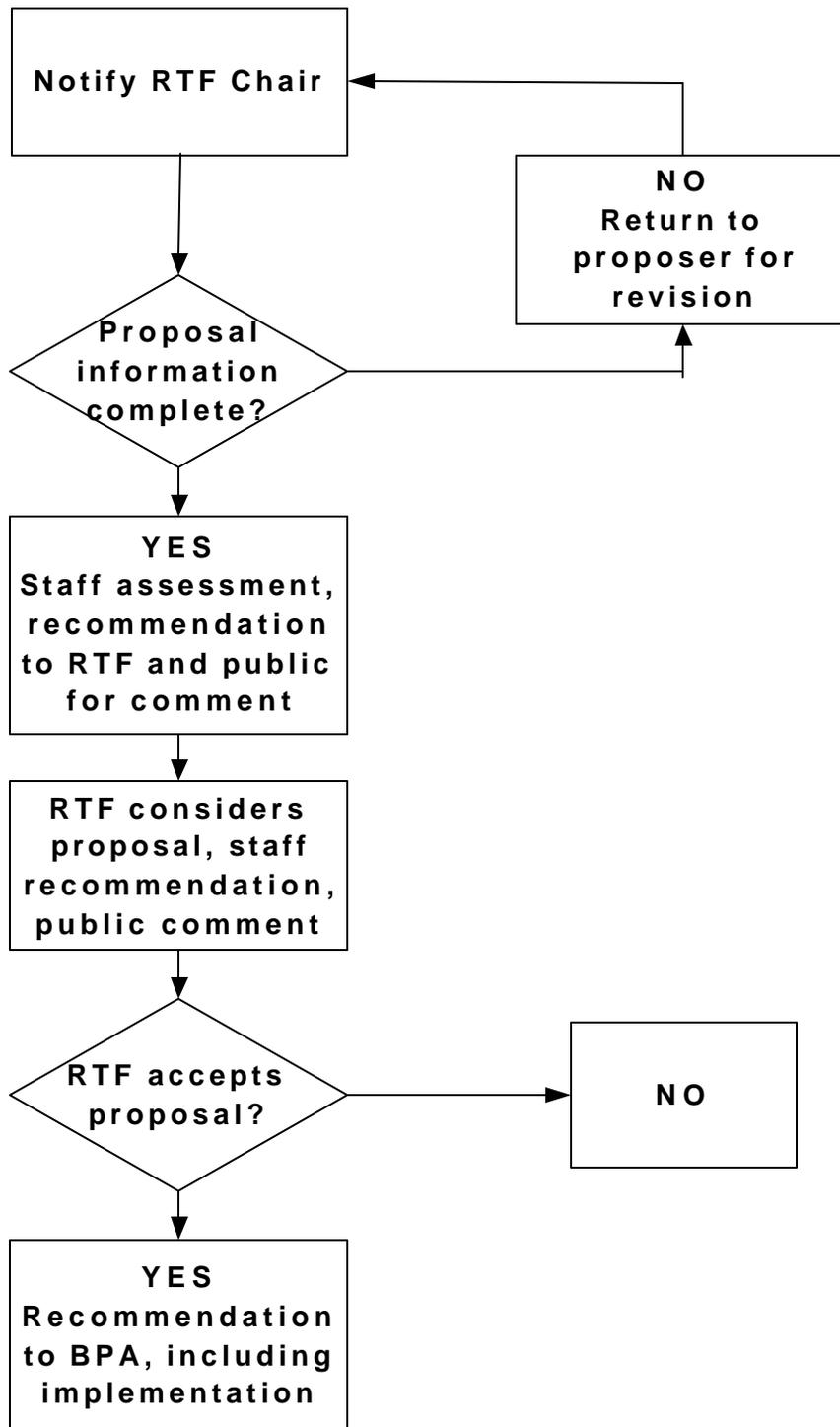
The RTF anticipates that it will normally be able to make decisions on most proposals within 90 days of receiving them, though complex issues could take longer and some circumstances (e.g. health and safety) could warrant more immediate action. Notice of pending actions on matters being appealed will be provided on the RTF's meeting announcements and agendas. Figure 1 below depicts the flow of a proposal through the RTF's process.

The RTF will consider the proposal, staff's assessment and recommendation, and any public comment and accept or reject the proposal. Acceptance or rejection will require a 60 percent vote by the RTF. The party

making the proposal may make a presentation directly to the RTF and may contact individual RTF members prior to the meeting. Members are obligated to disclose such contacts when the proposal is being considered.

Transmittal of Recommendation to Bonneville - Successful proposals will be submitted in writing to the Bonneville as RTF recommendations, including recommendations as to how any changes should be implemented. These changes could cover a wide range: for example, additions to the list of "deemed" savings measures, changes to assumptions affecting the calculation of measures benefits, acceptance of a proposed project as a research, development and demonstration project, changes to a protocol for verifying savings from an industrial process change, and others.

Figure 1 - Process Flowchart



Value of Conservation Savings and Renewable Resource Net Energy Production to the Region's Bulk Power System and Resource Cost - Effectiveness

Bonneville specifically requested that the RTF provide an estimate of the value of the energy savings or renewable resources net production to the regional power system. However, Bonneville did not request that the RTF assess the cost-effectiveness of those conservation measures and renewable resources it recommends as eligible for C&R Discount credits. In part this was due to the fact that the determination of "cost-effectiveness" is often more complex than comparing the cost of conservation or renewable resources to the cost of additional power supplies.

The RTF recognized that conservation measures or renewable resources might produce other benefits that alter their economics significantly. For example, conservation or distributed renewable resource systems might defer the need for distribution system upgrades. Similarly, a consumer purchasing a new resource-efficient clothes washer saves water and detergent costs in addition to electricity cost savings. The RTF believes that Bonneville's customers and the region's consumers should have access to information that will assist them in making more economically-rational energy decisions. Therefore, the RTF expanded its analysis to include the additional benefits and costs beyond those needed to determine the value of conservation and renewable resources to the region's bulk power system.

In addition to the "regional power system" perspective, the RTF also attempted to capture the benefits and costs associated with conservation and renewable resources from the local distribution utility's system perspective and from the perspective of society as a whole. This meant that other factors, beyond those specifically identified by Bonneville, had to be taken into account in the RTF's valuation and cost-effectiveness methodology.

The following section describes the methodology and major assumptions the RTF used to develop its estimates of value of conservation and renewable resources from three perspectives. The first is the region's bulk power system. This encompasses the costs and benefits associated with reductions in need for wholesale power supply purchases and wholesale transmission and distribution system expansion. The second perspective is that of the value of these resources to local utility distribution systems. This perspective includes those costs and benefits associated with local "wires and poles." Finally, the third perspective is that of society as a whole. This perspective includes all power system costs and benefits, as well as non-power system costs and benefits.

