

# CLIMATE CHANGE BPA'S INITIAL ROADMAP

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## I. INTRODUCTION

Potential climate change resulting from greenhouse gas emissions has emerged as a matter of intense and growing concern around the region and across the globe. Congress is considering several proposals to establish greenhouse gas emission reduction targets, most likely under a cap-and-trade system that would impose a cost on carbon dioxide (CO<sub>2</sub>) and potentially other greenhouse gas emissions. Pressure for a national renewable portfolio standard (RPS) is increasing. In 2007, Executive Order No. 13423 directed federal agencies to strengthen environmental practices by reducing greenhouse gas emissions. Given these developments, one of the greatest challenges BPA likely will face in the near future is finding cost-effective ways to meet our customers' growing needs for electricity in ways that don't significantly increase the region's greenhouse gas emissions, particularly under a cap-and-trade system.

In the Pacific Northwest, the Federal Columbia River Power System (FCRPS) has a long history of climate-friendly, cost-effective generation. The Northwest, including the FCRPS, produces less CO<sub>2</sub> per megawatt-hour than any other region in the United States. The FCRPS alone produces about 7,000 average megawatts of hydro-electricity even in a dry water year, enabling the region to sustain this relatively small carbon footprint.

As the future brings the potential of greenhouse gas reduction targets through state, regional or

national policies and programs, the Northwest will be looking for climate-friendly generation resources. Part of these targets will be achieved through new technological advancements in energy efficiency and wind, solar and wave energy. However, this may not be enough to achieve ambitious carbon reduction targets without additional investment in other areas, including hydropower.

Regional population and economic growth will place increasing demands on the already stretched FCRPS hydropower system for a variety of power and non-power products. While new wind, solar and wave energy efforts are important, it will be just as important to preserve and enhance the value of the existing FCRPS hydropower system.

Northwest states are considering ways to reduce CO<sub>2</sub> and other emissions. Three states have already enacted legislation requiring investor-owned and consumer-owned electric utilities – BPA's customers – to supply more power from renewable, low- or no-carbon sources. The Western Climate Initiative, a collaboration of several Western governors, has established regional goals for greenhouse gas emission reductions, and is currently drafting a market-based mechanism to help achieve reduction goals. Many Western states either now have or are drafting mandatory greenhouse gas emission reporting rules.

For the Pacific Northwest in particular, an area of concern is how potential changes in temperature and precipitation patterns may

affect the operation of the FCRPS. According to a 2007 annual report on BPA expenditures by the Northwest Power and Conservation Council (Council), it has cost the agency more than \$5 billion since 1978 to make supplemental power purchases and forego revenues attributable to reduced hydropower generation to benefit fish.

Climate change could further affect the operation of the FCRPS, both directly through precipitation patterns, for example, and indirectly through additional constraints that might be necessary to protect the region's fish and wildlife. A 2007 report on climate change by the Council's Independent Scientific Advisory Board details potential hydrological and biological impacts, as well as mitigating actions such as tributary habitat protection.

The recent 2008 Biological Opinion on the operation of the FCRPS describes a 10-year plan for hydro operations and mitigation for fish listed under the Endangered Species Act, including specific consideration of climate change and a number of actions to address potential effects on listed salmon.

BPA's extensive fish and wildlife program also leads to natural sequestration of greenhouse gas emissions, particularly through habitat restoration and enhancement projects, a factor that has been largely overlooked.

These and other factors regarding climate change will all be important to BPA's business in the years to come.

For 2008, BPA adopted new initiatives related to climate change and elevated the issue into our agency strategic objectives and key agency performance targets.

### **BPA Climate Change Initiatives**

For 2008, BPA adopted a new Strategic Business Objective and a Key Agency Target related to climate change:

**Strategic Business Objective (S9)** – BPA encourages and implements integrated, cost-effective policies which lead to greenhouse gas emission reductions.

**Key Agency Target** – BPA will complete development and begin implementation of a Climate Change Action Plan.

This initial roadmap describes how BPA has fulfilled its strategic direction related to climate change in 2008. It lays out the baseline of BPA's current activities related to climate change issues. This work includes efforts to integrate greenhouse gas considerations into agency decision making, complete a greenhouse gas inventory, and to support energy efficiency, renewable development and climate-friendly business practices.

One of the first steps we are taking to prepare for climate change and anticipated legislation is development of this, BPA's initial climate change roadmap. This is a step toward adopting subsequent, more robust plans as our strategy for managing greenhouse gas emissions evolves. For this reason, we anticipate revising our climate change roadmap regularly as circumstances warrant.

Throughout, this document identifies both near-term and long-term potential actions to meet agency targets and to contribute to national and regional goals to reduce greenhouse gas emissions. The year 2008 marks the first time

that BPA has elevated consideration of greenhouse gas issues to the level of a key agency target and business objective. Many potential actions are identified in the roadmap, and certainly many more will arise in the future. Our intent is to begin to identify future initiatives that we can undertake.

Many of the specific actions described in this document are already in progress; some are well on their way to completion. Others may prove impracticable or less effective than options that have yet to be devised and will be modified or amended as we learn more.

Over the next year, we will continue to explore ways BPA can reduce its own carbon footprint and can help its customers succeed as we all prepare to address the potential for a carbon-constrained future.

### **What is cap-and-trade?**

Cap-and-trade programs provide economic incentives for achieving reductions in polluting emissions. Generally, the mechanism caps emissions at a targeted level, issues allowances to emit up to the capped levels, then allows regulated entities to trade emission allowances among themselves. In the programs that have been proposed, the capped level, the methods for allocating emissions and the point of regulation (at the fuel source, at the generator level or at the end-use level) all vary, as do the sectors that are regulated.

## **II. INVENTORY OF BPA'S GREENHOUSE GAS FOOTPRINT**

A key starting point in managing greenhouse gas emissions is to measure BPA's greenhouse gas footprint. BPA will collect data in 2009 to complete an inventory of existing greenhouse gas emissions. Once the inventory is reported in 2010, it will serve as a benchmark for quantifying reductions in subsequent greenhouse gas emissions from various activities and functions and will help BPA identify in quantifying the value of potential remedies for reducing emissions, estimating the costs of changing current practices and prioritizing future greenhouse gas emission reduction actions.

On May 1, 2008, BPA signed a letter of intent to report its 2009 greenhouse gas emissions to The Climate Registry (TCR). In doing so, the agency became one of 243 "Founding Reporters" to TCR. TCR is a non-profit greenhouse gas-reporting organization supported by 39 member states. Its greenhouse gas reporting protocols are the reference point for existing and proposed mandatory reporting requirements. We expect to report our greenhouse gas emissions annually.

BPA signed this letter of intent to reflect our commitment to supporting greenhouse gas emission reductions. A primary driver for BPA's decision to report greenhouse gas emissions voluntarily is a desire to support our customers as they begin to respond to mandatory state greenhouse gas reporting rules. BPA also has an interest in establishing standards and protocols for reporting greenhouse gas emissions and capturing credits (reductions in greenhouse gas emissions that qualify for "carbon credits"),

particularly for a predominately low carbon impact hydro system.

Tracking emissions will establish baseline levels against which we can measure progress toward target levels. Currently, BPA voluntarily reports its annual resource portfolio to the California Energy Commission, the Washington Department of Community Trade and Economic Development and the Oregon Department of Energy. BPA also supplies information on the BPA resource portfolio to utility customers with greenhouse gas reporting obligations. This information on our resource mix is the basis for estimating greenhouse gas generated from BPA’s generating resources.

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### ACTIONS

- ◆ Enhance internal agency technical expertise on greenhouse gas reporting.
  - ◆ Participate in development of greenhouse gas reporting protocols to ensure the unique perspective of the Pacific Northwest electric industry is represented.
  - ◆ Voluntarily report the agency’s greenhouse gas emissions inventory.
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## III. POWER SERVICES

Apart from actions to measure and reduce greenhouse gas emissions from BPA’s direct activities, it is important to account for greenhouse gas in relation to BPA’s power operations and marketing. Even under poor water conditions, the FCRPS base system generates around 7,000 aMW of hydroelectric energy and another 1,000 aMW of nuclear energy annually, both virtually free of greenhouse gas.

### HYDROPOWER

One strategy that fits a low greenhouse gas emissions future is to improve the efficiency and increase capacity of existing hydro plants, something BPA has supported for many years. Placing additional value on avoiding greenhouse gas emissions may make other hydro improvement opportunities economical.

In the past, decisions to support the enhancement and refurbishment of FCRPS hydropower have assessed its value without including the benefit of avoiding greenhouse gas emissions from generation alternatives. With potential carbon limits and greenhouse gas emission restrictions, the evaluation process may need to be expanded to consider the benefits achieved in reducing greenhouse gas emissions.

BPA estimates that FCRPS hydro efficiency improvements achieved to date avoid between 600,000 and 1.5 million tons per year of CO<sub>2</sub> emissions compared to equivalent generation from Combined Cycle Natural Gas (CCNG) or Pulverized Coal (PC), respectively. Additional efficiency improvements planned through 2013 will achieve CO<sub>2</sub> reductions per year of 300,000 tons compared to CCNG to 750,000

tons compared to PC. Additional unfunded opportunities could yield CO<sub>2</sub> avoidance levels of over 2 million tons per year.

## COLUMBIA GENERATING STATION

New technological advancements and integration will be needed for future regional consumers to achieve the potential greenhouse gas reduction targets from state, regional or national efforts. While these efforts are important, it will be equally important to preserve and enhance the value of the current federal power system, which derives some of its energy from nuclear power. Nuclear energy has a relatively low carbon footprint. While this does not presuppose that nuclear power will be the future resource of choice for the region, the possibility of new nuclear plants in the region may be considered at some point. Meanwhile, the capabilities and potential efficiency improvements of existing nuclear power plants should be valued with respect to their ability to offset high carbon-emitting resources.

The current federal power system portfolio includes the output from the region's only operating nuclear power plant, Columbia Generating Station. While Energy Northwest, a consortium of utilities, owns and operates this nuclear plant, BPA is currently the sole purchaser of the plant's output. Columbia Generating Station has provided 960 aMW over the past five years with near zero greenhouse gas emissions for integration into the FCRPS. In the past, the benefits of the Columbia Generating Station to the federal power system have been measured in terms of economic value, efficiency, flexibility and reliability for the region. However, with potential carbon limits

and greenhouse gas emission restrictions, this evaluation should include an analysis of benefits achieved by near-zero greenhouse gas emissions.

Columbia Generating Station's current license expires in 2023. It is possible to extend the nuclear plant's operating license another 20 years to 2043, and work to extend the license has already begun. If the plant's license is renewed, the benefits of operating a near-zero greenhouse gas emission project would be captured for another 20 years. It also may be possible to increase Columbia Generating Station's output by 100 to 150 aMW by investing in improvements.

## POWER PURCHASES

BPA also purchases energy from other sources to meet near-term obligations required to balance loads and resources in daily and seasonal operations. At times, we make longer-term "augmentation" acquisitions to compensate for forecast loads exceeding the firm energy available from the federal system. These power purchases include power generated from natural gas and coal generation, as well as renewable power from wind, hydro and geothermal projects.