METHODOLOGY

In order to estimate the value of the energy savings or renewable resources net electricity production to the regional power system the RTF first identified the major parameters that impact this value. In addition to the four factors Bonneville specified (i.e., measure life, shape of the savings, bulk power system transmission system benefits and the avoided cost of new electricity supplies) the RTF identified thirteen other parameters that are either required or need to be taken into account when all three perspectives described above are considered. These include the following:

1. ***Capital Costs*** - The incremental capital cost of conservation and renewable resources. In the case of conservation this is the difference between the cost of the energy efficient technology or practice compared to the technology or practice that is currently in place or would have been used. In the case of renewable resources it is the initial cost of the new project or incremental cost of an upgrade.
2. ***Incremental Operation and Maintenance Costs*** - The incremental cost of operating and maintaining conservation and renewable resources. In the case of conservation this is the difference between the operating and maintenance cost of the energy efficient technology or practice compared to the

technology or practice that is currently in place or would have been used. In the case of renewable resources it is the cost of operating and maintaining the project.

3. ***Periodic Capital Replacement Costs and Schedule*** - Some equipment may require component replacements in order to maintain their efficiency or service life. For example, heat pumps and central air conditioners may require a new compressor at some point during their normal lifespan. Similarly, a photovoltaic system usually requires battery replacements during its normal lifespan.
4. ***Discount Rate*** - The time value of money cost and savings associated with investments.
5. ***Finance Rate*** - The cost of capital borrowed to pay for an investment.
6. ***Amortization Period*** - The length of time over which the borrowed capital is to be repaid.
7. ***Local Distribution System Load Factors*** - This is the ratio of the average energy use per hour to the peak energy use per hour of individual or groups of end uses of electricity. End uses that have low load factors (e.g. air conditioning) require larger capital investments in distribution systems per unit of energy sold, because these end uses only operate during short periods of the year compared to end uses that have high load factors (e.g., refrigerators) which operate all year long.
8. ***Local Distribution System Capacity Costs*** - The capital investments in local utility transmission and distribution systems needed to accommodate load growth and maintain system reliability.
9. ***Bulk Power Transmission System Coincident Factors*** - This is the ratio of the peak demand of individual or groups of end uses of electricity at the regional bulk power transmission system's time of peak demand to the end use's non-coincident peak demand. The Northwest's bulk power transmission system's peak usage occurs during the winter. Conservation measures and renewable resources that reduce demand on the bulk power transmission system during its time of maximum demand (e.g. space heating conservation savings) provide greater transmission savings than those that reduce demand during the summer (e.g. air conditioning conservation savings).
10. ***Bulk Power Transmission System Capacity Costs*** - The cost of capital investments in regional bulk power system transmission and distribution systems needed to accommodate load growth and maintain system reliability.
11. ***Power System Benefits of Reduced Water Diversion*** - Several of the conservation measures included on the RTF's recommended list of eligible measures result in reduced irrigation water use. If these actions result in decrease water diversions from the Northwest's hydroelectric system then this system can produce additional electricity. The RTF developed estimates of the amount of additional generation that could result from reduced irrigation water diversions at various locations in the region. The approach and results of this analysis are described in *Appendix G - Value of Diverted Water in the Columbia River Basin*.
12. ***Non-Power System Benefits (or Costs) of Conservation and Renewable Resources*** - In some cases conservation measures and renewable resources may provide non-power system benefits or produce non-power system costs. For example, more energy-efficient clothes washers and dishwashers save significant amounts of water as well as electricity.
13. ***Environmental Externalities*** - The Bonneville Administrator is required to estimate all direct costs of a resource or measure over its effective life when determining whether a resource or measure is cost-effective. Quantifiable environmental costs and benefits are among the direct costs of a resource or measure. The Northwest Power Act requires the Council to include "a methodology for determining quantifiable environmental costs and benefits" in the Council's Northwest Conservation

and Electric Power Plan. The Council's Plan contains a methodology to be used by the Administrator to quantify all environmental costs and benefits directly attributable to a measure or resource.¹² The RTF believes that carbon dioxide production is the primary environmental externality produced by electric power generation that has yet to be internalized in wholesale power prices.¹³

ANALYTICAL PROCESS

The RTF developed a modified version of the Council's PROCOST model for analyzing the regional cost-effectiveness of alternative conservation and renewable resources. The PROCOST model was developed to provide a method to characterize the costs and benefits of conservation program savings, "customer-side-of-the-meter" generating renewable resources and direct application renewable resources so that they can be compared on an equal footing to other energy generating resource options. The model was originally intended to take a full "life-cycle" view of the program from both the bulk power systems perspective and from a *societal* perspective. The model was modified to incorporate the local distribution system perspective. This required the addition to the model of the distribution system "load factor" impacts of conservation and "customer-side" generating and direct application renewable resources and the capital cost of deferred distribution system upgrades.

The PROCOST model quantifies all costs to society including first costs, operating costs, and periodic maintenance and replacement costs and costs on the transmission and distribution system. The model also incorporates all of the benefits to society that can be quantified including avoided energy and capacity resources, avoided transmission and distribution system losses, and non-energy benefits such water savings, as well as environmental externalities and the regional conservation credit.

Appendix J contains a detailed description of the PROCOST model, its input assumption requirements and calculation process. Short descriptions of the major assumptions used in PROCOST by the RTF to estimate the value of conservation, "customer-side" generating renewable resources and direct application renewable resources to the regional bulk power and local distribution systems and to society as a whole appears below.

Discount and Finance Rates and Amortization Life - The RTF used a real discount rate and real finance rate of 4.75%. All capital costs were amortized over 15 years. These assumptions are consistent with those used in the Council's Fourth Northwest Conservation and Electric Power Plan. The 15-year amortization life was selected to match the anticipated financing life of new "merchant plant" generating facilities. The RTF intends to review these values in the future.

Measure Life - The RTF used the useful life for each conservation measure for which it developed a "deemed savings" estimate. The assumptions and sources used are shown in Table 1 below.

¹² Fourth Northwest Conservation and Electric Power Plan, Appendix I -- Environmental Cost Methodology. Northwest Power Planning Council, Document 99-22.

¹³ The RTF considers the cost of other emissions, such as sulfur dioxide and nitrous oxide, to be internalized in the cost of power because there are overall limits on the emission of these pollutants.

Table 1 - Useful Life of Conservation and Renewable Resource Measures Used to Develop the RTF's Deemed Savings Estimates