Our load-resource forecast projects that BPA will be in a resource deficit in a few years if we are asked to supply power to our customers to meet anticipated load growth (which BPA is obligated to do for certain customers).

BPA plans to replace our current wholesale power sales contracts with our new, long-term contracts effective in 2012. These new contracts help define BPA's potential need for additional resources. Our Resource Program will provide

guidance for developing a portfolio of resources to meet BPA's obligations. The portfolio is likely to include a combination of generating resources, energy efficiency and demand response resources, as well as other potential resources such as energy storage.

## RESOURCE PROGRAM

The Resource Program is a renewed effort, updated from the previous program of 1992 to reflect current circumstances. It will help us identify priorities for prospective long-term energy resource acquisitions to meet future customer net requirements. The 2009 Resource Program will examine the agency's projected load-resource balance and describe available resource types and costs to fill any projected deficits. It will be guided by the Northwest Power and Conservation Council's Northwest Power Plan. Consistent with the Northwest Power Act, the 2009 Resource Program will give priority in BPA's resource acquisition first to energy efficiency, then to renewable energy, followed by resources using waste heat or high fuel-conversion efficiency, and finally to conventional resources. It will analyze the economic and environmental characteristics of alternative resource acquisitions. The environmental characteristics will include an estimate of greenhouse gas emissions, and the economic evaluation will include the impacts of a range of potential costs of CO<sub>2</sub> emissions against the cost and risks associated with acquisition of new resources.

In addition to economic and environmental criteria, the Resource Program will evaluate how well various resource portfolios meet the region's Renewable Portfolio Standard (RPS) requirements. Based on all of these criteria, the

Resource Program will identify a preferred resource portfolio to inform the agency as it considers future resource acquisitions. If BPA seeks to acquire a "major" resource, then BPA would follow a process established in section 6(c) of the Northwest Power Act to verify the consistency of resource acquisitions with the Council's Power Plan.

## CLEAN ENERGY ACQUISITION DEMONSTRATION PROJECT

Power Services is exploring a clean energy standard offer for power generated by combined heat and power units located at Northwest industrial facilities. This standard offer could be extended to developers with new cogeneration units that use waste heat and/or industrial waste streams to generate electricity.

## RENEWABLE GENERATION

Up to a point, the federal hydropower system is perfectly suited to provide integration services for intermittent renewables such as wind because water flows can be adjusted in seconds.

However, there are physical limits to the capability of the FCRPS to accommodate large changes in flows necessary to integrate large amounts of wind. Most of the wind located in the Northwest is clustered in BPA's system at the eastern end of the Columbia River Gorge. Capacity reserves provided by a few co-located dams on the lower Columbia River can affect efficiencies on the system as a whole because the FCRPS is interconnected and is operated as a whole to achieve the greatest efficiencies.

Holding back capacity reserves for intermittent resources also forces BPA to use water less efficiently. Water that might otherwise be saved

for later may have to be spilled. Conversely, water held for capacity reserves cannot be used to generate power for other purposes. FCRPS operations are also limited by non-power obligations such as flood control, fish mitigation, irrigation, navigation, tribal fisheries and recreation. As the hydropower's system's ability to provide integration services reaches its physical limit, it is likely that integration services will be provided through use of greenhouse gas-emitting thermal resources.

The large amount of wind power being added to the Northwest power supply, regardless of who owns these resources, will place increasing demands on the BPA system to provide wind integration and related services. Because wind is intermittent and needs to be backed up, this may result in a need to acquire additional flexible capacity resources. Some of these may include natural gas or other greenhouse gas emitting generation. Under many scenarios, BPA would need to acquire additional capacity and energy resources under long-term contracts for capacity resources, although we are likely to continue to use short-term purchases and medium-term augmentation contracts as part of our portfolio of resources.

Power Services will supply capacity to Transmission Services for within-hour wind integration services as described in the Wind Integration Rate Case completed this year. We also are offering renewable shaping services to public power customers acquiring this energy for requirements load. Wind integration efforts can be expected to evolve in subsequent rate cases and through the work of the Wind Integration Team (discussed below).

## ENVIRONMENTALLY PREFERRED POWER

BPA currently markets “environmentally preferred power”<sup>1</sup> from existing wind projects to more than 50 public power customers. BPA reinvests 100 percent of the revenues from the sale of EPP and Renewable Energy Certificates. These revenues are directed to BPA-sponsored research, development and demonstration projects which foster future development of renewable generation in the Northwest and to the Bonneville Environmental Foundation, which uses the funds for renewable education, distributed renewable generation and/or renewable research development or demonstration projects in BPA's public customers' service territories.

## REGIONAL DIALOGUE CONTRACTS DISTRIBUTE RECs TO CUSTOMERS

Under long-term Regional Dialogue contracts, BPA will distribute uncommitted Renewable Energy Certificates<sup>2</sup> from Tier 1 renewable resources to customers in proportion to their Rate Period High Water Marks.<sup>3</sup> This will be

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<sup>1</sup> Environmentally Preferred Power is a BPA green power product sold to public utilities located in the Pacific Northwest. EPP is a blend of new and existing wind and low-impact hydro.

<sup>2</sup> Renewable Energy Certificates (RECs), also known as green certificates, green tags or tradable renewable certificates, represent the environmental attributes of the power produced from renewable energy projects and are sold separately. RECs are typically created on a one-to-one basis with the megawatt-hour production of electricity from a renewable resource.