| SECTOR/MEASURE | LIFE (YRS) | SOURCE |
|--|------------|----------------------|
| Residential | | |
| New Construction Building Shell Measures - Site Built | 70 | Council Plan |
| New Construction Building Shell Measures - Manufactured Housing | 45 | Council Plan |
| Existing Construction, Site Built Building Shell Measures | 45 | Council Plan |
| Existing Construction, Manufactured Home Building Shell Measures | 25 | WeatherWise |
| Air Source Heat Pump | 18 | US DOE ¹⁴ |
| Air Source Heat Pump Compressor | 14 | US DOE |
| Ground/Geothermal Source Heat Pump | 30 | GHPC ¹⁵ |
| Ground/Geothermal Source Heat Pump Compressor | 20 | GHPC |
| Central Air Conditioner | 18 | US DOE |
| Central Air Conditioner Compressor | 14 | US DOE |
| Window Air Conditioner | 9 | US DOE |
| Domestic Hot Water Heater | 12 | US DOE |
| Heat Pump Hot Water Heater | 15 | US DOE |
| Clothes Washer | 14 | US DOE |
| Dishwasher | 9 | US DOE |
| Bi-Radiant Oven | 20 | US DOE |
| Refrigerator | 19 | US DOE |
| Freezer | 22 | US DOE |
| Compact Fluorescent Lamps - Interior | 10,000 hrs | RTF |
| Compact Fluorescent Lamps - Exterior | 8,000 hrs | RTF |
| Compact Fluorescent Fixtures | 15 | RTF |
| Commercial | | |
| New Construction - Building Shell | 30 | Council Plan |
| New and Retrofit HVAC Systems & Controls | 15 | Council Plan |
| New Lighting Fixtures | 20 | Council Plan |
| Retrofit Lamps & Ballasts | 12 | Council Plan |
| Electronic Ballasts and Retrofit Fixtures | 15 | Council Plan |
| Industrial | | |
| Motors | 15 | Council Plan |
| Irrigated Agriculture | | |
| Irrigation Scheduling/Water Management | 1 | WaterWise |
| Low Pressure Nozzles | 5 | WaterWise |
| Pumps and Pump Repairs | 10 | WaterWise |
| Drop Tubes | 10 | WaterWise |
| Steel Pipe & Fittings | 15 | WaterWise |
| Mortar Lining (Installed to AWWA Specifications) | 15 | WaterWise |
| PVC Pipe (Installed to AWWA Specifications) | 15 | WaterWise |
| Renewable Resources | | |
| Solar Photovoltaic Systems | 20 | RTF |
| Solar Domestic Hot Water Systems | 20 | RTF |

¹⁴ All references to "USDOE" are to US Department of Energy, Technical Support Documents for the applicable appliance or equipment developed for standards rulemaking

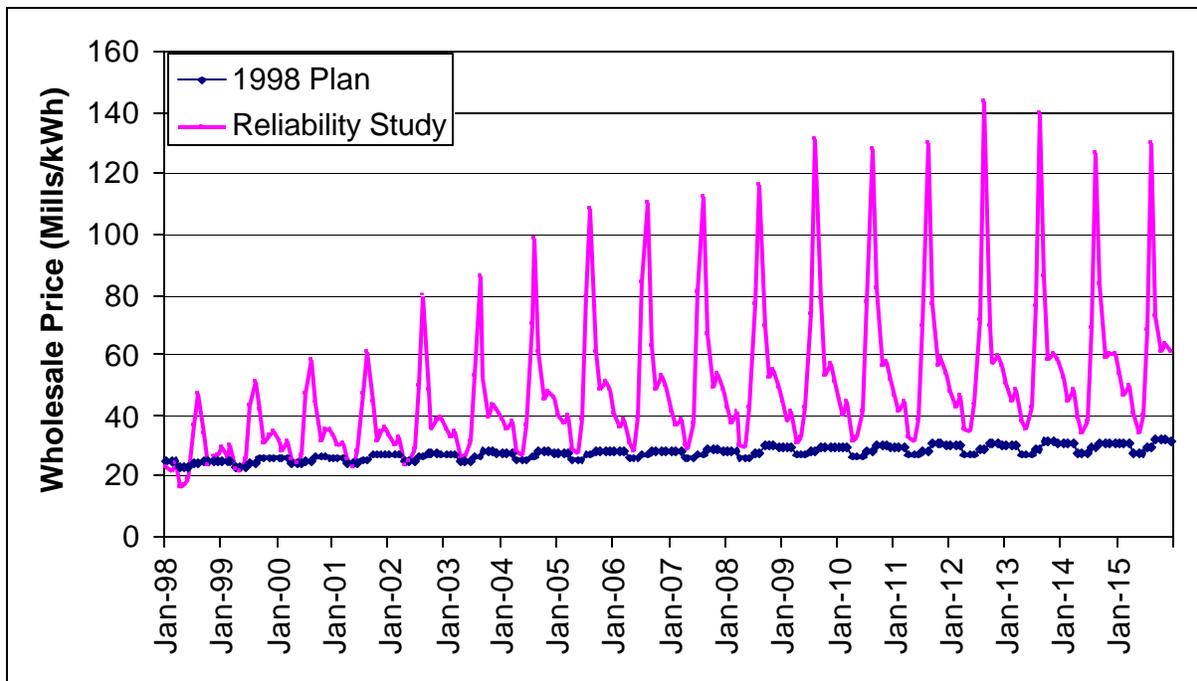
¹⁵ Ground Source Heat Pump Consortium

Avoided Cost of Future Electricity Supply - The RTF used the Council's forecast of future wholesale prices for electricity developed for its "Northwest Power Supply Adequacy/Reliability Study - Phase 1 Report."¹⁶ The detailed assumptions underlying the development of this forecast are described in "Appendix A - Data Assumptions Used for the Resource Development Forecast" of the Council's report. Figures 2 and 3 compare the Council's more recent forecast of avoided cost with the forecast in the Fourth Northwest Conservation and Power Plan for "On-peak" and "Off-Peak" wholesale electricity prices at the Mid-Columbia trading hub. Values shown in Figures 2 and 3 are in 1997 dollars.

As can be seen from Figures 2 and 3, in the more recent forecast future wholesale power prices exhibits significantly more daily and monthly variation than the forecast used in the development of the Council's Fourth Plan. In addition to being significantly more volatile, the Council's more recent forecast also anticipates that overall wholesale power prices for new electricity supplies will be more expensive than its prior estimates. The RTF analysis revealed that the Council's more recent forecast of future wholesale power prices increases the average value of conservation and renewable resources by about 35 to 40 percent above their values derived using the Plan's forecast of future prices. Because of the increasing influence of California and southwestern air conditioning loads on Northwest prices, the increases are even more dramatic for conservation measures and renewable resources that produce the majority of their savings/output during the summer and early fall time periods.

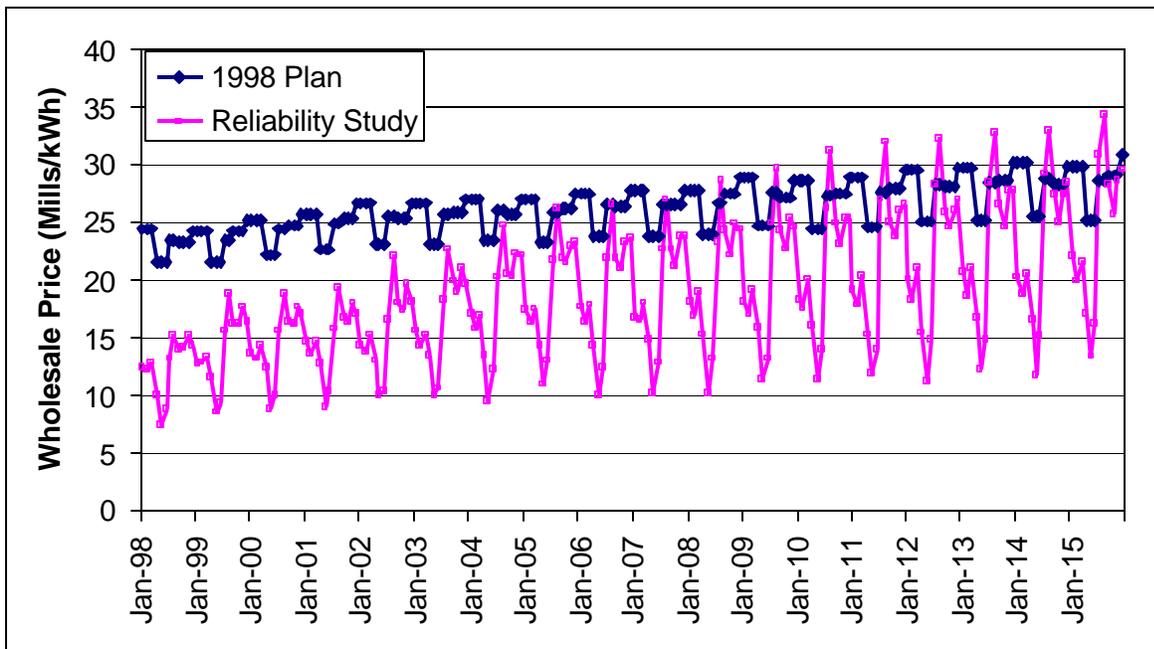
The RTF is aware of recent volatility in wholesale electricity prices and increases in the future cost of natural gas. It will revisit the avoided cost forecast it used for estimating the value to the bulk power system of conservation energy savings and the net energy production of customer-side renewable resources should conditions warrant.