<sup>3</sup> BPA has established “High Water Marks” that define how much power a preference customer may buy at Tier 1 prices. The HWM is calculated in accordance with the Tiered Rate Methodology and is based generally on a utility's load in 2010 minus its own resources.

subject to withdrawal at BPA’s discretion if we incur compliance costs associated with renewable or greenhouse gas regulations. BPA also plans to distribute Tier 2 RECs and carbon credits supplied by Tier 2 resources to purchasers of power at Tier 2 rates.

## GREENHOUSE GAS REGULATION

Tracking emissions will establish baseline levels against which we can measure progress toward target levels. Currently, BPA voluntarily reports its annual resource portfolio to the California Energy Commission, the Washington Department of Community Trade and Economic Development and the Oregon Department of Energy. BPA also supplies information on the BPA resource portfolio to utility customers with greenhouse gas reporting obligations. This information on our resource mix is the basis for estimating greenhouse gas generated from BPA’s generating resources.

## SPECIFYING GENERATION SOURCES

In the Western United States, a given block of power may be traded numerous times and may pass through different systems before it is delivered to the buyer. For these transactions, there is no practical way to determine accurately which generator actually served which load. Generally speaking, buyers in short-term markets seek the least-cost supplier, which is often a function of fluctuating fuel prices, heat rates of available generators, transmission costs and constantly varying system and market conditions.

Except in a few cases, it is not possible to associate greenhouse gas emissions with specific

transactions. Thus, greenhouse gas emission reporting systems under consideration in the West would assign a default greenhouse gas emissions factor, possibly based on the average emissions of all generators supplying energy to the Northwest Power Pool. The default emissions factor may assume a “worst case” scenario, which would be a high-emissions power plant. In any event, power from “unspecified sources” for greenhouse gas reporting purposes would be a default emissions factor set by regulators and would not be based on actual greenhouse gas production. Over time, the default emissions factor may be designed to approximate the greenhouse gas emissions of the generation fleet supporting these short-term transactions.

For BPA, it is important that any reporting system accurately account for the carbon-free quality of power from the FCRPS, although default emissions factors may be necessary to account for emissions from unspecified sources.

## METEOROLOGICAL AND HYDROLOGICAL IMPACTS TO THE FCRPS

Climate change has the potential to alter the meteorological and hydrological characteristics of the Northwest and consequently impact the FCRPS. Although acknowledged experts predict that the world is facing major climate change, the nature of this change, the rates at which changes take place and the significance of the impacts on the FCRPS are uncertain. Managing and planning around these uncertainties will require a greater understanding of the issues.

BPA’s strategic approach to understanding the physical impacts of climate change is made up of three parts: 1) modeling the FCRPS under

possible future climate change scenarios; 2) monitoring the hydrologic system for trends, cycles and changes; and 3) staying abreast of research and studies addressing climate cycles, trends and modeling.

## MODELING THE FCRPS USING POSSIBLE FUTURE CLIMATE CHANGE SCENARIOS

In terms of understanding potential future climate scenarios, the majority of general circulation models used to project future climate change scenarios indicate the potential for meteorological and hydrological pattern shifts across the FCRPS. This runs true when including varying degrees of future greenhouse gas emissions. Although there are wide ranges in magnitude and timing of these changes among various general circulation models, most scenarios include overall warmer temperatures.

The result would be more winter precipitation in the form of rain rather than snow in the Columbia Basin. If so, this would create higher streamflows in winter and less snow accumulation in the mountains of the region. Lower overall snowpacks could potentially lead to earlier and smaller runoffs and lower flows during summer months.

All these potential changes to the hydrology of the Columbia Basin could lead to further complications and issues, as noted in the Fifth Northwest Electric Power and Conservation Plan, 2005, such as:

- ◆ Putting greater flood control pressure on storage reservoirs and increasing the risk of winter flooding;

- ◆ Boosting winter production of hydropower when Northwest demands are likely to drop due to higher average temperatures;
- ◆ Reducing late spring and summer river flows and potentially causing average water temperatures to rise;
- ◆ Jeopardizing fish survival, particularly salmon and steelhead, by reducing the ability of the river system to meet minimum flow and temperature requirements during spring, summer and fall migration;
- ◆ Reducing the ability of reservoirs to meet demands for irrigation water;
- ◆ Reducing summer power generation at hydroelectric dams when Northwest demands and power market values are likely to grow due to higher air-conditioning needs; and
- ◆ Affecting summer and fall recreation activities in reservoirs.<sup>4</sup>

The first step in evaluating these potential impacts and consequences is to establish a streamflow data set reflecting the current “best science” modeling of future climate change. Currently BPA is partnering with the Climate Impacts Group, Washington Department of Ecology and the Northwest Power and Conservation Council to support the development of a set of climate-altered streamflow models for the Columbia Basin. They will be based on 10 general circulation model outputs from the Intergovernmental Panel on Climate Change Fourth Assessment studies.

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<sup>4</sup> Source: The Fifth Northwest Electric Power and Conservation Plan, 2005

Once these scenarios are complete (in FY 2009), we will work in conjunction with the Council to assess the impact of these climate-adjusted streamflows on the FCRPS and the region. BPA modeling will include a range of areas that might be affected, such as inventory, system reliability, flood control and non-power obligations. The region will benefit from having a set of climate-adjusted streamflows that will be publicly available for use in evaluating fish operations and mitigation and other water and biological considerations.