Figure 2 - Forecast of On Peak Wholesale Power Prices 1998 - 2015 at Mid-Columbia Point of Delivery



¹⁶ Northwest Power Planning Council. Northwest Power Supply Adequacy/Reliability Study - Phase 1 Report. Document 2000-4. March 6, 2000.

Figure 3 - Forecast of Off-Peak Wholesale Power Prices 1998 - 2015 at Mid-Columbia Point of Delivery



Bulk Transmission System Capacity Benefits (Value) - The RTF did not have access to information that would enable it to establish a quantitative estimate of the bulk transmission system capacity benefits of conservation and distributed renewable resource generation that reflects potential transmission constraints in different location across the region. However, the RTF believes that most conservation and distributed renewable generation resources have economic value due to their ability to defer transmission capacity upgrades and improve transmission system efficiency. Therefore, the RTF used a "placeholder" value of \$3 per kW-year as the average regional bulk power transmission system benefit of conservation and distributed renewable resource generation. It was also assumed that this is proportional to the conservation measures savings or the renewable resource's net energy production during peak load hours in January. The RTF recommends that Bonneville's Transmission Business Line develop information on what the appropriate values for bulk transmission system capacity benefits from conservation and distributed renewable resources are and make those available for use.

Shape of Savings/Net Energy Production - As can be seen from Figures 2 and 3 the value of energy savings and the net energy production of renewable resources varies significantly both over the course of the day and during the year. The RTF used estimates of the shape of the conservation savings that were developed from submetering data collected during Bonneville's End Use Load and Consumer Assessment Project (ELCAP). Each end use's annual consumption was allocated to four time periods (or load segments) per day for each of the twelve months of the year. The present value regional benefit of energy savings or distributed electricity production during each of these load segments was computed by comparing the avoided cost of electricity supply during these same times of the day and year.

Appendix K describes in more detail how the RTF used the shape of conservation measure savings and net energy production from renewable resources to develop its estimates of regional bulk power system value.

Value of Conservation Savings and Renewable Resource Net Energy Production to the Region's Bulk Power System

Table 2 provides a summary of the RTF's estimate of the present value benefit to the region's bulk power system of conservation savings and the net energy production of customer-side renewable resources with

varying load shapes and lifetimes. The values in Table 2 include the 10% conservation credit in the Act (except for customer-side renewable resources), the benefits of avoided future power supply purchases and reflect the bulk transmission and sub-transmission savings of \$3.00 per kilowatt-year of capacity. The effect of environmental externalities is excluded from the values in Table 2. All values are stated in terms of year 2000 present value dollars per kilowatt-hour of first year savings or net electricity production. No values are shown for lifetimes significantly beyond the expected life of the applicable measure (e.g. water heaters are only expected to last 10 to 12 years and therefore no values are given beyond 15 years for this measure).

The bulk power system value of a particular conservation measure or renewable resource's net energy production can be derived by multiplying its first year savings or output times the value in Table 2 that matches its end use and measure life. For example, a Heat Pump installed Climate Zone 1 with a measure life of 15 years that saves 5,000 kilowatt-hours annually would have a present value bulk power system benefit of \$1,750 (5,000 kWh/year x \$0.35/kWh).

Table 2 - Present Value Benefit of Conservation Savings and Renewable Resource Net Energy Production to the Region's Bulk Power System, Without Environmental Externalities

| MEASURE LIFE (YEARS) | 5 | 10 | 15 | 20 | 30 | 40 | 50 | 60 | 70 |
|----------------------------------|--|---------|---------|---------|---------|---------|---------|---------|---------|
| Sector/End Use | Present Value Benefit in year 2000 dollars (\$/kWh) | | | | | | | | |
| Residential | | | | | | | | | |
| Cooking | \$ 0.15 | \$ 0.28 | \$ 0.39 | \$ 0.47 | | | | | |
| Clothes Dryers | \$ 0.15 | \$ 0.27 | \$ 0.37 | | | | | | |
| Clothes Washers | \$ 0.15 | \$ 0.27 | \$ 0.37 | | | | | | |
| Refrigerators | \$ 0.13 | \$ 0.24 | \$ 0.33 | \$ 0.40 | | | | | |
| Freezers | \$ 0.13 | \$ 0.25 | \$ 0.34 | \$ 0.41 | \$ 0.51 | | | | |
| Lighting | \$ 0.13 | \$ 0.25 | \$ 0.34 | | | | | | |
| Water Heating | \$ 0.14 | \$ 0.26 | \$ 0.35 | | | | | | |
| Heat Pump Zone 1 | \$ 0.14 | \$ 0.26 | \$ 0.35 | \$ 0.43 | | | | | |
| Heat Pump Zone 2 | \$ 0.14 | \$ 0.25 | \$ 0.34 | \$ 0.42 | | | | | |
| Heat Pump Zone 3 | \$ 0.14 | \$ 0.25 | \$ 0.34 | \$ 0.42 | | | | | |
| Forced Air Furnace Zone 1 | \$ 0.13 | \$ 0.24 | \$ 0.32 | \$ 0.39 | \$ 0.49 | | | | |
| Forced Air Furnace Zone 2 | \$ 0.13 | \$ 0.24 | \$ 0.33 | \$ 0.40 | \$ 0.50 | | | | |
| Forced Air Furnace Zone 3 | \$ 0.14 | \$ 0.25 | \$ 0.35 | \$ 0.42 | \$ 0.53 | | | | |
| Baseboard - All Zones | \$ 0.13 | \$ 0.23 | \$ 0.32 | \$ 0.39 | \$ 0.48 | | | | |
| Space Heating - Retrofit | \$ 0.13 | \$ 0.24 | \$ 0.33 | \$ 0.40 | \$ 0.49 | \$ 0.56 | \$ 0.59 | | |
| Space Heating - New Construction | \$ 0.13 | \$ 0.24 | \$ 0.32 | \$ 0.39 | \$ 0.49 | \$ 0.55 | \$ 0.58 | \$ 0.61 | \$ 0.62 |
| Window Air Conditioning | \$ 0.20 | \$ 0.39 | | | | | | | |
| Central Air Conditioning- Zone 1 | \$ 0.15 | \$ 0.29 | \$ 0.39 | \$ 0.47 | | | | | |
| Central Air Conditioning- Zone 2 | \$ 0.16 | \$ 0.30 | \$ 0.41 | \$ 0.49 | | | | | |
| Central Air Conditioning- Zone 3 | \$ 0.19 | \$ 0.38 | \$ 0.51 | \$ 0.62 | | | | | |
| Residential Other | \$ 0.13 | \$ 0.25 | \$ 0.34 | \$ 0.41 | | | | | |
| Commercial | | | | | | | | | |
| Lighting | \$ 0.13 | \$ 0.25 | \$ 0.34 | \$ 0.41 | | | | | |
| Retrofit - Shell Measures | \$ 0.14 | \$ 0.27 | \$ 0.37 | \$ 0.44 | \$ 0.55 | | | | |
| New Construction- Shell Measures | \$ 0.14 | \$ 0.26 | \$ 0.36 | \$ 0.43 | \$ 0.54 | | | | |
| Industrial | | | | | | | | | |
| Food Processing | \$ 0.14 | \$ 0.26 | \$ 0.35 | | | | | | |
| Lumber & Wood Products | \$ 0.14 | \$ 0.25 | \$ 0.35 | | | | | | |
| Primary Aluminum Smelting | \$ 0.13 | \$ 0.24 | \$ 0.33 | | | | | | |
| Pulp & Paper | \$ 0.13 | \$ 0.24 | \$ 0.33 | | | | | | |
| Irrigated Agriculture | \$ 0.14 | \$ 0.26 | \$ 0.36 | | | | | | |
| Renewable Resources | | | | | | | | | |
| Solar Domestic Hot Water Heating | \$0.12 | \$0.23 | \$0.31 | \$0.38 | | | | | |
| Customer Side Solar Photovoltaic | \$ 0.15 | \$ 0.29 | \$ 0.40 | \$0.48 | | | | | |