### MONITORING THE HYDROLOGIC SYSTEM FOR TRENDS, CYCLES AND CHANGES

General circulation models, or any model attempting to project atmospheric conditions in the future, will inherently have errors and inaccuracies associated with the complexity of dynamic and physical modeling. Therefore, it is important to continually compare model projections with observed and existing conditions through time. It is also important to understand historical trends and conditions over long periods, the degree to which significant changes in the Northwest climate can be distinguished from normal variations, and to understand factors that influence the meteorological and hydrological conditions from year to year. This information may assist in realizing the forecasting improvement commitments that are part of the FCRPS Biological Opinion and Columbia Basin Fish Accords and may provide additional information for consideration in salmon and steelhead mitigation.

### STAYING ABREAST OF RESEARCH AND STUDIES

Staying informed and educated on climate change work and research efforts is important for a number of reasons. It will allow the region to anticipate potential impacts to the Columbia Basin, the FCRPS and BPA. It will help assure modeling efforts accurately capture Northwest conditions, so that the region can take early action should significant trends develop. We will continue to support and participate in climate change workshops and conferences, as well as collaborative work and research as it pertains to the Columbia Basin and the FCRPS. Internally, our staff will review and evaluate research and studies relating to local climatology and hydrology wherever possible. Reviewed studies and research will be reported in annual and cumulative progress reports on fish operations and mitigation and potentially could be used in making adaptive management decisions on fish effects and priorities.

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### POWER SERVICES ACTIONS

- ◆ Continue incorporating issues regarding climate change and Renewable Portfolio Standards in planning functions.
  - ◆ Compare greenhouse gas emissions of each proposed refurbishment or improvement to the FCRPS hydropower system to equivalent natural gas and/or coal-based generation.
  - ◆ When appropriate, incorporate the value of FCRPS hydro generation improvements in terms of greenhouse gas emission abatement or prevention in the decision-making process.
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- ◆ Include greenhouse gas avoidance benefits in asset planning analyses and business cases for proposed capital and major expense sub-agreements.
  - ◆ Fund the preparation and submittal of a Columbia Generating Station license extension application to the Nuclear Regulatory Commission. BPA will also fund the costs for NRC to review and respond to the application.
  - ◆ Investigate and consider funding to increase CGS output by 100 to 150 aMW through a “power-up” rate.
  - ◆ Conduct a demonstration project to test and evaluate new approaches for acquiring clean power from low-cost industrial waste heat recovery projects.
  - ◆ Provide public power customers with resource shaping services for renewable generation dedicated to requirements load.
  - ◆ Distribute Renewable Energy Certificates as a means of helping our customers meet Renewable Portfolio Standards.
  - ◆ Enhance understanding of the hydro system capability to integrate intermittent renewable resources such as wind.
  - ◆ Monitor and, if applicable, participate in regional and other greenhouse gas processes where greenhouse gas reporting rules are set.
  - ◆ Encourage and support further research and development of updated, climate-altered weather and streamflow data sets for the Columbia Basin as modeling capabilities improve and evolve.
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- ◆ Create the ability to assess potential climate change impacts to the FCRPS and BPA ratepayers in BPA long-term decisions and risk assessments.
  - ◆ Continue to work collaboratively with the U.S. Army Corps of Engineers, U.S. Bureau of Reclamation, Northwest Power and Conservation Council and other regional parties to model and assess climate change impacts to the region. Results may be shared for possible consideration in salmon and steelhead mitigation.
  - ◆ Evaluate power and system impacts of climate change streamflow scenarios on the region and the FCRPS. Complete assessment on a “medium” case scenario representing a potential climate change at the 2025 time horizon.
  - ◆ Continue to stay abreast of research and studies evaluating and investigating climate trends and cycles in the Columbia Basin.
  - ◆ Develop simple methodologies for tracking and evaluating hydrological data pertaining to the FCRPS and the Columbia Basin in order to monitor the trends and cycles of water supply volumes, runoff timing and streamflows. Results may be shared for possible consideration in salmon and steelhead mitigation.
  - ◆ Develop a monitoring tool that will track the historical timing of runoff and/or the trends in streamflows/volume runoffs for the Columbia Basin.
  - ◆ Review and evaluate research and studies pertaining to local climatology and hydrology.
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## IV. ENERGY EFFICIENCY

BPA's energy efficiency work with customers demonstrates its long-standing commitment to a climate-friendly future. Since 1982, BPA has captured 1,000 aMW in first-year energy savings in close coordination with our partner utilities and other customers. These energy efficiency projects have displaced about 3.5 million tons of CO<sub>2</sub> in the measures' first years of operation alone, assuming that the efficiencies displace the average Northwest system power generation mix.

In the past five years (FY 2003-2007), BPA has facilitated 255 aMW of energy savings. BPA continues to have aggressive energy savings goals of 52 aMW per year (plus 4 aMW/year of naturally occurring conservation) for the current rate period. These efficiencies will help the region avoid around 200,000 tons of CO<sub>2</sub> per year. These goals will be met with a combination of BPA program offerings that use the conservation rate credit and bilateral contracts as well as utility-funded projects and market transformation efforts. This supports the development of new technologies and business strategies with high potential to deliver cost-effective energy efficiency and related services to consumers.

BPA's strategy to achieve 52 aMW per year of savings continues to focus on facilitating the efforts of customer utilities, trade allies, consultants and other energy service providers to acquire energy savings. We will continue to build regional infrastructure to accomplish this goal. Achieving targets, as well as potentially pursuing higher targets, will require greater

regional collaboration by a wide range of market players. Both incentive-based approaches targeted at end users and market transformation efforts to change manufacturer, retail and trade ally practices are essential. In sum, BPA expects to collaboratively support development of even more efficient supply chain and distribution systems with a wide range of entities to deliver energy efficiency services to consumers.