Local Distribution System Benefits and Costs

Conservation and distributed renewable resources can defer or reduce the need for capital investments in local utility transmission and distribution systems. The RTF recommends that individual utilities include the

present value of deferred or reduced investments in their transmission and distribution systems when analyzing the economic benefits of conservation and distributed renewable resources. The RTF recognizes that potential transmission and distribution systems cost savings are highly dependent upon the local conditions. However, the RTF obtained data from the Oregon Public Utilities Commission to develop a "default" estimate of avoided transmission and distribution costs. Table 3 presents data collected from PacifiCorp and Portland General Electric (PGE) based on their filings in Oregon. Information from Snohomish County Public Utility District (Snohomish PUD) on distribution system costs only are also included in this table.

Table 3 - Utility Specific Avoided Costs for Transmission and Distribution

| COMPANY | TRANSMISSION | DISTRIBUTION | TOTAL |
|----------------|---------------------|---------------------|---------------|
| PacifiCorp | \$21.40/kW-yr | \$57.59/kW-yr | \$78.99/kW-yr |
| PGE | \$7.18/kW-yr | \$15.40/kW-yr | \$22.58/kW-yr |
| Snohomish PUD | (N/A) | \$9.50/kW-yr | (N/A) |

From the information collected, the RTF chose as its "default" assumption a value of \$20/kW-yr as the avoided cost of local utility transmission and distribution avoided cost. This present value of avoiding these investments is included as part of the local distribution system benefits of conservation and distributed renewable resources.

Estimating the distribution system benefit of conservation and distributed renewable resources requires knowledge of the shape of the conservation savings or renewable resource's output, both daily and seasonally. The ELCAP data, along with information collected from other end use metering projects (e.g., Bonneville's Residential Construction Demonstration Program) and from utility sub-station metering was used to derive the annual load factor for those end uses affected by conservation or distributed renewable resources.¹⁷ Table 4 shows the annual load factor used by the RTF to establish the local distribution system benefits of conservation savings and renewable resources net energy production. Table 4 also shows the bulk power system coincident factors used to estimate bulk transmission and distribution system benefits.

¹⁷ The RTF is seeking additional information on end-use load factors for solar water heating and other distributed renewable resources.

Table 4 - Annual Distribution System Load Factors and Bulk Power System Coincident Factors for End Uses Impacted by Conservation and Distributed Renewable Resources

| SECTOR/END USE | LOAD FACTOR | COINCIDENT FACTOR |
|----------------------------------|-------------|-------------------|
| Residential | | |
| Cooking | 0.12 | 0.03 |
| Clothes Dryers | 0.24 | 0.03 |
| Clothes Washers | 0.22 | 0.03 |
| Refrigerators | 0.66 | 0.27 |
| Freezers | 0.49 | 0.19 |
| Lighting | 0.40 | 0.28 |
| Water Heating | 0.29 | 0.32 |
| Heat Pump Zone 1 | 0.16 | 0.36 |
| Heat Pump Zone 2 | 0.16 | 0.36 |
| Heat Pump Zone 3 | 0.16 | 0.36 |
| Forced Air Furnace Zone 1 | 0.19 | 0.37 |
| Forced Air Furnace Zone 2 | 0.19 | 0.37 |
| Forced Air Furnace Zone 3 | 0.19 | 0.37 |
| Baseboard - All Zones | 0.24 | 0.47 |
| Space Heating - Retrofit | 0.21 | 0.40 |
| Space Heating - New Construction | 0.18 | 0.37 |
| Window Air Conditioning | 0.17 | 0.00 |
| Central Air Conditioning- Zone 1 | 0.17 | 0.00 |
| Central Air Conditioning- Zone 2 | 0.17 | 0.00 |
| Central Air Conditioning- Zone 3 | 0.17 | 0.00 |
| Residential Other | 0.45 | 0.20 |
| Commercial | | |
| Commercial Lighting | 0.54 | 0.36 |
| Commercial - Retrofit | 0.48 | 0.46 |
| Commercial - New | 0.51 | 0.49 |
| Industrial | | |
| Food Processing | 0.48 | 0.25 |
| Lumber & Wood Products | 0.60 | 0.56 |
| Pulp & Paper | 0.54 | 0.33 |
| Primary Aluminum Smelting | 0.57 | 0.37 |
| Irrigated Agriculture | 0.30 | 0.00 |

| Distributed Renewable Resources | | | |
|--|-------|-------|--|
| Photovoltaics - winter-peaking load area | | | |
| Solar Zone 3 | 18.27 | 0.002 | |
| Solar Zone 4 | 12.66 | 0.002 | |
| Solar Zone 5 | 10.00 | 0.002 | |
| Solar Zone 6 | 8.26 | 0.002 | |
| Solar Zone 7 | 6.83 | 0.002 | |
| Photovoltaics - summer-peaking load area | | | |
| Solar Zone 3 | 4.70 | 0.002 | |
| Solar Zone 4 | 4.49 | 0.002 | |
| Solar Zone 5 | 4.15 | 0.002 | |
| Solar Zone 6 | 4.07 | 0.002 | |
| Solar Zone 7 | 4.19 | 0.002 | |

Table 5 shows the present value local transmission system benefit per kilowatt-hour of conservation savings and renewable resource net energy production for the end uses and load factors shown in Table 4 for measure lifetimes between 5 and 70 years, assuming \$20/kW-year as the avoided cost of local utility transmission and distribution system capacity.

Table 5 - Present Value of Local Distribution Capacity Cost Deferrals from Conservation Savings and Customer-Side Renewable Resource Net Energy Production

| MEASURE LIFE (YEARS) | 5 | 10 | 15 | 20 | 30 | 40 | 50 | 60 | 70 |
|----------------------------------|--|---------|---------|---------|---------|---------|---------|---------|---------|
| Sector/End Use | Present Value Benefit (year 2000\$/kWh) | | | | | | | | |
| Residential | | | | | | | | | |
| Cooking | \$ 0.09 | \$ 0.16 | \$ 0.22 | \$ 0.27 | | | | | |
| Clothes Dryers | \$ 0.05 | \$ 0.09 | \$ 0.12 | | | | | | |
| Clothes Washers | \$ 0.05 | \$ 0.08 | \$ 0.11 | | | | | | |
| Refrigerators | \$ 0.02 | \$ 0.03 | \$ 0.04 | \$ 0.05 | | | | | |
| Freezers | \$ 0.02 | \$ 0.04 | \$ 0.05 | \$ 0.06 | | | | | |
| Lighting | \$ 0.03 | \$ 0.05 | \$ 0.06 | | | | | | |
| Water Heating | \$ 0.04 | \$ 0.07 | \$ 0.09 | | | | | | |
| Heat Pump Zone 1 | \$ 0.07 | \$ 0.12 | \$ 0.16 | \$ 0.20 | | | | | |
| Heat Pump Zone 2 | \$ 0.07 | \$ 0.12 | \$ 0.16 | \$ 0.20 | | | | | |
| Heat Pump Zone 3 | \$ 0.07 | \$ 0.12 | \$ 0.16 | \$ 0.20 | | | | | |
| Forced Air Furnace Zone 1 | \$ 0.06 | \$ 0.10 | \$ 0.13 | \$ 0.16 | \$ 0.20 | | | | |
| Forced Air Furnace Zone 2 | \$ 0.06 | \$ 0.10 | \$ 0.13 | \$ 0.16 | \$ 0.20 | | | | |
| Forced Air Furnace Zone 3 | \$ 0.06 | \$ 0.10 | \$ 0.13 | \$ 0.16 | \$ 0.20 | | | | |
| Baseboard - All Zones | \$ 0.05 | \$ 0.08 | \$ 0.11 | \$ 0.13 | \$ 0.16 | | | | |
| Space Heating - Retrofit | \$ 0.05 | \$ 0.09 | \$ 0.12 | \$ 0.15 | \$ 0.19 | \$ 0.21 | \$ 0.22 | | |
| Space Heating - New Construction | \$ 0.06 | \$ 0.11 | \$ 0.15 | \$ 0.18 | \$ 0.22 | \$ 0.25 | \$ 0.26 | \$ 0.27 | \$ 0.28 |
| Window Air Conditioning | \$ 0.06 | \$ 0.11 | | | | | | | |
| Central Air Conditioning- Zone 1 | \$ 0.06 | \$ 0.11 | \$ 0.15 | \$ 0.18 | | | | | |
| Central Air Conditioning- Zone 2 | \$ 0.06 | \$ 0.11 | \$ 0.15 | \$ 0.18 | | | | | |
| Central Air Conditioning- Zone 3 | \$ 0.06 | \$ 0.11 | \$ 0.15 | \$ 0.18 | | | | | |

| | | | | | | | | | |
|-------------------------------------|----------|----------|----------|----------|---------|--|--|--|--|
| Residential Other | \$ 0.02 | \$ 0.04 | \$ 0.06 | \$ 0.07 | | | | | |
| Commercial | | | | | | | | | |
| Lighting | \$ 0.02 | \$ 0.04 | \$ 0.05 | | | | | | |
| Retrofit - Shell Measures | \$ 0.02 | \$ 0.04 | \$ 0.05 | \$ 0.07 | \$ 0.08 | | | | |
| New Construction - Shell Measures | \$ 0.02 | \$ 0.04 | \$ 0.05 | \$ 0.06 | \$ 0.08 | | | | |
| Industrial | | | | | | | | | |
| Food Processing | \$ 0.02 | \$ 0.04 | \$ 0.05 | | | | | | |
| Lumber & Wood Products | \$ 0.02 | \$ 0.03 | \$ 0.04 | | | | | | |
| Primary Aluminum Smelting | \$ 0.02 | \$ 0.04 | \$ 0.05 | | | | | | |
| Pulp & Paper | \$ 0.02 | \$ 0.03 | \$ 0.05 | | | | | | |
| Irrigated Agriculture | \$ 0.04 | \$ 0.06 | \$ 0.09 | | | | | | |
| Distributed Renewable Resources | | | | | | | | | |
| Photovoltaics - winter-peaking area | | | | | | | | | |
| Solar Zone 3 | \$ 0.001 | \$ 0.001 | \$ 0.001 | \$ 0.002 | | | | | |
| Solar Zone 4 | \$ 0.001 | \$ 0.001 | \$ 0.002 | \$ 0.002 | | | | | |
| Solar Zone 5 | \$ 0.001 | \$ 0.002 | \$ 0.002 | \$ 0.003 | | | | | |
| Solar Zone 6 | \$ 0.001 | \$ 0.002 | \$ 0.003 | \$ 0.004 | | | | | |
| Solar Zone 7 | \$ 0.001 | \$ 0.003 | \$ 0.004 | \$ 0.004 | | | | | |
| Photovoltaics - summer-peaking area | | | | | | | | | |
| Solar Zone 3 | \$ 0.002 | \$ 0.004 | \$ 0.005 | \$ 0.006 | | | | | |
| Solar Zone 4 | \$ 0.002 | \$ 0.004 | \$ 0.005 | \$ 0.006 | | | | | |
| Solar Zone 5 | \$ 0.002 | \$ 0.004 | \$ 0.006 | \$ 0.007 | | | | | |
| Solar Zone 6 | \$ 0.002 | \$ 0.004 | \$ 0.006 | \$ 0.007 | | | | | |
| Solar Zone 7 | \$ 0.002 | \$ 0.004 | \$ 0.006 | \$ 0.007 | | | | | |

The present value of the local transmission and distribution system benefits of a particular conservation measure or renewable resource's net energy production can be derived by multiplying its first year savings or output times the value in Table 5 that matches its end use and measure life. For example, if a High Efficiency Central Air Condition with a measure life of 15 years was installed in a residence and it saved 200 kilowatt-hours annually its present value local transmission and distribution system benefit would be \$30 (200 kWh/year x \$0.15/kWh).