Energy efficiency reduces greenhouse gas emissions not only by reducing overall energy consumption, but frequently by shaving peak demand, thereby deferring investment in costly capacity resources. In most cases, energy efficiency is the least-cost resource. The region has benefited greatly from this investment and will continue to benefit into the future. BPA's expertise in energy efficiency has also allowed for the facilitation and implementation of many efficiency projects at federal facilities in the Pacific Northwest and beyond.

Moving forward, BPA will quantify the greenhouse gas reductions and other environmental benefits of energy efficiency captured by BPA. Additionally, we will ensure that all future conservation plans clearly incorporate climate change impacts and broader BPA targets.

### NEAR-TERM CLIMATE ACTION ITEMS

In the near term, we will continue to pursue cost-effective energy efficiency within the service territories of public customers who place load on BPA. This will help meet our load obligations while contributing to greenhouse gas reductions.

Starting in FY2012, BPA has committed to ensuring achievement of conservation equivalent to all cost-effective conservation in the service territories of those public utilities served by BPA. This will be accomplished in close partnership with our public utility customers at the lowest possible cost to BPA. The agency will count all cost-effective conservation achieved as a result of BPA-funded and utility self-funded efforts toward meeting this target.

BPA's FY 2008-2009 Conservation Plan identifies initiatives, contractual and reporting improvements, as well as marketing and infrastructure strategies necessary to achieve these targets. BPA supports market transformation through significant support of the Northwest Energy Efficiency Alliance. This is another way we can demonstrate a long-term commitment to creating market change to achieve greater efficiency over the long-term. In addition, the implementation of a tiered rate structure through the Regional Dialogue process will create new economic incentives for customers to pursue energy efficiency.

Because of our unique business relationships in the region, BPA has the ability to coordinate across utility boundaries to help meet increased energy efficiency goals as a result of state-level initiatives and internal utility mandates. This can include regional marketing and public awareness campaigns, market research, research and development, program evaluation and additional regional facilitation. These functions will help reduce greenhouse gas production and emissions and will benefit our customer utilities and the region.

BPA is co-managing a high level regional Energy Efficiency Taskforce formed in

FY 2008. This group brings together high level officials from across the Northwest to build a common understanding of the energy environment and how energy efficiency fits into that arena. The goal of the forum is to identify options for enhancing the efficiency and accelerating the acquisition of energy efficiency in the region. The taskforce could provide additional concrete steps that will enable BPA to continue to capture large reductions in greenhouse gas emissions, particularly with the support and collaboration of our customers.

## LONG-TERM CLIMATE ACTION ITEMS

In the long term, energy efficiency will continue to be a valuable resource for reducing greenhouse gas. Because conservation is a key piece of Tier 1 in the Regional Dialogue's tiered rates structure, it will be maintained as a strong resource for reducing greenhouse gas emissions into the future. Additionally, if carbon taxes or cap-and-trade regimes are put into place, more conservation will become cost effective to implement.

BPA also has developed an Accelerated Conservation Business Plan. This may serve as an acquisition strategy for the agency's Resource Program and help to augment the Tier 1 System Resources with conservation to serve FY 2012 loads. Because conservation is often the least-cost resource, BPA needs to first look at this resource as part of its augmentation strategy.

We will use the Accelerated Business Plan and Strategic Marketing Plan to inform our strategies to determine how best to achieve the accelerated targets that are anticipated in the Sixth Power Plan. Conservation efforts will focus on

efficiency measures and market sectors that have the best potential to reduce load during times of system peak. These efforts will examine program delivery strategies and evolving marketing strategies. Roundtable meetings have been held with large utilities to identify the potential for specific technologies and markets and to discuss concepts for potential collaboration.

In FY 2008, BPA began developing load management guiding principles and a related action plan that will also help with capacity and transmission concerns. Peaking resources can emit high amounts of greenhouse gas. Therefore, if peaks can be reduced with load management programs (including distributed generation) where customers are reacting to proper price signals in the market, greenhouse gas emissions may be reduced. This could be achieved by operating peaking resources less, deferring construction of peaking resources and, in some cases, avoiding the need to add peaking resources.

An aggressive demand response program could yield flexible demand response resources in quantities sufficient to provide ancillary services to integrate wind resources. Services might include regulation, frequency response, imbalance energy, short-term spinning and non-spinning reserves, congestion relief and redispatch, thereby reducing the need to construct and operate peaking resources to supply these services. These issues will be important to consider in designing future demand response programs, particularly if Congress adopts a cap-and-trade program to price greenhouse gas emissions.

## EFFORTS TO INTERACT WITH OUTSIDE PARTIES

BPA will continue to provide a portfolio of conservation programs that build on incentives offered by BPA to ensure that conservation targets are met at the least cost to our customers, BPA and the region as a whole. This will ensure the continued cost-effective reduction of greenhouse gas through energy efficiency. BPA will work collaboratively with its customers, energy service providers, non-profit entities, state and local government and others to help design and achieve effective, cost-effective conservation and demand management programs in as efficient manner as possible.

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## ENERGY EFFICIENCY ACTIONS

- ◆ Continue to pursue all cost-effective conservation in the load served by BPA.
  - ◆ Convene and complete a regional Energy Efficiency Task Force.
  - ◆ Quantify the greenhouse gas emission reductions and other environmental benefits of BPA's energy efficiency achievements.
  - ◆ Develop and implement strategies to achieve accelerated energy efficiency targets that are expected in the Sixth Power Plan.
  - ◆ Develop and implement a load management action plan.
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## V. TRANSMISSION SERVICES

BPA Transmission Services' primary responsibility is to provide a reliable and adequate transmission system to move power from generation to load. Over the past decade or so, others have increasingly relied on BPA's transmission system to help serve load at least cost. While the use of the system has increased, as in many transmission systems, investment has lagged behind the increase in use for a variety of reasons.