Environmental Externalities

The Northwest Power Act requires BPA to take environmental externalities into account, using the methodology developed by the Northwest Power Planning Council.¹⁸ The Power Plan recommends that environmental externalities be "monetized" or expressed in monetary values whenever possible, but

¹⁸ This methodology is presented in the Council's latest Power Plan (see the [Northwest Conservation and Electric Power Plan](#) and the [Addendum to The Fourth Northwest Conservation and Electric Power Plan](#) at http://www.nwppc.org/enr_issue.htm).

recognizes that for a number of reasons this may not always be practical. In such cases, the Plan recommends accounting for physical effects.

Most conservation measures and many renewable energy resources have little impact on the environment directly -- their main effect is to reduce the environmental impacts of conventional generating resources that they displace. The RTF's evaluation of environmental effects will note any direct impacts, but will concentrate on effects of these generating resources that are displaced by conservation measures and renewable resources. In fact, the resources displaced by a given conservation measures or renewable resource may vary depending on the time of day and year. The RTF intends to perform this analysis eventually, but a full analysis of this variation will require more time than the RTF or its staff can devote now. For the time being, the RTF has assumed that a gas-fueled combined-cycle combustion turbine (CCCT) is the marginal generating resource, that is, the resource that is made unnecessary by conservation measures and renewable resources.

The RTF has considered a variety of environmental effects of CCCTs and concluded that many of them are controlled to low levels (for example emissions of nitrous oxides, controlled as the result of regulatory processes that have considered the costs and benefits of control equipment) or carry explicit costs to the generating plant operator (e.g. tradable Sulfur Dioxide emission permits). These emissions could be considered to be no longer externalities, or at least no longer significant externalities. Other effects depend on the specific local conditions of the generating plant. These effects are usually taken into account in siting license processes; in any case, the RTF cannot make an evaluation of such effects that is accurate throughout the region.

The most significant environmental effect of CCCTs that is not yet "internalized" in a significant way is emissions of carbon. People continue to disagree about the amount of global climate change that may result from continued increases of greenhouse gasses, including carbon dioxide, in the atmosphere, and they continue to disagree about the damage global climate change may do. However, the RTF has concluded that there is at the very least a risk that serious damage will result from continued increases in greenhouse gas concentrations in the atmosphere. Therefore, one of the benefits of a conservation measure or renewable resource is a reduction in the risks and/or the rate of global climate change.

To assign a value to this reduction in risk is necessarily a subjective process, but the RTF agreed that "zero" is too low. In its Fourth Northwest Power Plan the Council stated that based on its review of the available literature, estimates of the value of this risk ranged between \$5 and \$40 per ton of carbon dioxide. Taking this range into account the RTF recommends that for purposes of computing the total societal value (i.e. the value to the global community) of conservation and renewable resources, that \$15/ton of carbon dioxide be added to the avoided cost of new power supplies. For a new gas-fired combined cycle plant, this is equivalent to 6 mills per kilowatt-hour. Currently, the reduction in risk of global climate change is not a benefit to the regional power system. Were there a global agreement establishing credits for reductions or costs for carbon dioxide and other greenhouse gas emissions then the 6 mills per kilowatt-hour should be considered. Table 6 shows the present value impact per kilowatt-hour of adding the cost of environmental externalities for conservation measures and renewable resources with measure lives between 5 and 70 years.

Table 6 - Present Value Cost to Society of Including \$15 per Ton of Carbon Dioxide Produced by a Combined Cycle Combustion Turbine as an Environmental Externality

| MEASURE LIFE(YRS) | 5 | 10 | 15 | 20 | 30 | 40 | 50 | 60 | 70 |
|--|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Present Value Cost of Environmental Externalities (2000\$/kWh) | \$0.03 | \$0.05 | \$0.06 | \$0.08 | \$0.09 | \$0.11 | \$0.11 | \$0.12 | \$0.12 |

Total Societal Benefits (Value)

In addition to calculating the regional bulk power system and local distribution system benefits of conservation and renewable resources the RTF believes it is important to recognize that in many cases these measures provide other non-power system benefits. For example, more energy efficient clothes washers and dishwashers save significant amounts of water as well as electricity. Similarly, some industrial efficiency improvements also enhance productivity or improve process control. Therefore, the RTF attempted to identify whether the conservation measure or activity or renewable resource system would provide non-power system benefits. When possible such benefits were then quantified (e.g., gallons of water savings per year). For a small subset of the measures reviewed by the RTF it was also possible to provide an estimate of the economic value of these non-power system benefits. These benefits were added to the RTF's estimate of value to the bulk power system and the local electric distribution systems of conservation and renewable resources when computing Total Societal Benefits.

Total societal benefits (value) is calculated by adding regional bulk power system value, local distribution system value and environmental externalities benefits. For example, an irrigation measure with a 15-year measure life that saves 10,000 kWh per year has a present value benefit to the bulk power system of \$0.36 per first year kilowatt-hour savings (from Table 2), a present value local distribution system benefit of \$0.09 per first year kilowatt-hour savings (from Table 4) and a present value environmental externalities benefit of \$0.06 per first year kilowatt-hour savings (from Table 5) for a total societal value of \$0.51 per first year kilowatt-hour savings. Since the measure saves 10,000 kWh per year, this equates to \$5,100 total societal benefit.

In those cases where a measure also has other non-electric system benefits (beyond environmental externalities) these are added to the values determined by summing the benefits shown in Tables 2, 5 and 6 to determine total societal value. For example, resource efficient clothes washers save significant amounts of water and detergent in addition to their electricity savings. For clothes washers used in single family residences these benefits add \$0.80 per first year kilowatt-hour savings to the \$0.52 per first year kilowatt-hour savings derived by summing their benefits to the bulk power system, local distribution system and environmental externalities.

Deemed Measures List for Conservation and Direct Application Renewable Resources

Bonneville requested that the RTF develop a list of conservation and renewable resource measures and activities for which savings or net energy production could be "deemed." In order to address this request the RTF used the screening criteria described previously to select conservation measures and renewable resource technologies and applications whose costs, savings or output could be predicted with confidence.

In addition to those measures for which savings or output can be confidently predicted, the RTF identified others where, given a minimum amount of additional information a reasonable estimate of savings or output can be predicted. For example, if the differential improvement in energy efficiency of a replacement motor is known, it is often possible to predict annual energy savings by simply ascertaining the number of hours per year the motor operates.

The detailed "Deemed Measure Tables" appear in Appendices L-O.

Protocols for Estimating the Energy Production of Unmetered Renewable Resources

Bonneville requested that the RTF establish methods for estimating the electric energy production of renewable resources that are located on customer-side-of-the-meter. The RTF anticipates that the "unmetered" renewable resources most likely to be developed will be photovoltaic systems and solar water heating systems. The RTF developed deemed production values for representative solar hot water heating systems and solar photovoltaic systems using these protocols. These values are shown in Tables 2, 5 and 6. The RTF also recommends that a customer utility having more site-specific information on facilities it is proposing for C & R Discount credit have the option of using the protocols for refining estimated production.

The RTF recommended protocols for estimating the electric energy production from these systems are described in *Appendix Q*. Methods for estimating the output of other unmetered renewable resources will be developed based on the demand for such protocols.