As the region's load grows, we expect our transmission to be used even more extensively. Load growth is expected to result in the addition of substantial amounts of new generation to the Northwest generation fleet. A significant portion of this new generation supply is likely to come from renewable resources, particularly wind power, although other technologies such as solar, geothermal and wave energy are likely to be included in the future mix of resources. BPA expects a significant portion of these new resources to use federal transmission and related services, such as integration and ancillary services to move power to load. This was borne out in BPA's first Network Open Season.

### NETWORK OPEN SEASON

In spring 2008, BPA conducted a Network Open Season for parties wishing to secure long-term firm capacity on our network transmission system. Participants were asked to sign "precedent agreements," which committed them to take service at a specified time and under specified terms.

The customer response exceeded expectations with 28 customers signing 153 agreements representing 6,410 MW. They also put up more than \$83 million in security deposits. Wind project interconnection requests made up 74 percent of the total (4,716 MW). Given that there are now about 1,500 MW of wind currently on BPA's system and approximately 3,000 MW total expected by the end of 2009, BPA is accelerating its efforts to tackle issues related to integrating large amounts of wind in the region.

This is likely to give rise to the need to construct additional transmission to support new generation. Similarly, new mandatory reliability standards may influence the timing and investment in transmission infrastructure. To support these responsibilities, BPA is implementing new approaches to evaluating needs and revenue support for new infrastructure.

BPA is in the process of developing a preferred plan-of-service based on the infrastructure needs resulting from the signed agreements. We will then evaluate the costs and revenues to determine if there is a viable business case under our Commercial Infrastructure Expansion and Financing Policy to justify additional investment. A key goal of the open season was to determine which transmission requests are supported by funding to support infrastructure construction. This helps assure that infrastructure needed to support new generation is built when and where needed.

Obviously, construction of transmission will result in greenhouse gas emissions from consumption of commodities. However, we believe much of the infrastructure in the current

queue will be used to support renewable resources in part to meet Renewable Portfolio Standards in the Northwest and California. On balance, BPA expects these activities to reduce greenhouse gas emissions below the levels they would have been had RPS not been adopted. By seeking to build transmission that better matches the needs of developers willing to put up the money, BPA's open season helps assure that the cost-effective transmission with minimal environment impacts gets built.

### COMMERCIAL INFRASTRUCTURE EXPANSION AND FINANCING POLICY

BPA plans to finance and build the facilities if there is adequate Point-to-Point revenue support for new transmission facilities, and if additional facilities are needed to reliably integrate new network resources for Network Integration (NT) customers. This new approach should result in a more robust system that reflects the needs of generators and merchants willing to make long-term commitments to pay for transmission service. It is anticipated that no distinction will be drawn between greenhouse gas and non-greenhouse gas emitting resources in determining which resources to integrate and in what order. As noted above, construction activities will result in modest greenhouse gas emissions.

### LARGE GENERATOR INTERCONNECTION CREDITS

Under our Large Generator Interconnection rules, BPA requires that generators provide advance funding for network facilities needed for interconnecting generators to the network. In exchange, BPA provides credits for the funding against transmission charges for service from the

generator. We have recently expanded our list of eligible transmission service for credits to provide a level playing field for resource development for both Point-to-Point and Network Integration customers. Again, BPA expects its interconnection credit policies will be greenhouse gas neutral, meaning no distinction will be made between greenhouse gas and non-greenhouse gas emitting generation in granting such credits.

### INTEGRATION OF RENEWABLE GENERATION

Meeting the firm transmission needs of generators will facilitate development of renewable energy. We expect that development of renewable resources, primarily wind generators, will continue within our balancing authority. Customers taking the output from these resources are likely to request long-term firm transmission service under the open season. The anticipated revenue support from new renewable resources will help ensure that we have adequate transmission to integrate renewable energy resources, although no preference will be given to greenhouse gas generation over non-greenhouse gas generation in granting service requests.

### WITHIN-HOUR BALANCING:

Intermittent resources, such as wind, increase the within-hour balancing requirements for our balancing authority. To establish cost recovery for the provider of the balancing capacity and to allocate costs to those creating the need for the balancing, BPA conducted and settled the Wind Integration Within-Hour Balancing rate case in early 2008. The rate applies to 2009.

As part of the non-rate terms and conditions of the settlement, BPA agreed to establish a wind integration team to further study balancing requirements and to develop ways to manage the impacts of wind and the associated balancing costs within our balancing authority. The team is now actively engaged; new methodologies developed by the team will be used in setting revenue requirements for rates for wind integration services for FYs 2010-2011.

Wind is fast becoming a major electricity source in the Northwest and across the nation. BPA along with the rest of the utility industry is now addressing how best to work large amounts of wind into the power grid in a manner that maintains system reliability while at the same time minimizing cost to consumers. As the largest transmission and power supplier in the Pacific Northwest, BPA is deeply involved in this regional and West-wide effort.

BPA currently has integrated about 1,500 MW of installed wind capacity within its Balancing Authority (also known as its control area). This is about 15 percent of the 10,500 MW peak load in the balancing area. Most of this generation does not serve load in BPA's balancing area but is serving loads in other utilities' balancing areas. Given current requests, BPA expects to see as much as 6,000 MW of wind capacity installed in its balancing area by 2013.

## WIND INTEGRATION TEAM

BPA supports the development of wind generation in the Northwest and is committed to taking on the challenges necessary for reliable integration of wind into our balancing area. To support this, and as fulfillment of commitments in the 2009 Wind Integration Rate Case

Settlement, BPA established the Wind Integration Team (WIT).