UTILITY CONSERVATION AND RENEWABLE RESOURCE TRACKING AND REPORTING

Approach selected

The RTF is charged with providing information about the regionwide C&R Discount program accomplishments. The RTF intends to track and report on the kilowatt-hour saved by all Bonneville customers on at least an annual basis. To facilitate the preparation and submittal of savings activity reports, the RTF with Bonneville assistance is funding the development of C&R Discount Application and Reporting software. An interactive and user-friendly web-based “report generation” tool will allow utilities to:

- Report annual targets for each conservation measure under consideration,
- Prepare and submit periodic activity summary reports,
- Determine utility deemed savings or direct reimbursement credit entitlements, and
- Examine program progress through measure and expenditure trending reports and graphical displays.

Reports will be sent to Bonneville and a server designated by the RTF. At the “receiving” location, utility reports will be aggregated in a C&R Discount Program Status Tracking database. The Program Status and Tracking module will be designed with filters to sort and indicate program progress by utility (with ‘All’ always available as a choice), by date range, state, by climate zone, and by conservation sector. Reports will be made available at the receiving site to display an “Energy Savings Summary,” (by utility, state, sector), “Conservation Credit Entitlement,” “Utility Expenditures,” and “Individual Measure Activity.”

Overview of Module Design, Functions, and Interactions - The C&R Discount Application and Reporting software to be developed is comprised of five modules. The *Introductory* module will contain a link to C&R Discount program information and allow new or repeat users to log-on. A button will be provided so that members of the general public can access a Table of Contents to gain information regarding C&R Discount program structure, objectives, and ongoing activities. A security protocol will be developed so that multiple users from a single utility can access and edit *Savings Activity* reports. Once the user's utility affiliation is known, the software will automatically update performance data for all weather-sensitive conservation measures on the Measures and Activity list to reflect appropriate climate zone(s) information for the utility service territory. This information will be used to customize various measure lists so only alternatives relevant for the user will be displayed. Also to be automatically displayed is an estimate of the utility's deemed savings credit entitlement (based upon examining an internal database of forecast electricity purchases from Bonneville for year).

The *Report Status* module will enable the user to design or create a new program, edit and then submit an open *Savings Activity* report, or update and then resubmit a previously submitted report. The *Report Status* screen will also allow the user to generate utility-specific Program Status reports including an Energy Savings Summary report, a Conservation Credit Entitlement report, and a Utility Expenditures report. The screen will also allow the user to E-Mail the RTF to suggest additional conservation measures that could be considered for inclusion on the deemed savings measure list.

The *Measures and Activities* module will contain a toolbar that allows users to view and access eligible measures lists for the Residential, Commercial, Institutional, Industrial, Agricultural, Utility, or Other sectors. Eligible Measure lists will be broken down by measure class and type---for instance, Residential sector measures might be broken out as Weatherization or Building Shell related, Appliance related, or as Lighting related. Subheads (in the Appliances area) could include Electric Water Heaters, Resource Efficient Clothes Washers, Resource Efficient Dishwashers etc. A separate measure record would be available for each

specific application (specific applications are defined by the RTF group). The *Measures and Activities* screen will be designed to allow the user to:

- Obtain descriptive information by clicking on the underlined measure title;
- Examine energy savings performance and deemed savings values by clicking on a Measure Performance and Benefits button;
- View a list of eligible appliances or standards by clicking on a Measure Specifications button; and
- Link to additional resources.

The *Measures and Activities* screen will be designed to allow the user to select which measures are to be included in the *Savings Activity* report, to enter annual targets for measure implementation, and to select the credit valuation or payment option (either deemed savings or use of a protocol or formula to determine the reimbursement for dollars expended). Measures for which deemed savings have been identified will have the deemed savings select button highlighted as a default. The user will be able to build a customized *Savings Activity* report by creating and saving the list of measures to be implemented through utility-sponsored conservation programs. When the measure lists have been saved for each sector, the software allows the user to click on the Program Action Summary button to access the *Savings Activity* screen with its savings calculator features.

The *Program Action Summary* will allow the user to create a *Savings Activity* report by entering the number of actions completed over a selected time interval for each measure selected in the *Measures and Activities* module. The software will be designed so that the user can also enter and track utility expenditures and administrative costs for each eligible conservation measure with total annual energy savings, the total demand reduction, and the utility credit entitlement automatically determined. These values will be based on data provided in the RTF Excel "Deemed Measure" spreadsheets.

The *Savings Activity* module will display energy and demand savings summaries by sector and indicate the total savings and deemed credit entitlement for actions taken in all sectors. A Measure Status button will be provided so that users can review the annual target and the number of measures completed (by measure type) within the current year. The *Savings Activity* report will also be designed such that the user can easily enter savings due to any number of "Performance-Based Measures". A performance-based (protocol-based savings) measure is one that is eligible for inclusion in the C&R Discount program but for which annual savings are application specific and cannot be "deemed". Finally, the *Program Action Summary* will be designed so that the user can elect to Submit their *Savings Activity* report to Bonneville or to assign it a unique title and then save the report in an archive or active workspace without sending it.

The final piece of the C&R Discount Application and Reporting software is the *Utility Program Status and Assessment* module. This module will be managed by the RTF or its designee. The report "receiver" will accept, save, and aggregate customer submitted *Savings Activity* reports. Query capabilities will be provided so that Bonneville or the RTF can filter the report database to examine all actions taken by measure type, or the annual savings or deemed credit entitlements awarded by utility, date range, state, by climate zone, or by sector. Program status reports will be available in both tabular and graphical formats.

Detailed descriptions of the required capabilities and features of each module are described in Appendix P.

SCHEDULE FOR DEVELOPMENT AND DEPLOYMENT

The Council, on behalf of the RTF contracted with the Washington State University's Cooperative Extension Service's Energy Program to prepare the detail specifications for its Tracking and Reporting Software. The Council, again on behalf of the RTF, intends to issue a request for proposals prior to September 1, 2000 to secure the services of a software development provider.

Once a contractor is selected, the RTF intends to have "beta test" version of the software available by the end of 2000 with full regional deployment completed in the late winter/early spring of 2001.

APPENDICES

A. BPA RTF Work Product Request

B. RTF Charter

C. RTF Members

D. RTF Work plan

E. Conservation Measures and Activities Eligible for Bonneville's Conservation and Renewable Resources Rate Discount

F. Qualifying Renewable Resource Measures and Activities

G. Memo on the Value of Water Diversions

H. Air Source Heat Pump Installation Standards

I. Ground/Water Source Installation Standards

J. Valuation of Conservation Savings and Renewable Resource Net Energy Production Analysis Tool : PROCOST

K. Conservation and Renewable Resource Load Shapes

L. Deemed Measure Table - Residential

M. Deemed Measure Table and Valuation Method - Commercial

N. Deemed Measure Table and Valuation Method - Industrial

O. Deemed Valuation Method - Irrigated Agriculture

P. Protocols for Estimating Energy Savings and Value for Non-Deemed Conservation Measures and Activities

Q. Protocols for Estimating the Energy Production of Unmetered Renewable Resources

R. Conservation and Renewable Resources Discount Program Applications and Reporting Software

c:\windows\desktop\rtf\drecmd.doc (Ken Corum)