The WIT is a cross-business line team of experts that is analyzing the within-hour as well as near-term planning and operational effects of wind on the power and transmission system. In addition, the WIT is identifying and implementing tools to better manage the large amounts of wind power entering the Northwest grid. Some of the WIT activities include:

- ◆ Improving identification of the type of reserves needed.
- ◆ Determining how to supply the increasing reserve requirements:
  - The availability of the FCRPS to supply the increasing reserve requirements.
  - Third-party supply of generation inputs to the BPA Balancing Authority.
  - Participation in the Area Control Area Diversity Interchange.
- ◆ Determining how to potentially reduce the amount of capacity required:
  - Improve wind forecasts and scheduling.
  - Feed Forward Automatic Generation Control.
  - Wind output controls.
- ◆ Assessing wind power plant dynamic performance.

## FUTURE NETWORK TRANSMISSION RESOURCE PLANNING

Transmission Services is developing a more robust process to more accurately assess future resource needs and associated transmission for our NT customers. This collaborative process, which will involve BPA Power Services and NT customers, will provide a forum where BPA and customers can better understand future nonfederal resource requirements. Key outputs of this process include a determination of where resources will likely be located, how much resource will be acquired by customers and the expected transmission needs for those resources. This information will inform BPA’s planning processes so we can better manage these resources and build facilities when they are actually needed.

## CONTINUING EFFORTS TO PROVIDE ADDITIONAL TRANSMISSION SERVICE

We plan to periodically repeat the open season process to obtain commitments from customers. Where there is demonstrated need and revenue support, we will build additional facilities to maintain an adequate and reliable transmission system.

## EXPANDING INTERTIE TRANSFER CAPABILITY

Expanding the transfer capability of interties would increase BPA’s ability to move power from renewable generating resources into and out of the region. This would provide energy benefits by increasing transmission capability between wind-rich areas and load centers. In addition, increasing the geographic diversity of

wind resources likely would reduce overall balancing capacity needs. Transmission Services will scope a possible Intertie Open Season to assess the feasibility of expanding intertie transfer capability.

## SULFUR HEXAFLUORIDE (SF<sub>6</sub>)

SF<sub>6</sub> is an inert gas that has several industrial uses. The most common use is as an insulating gas in electrical equipment such as breakers and switches. SF<sub>6</sub> is also a powerful greenhouse gas, many thousands of times more harmful than carbon dioxide. BPA uses SF<sub>6</sub> as an insulating gas in high-voltage transmission equipment and has taken steps to minimize any leakage of the gas. BPA trains workers on proper handling of SF<sub>6</sub> and tracks all use of the gas. In 1999, BPA voluntarily joined the Environmental Protection Agency’s SF<sub>6</sub> Emission Reduction Partnership. In addition to these other initiatives, BPA also will voluntarily report any SF<sub>6</sub> emissions through the agency’s greenhouse gas inventory (discussed on page 3).

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## TRANSMISSION SERVICES ACTIONS

- ◆ Investigate development of a more robust transmission requirements assessment process.
  - ◆ Continue to pursue opportunities to expand a reliable transmission system to facilitate development of renewable resources.
  - ◆ Explore interregional transmission and the scope of a possible Intertie Open Season for the purpose of providing access to renewable-rich zones.
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- ◆ Continue to evaluate opportunities for BPA to participate in regional and extra-regional transmission expansion efforts initiated by other transmission providers.
  - ◆ Investigate improving wind forecasting and scheduling to potentially reduce the amount of balancing capacity needed to integrate wind.
  - ◆ Work with other Balancing Authorities to develop strategies for further facilitation of wind integration, including increasing dynamic transfer capability between Balancing Authorities.
  - ◆ Work with wind generators through the Joint Operating Committee to enable data transfer and to limit power output to schedules when needed for reliability purposes.
  - ◆ Continue to explore opportunities to acquire third-party supply of balancing resources for wind integration.
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## VI. ENVIRONMENT, FISH AND WILDLIFE

Climate change could pose an additional threat to fish and wildlife species in the region. These impacts have been described in the 2007 report of the Council's Independent Scientific Advisory Board. The impacts discussed include projected warming and related precipitation changes, which will affect snowpack, stream flow and water quality. Consequently, wildfire frequency and intensity is expected to increase, as is the incidence of insect outbreaks and other disease. Warming water in the tributaries and in the ocean is expected to result in a number of impacts to fish, including a loss of salmon and trout habitat, changes to normal flow regimes, changes in availability of nutrients and an increased presence of invasive species.

In order to address these impacts, the ISAB report recommends a number of mitigation actions. These actions include the integration of climate change impacts into subbasin modeling and planning, implementing habitat improvement actions that would reduce water temperatures in the tributaries, increasing or augmenting streamflows in summer and fall, acquiring conservation easements, adjusting artificial production programs (e.g. the timing of hatchery releases), removing stream barriers to allow fish passage into thermal refuges, managing changes in predation and modifying harvest management models to incorporate climate change.

These potential impacts and mitigation actions have been considered and addressed in the NOAA Fisheries 2008 Biological Opinion for the operation of the FCRPS. To a significant

extent, the biological opinion addresses potential impacts of climate change in its provisions for forecasting improvements, dry year strategies, predator management and habitat protection and improvements. In addition, under the adaptive management approach, BPA (and the other Action Agencies – the U.S. Army Corps of Engineers and Bureau of Reclamation) will continue to monitor and assess potential climate change impacts on hydrological and fish conditions, will report on new developments, will use adaptive management and will provide a mechanism to implement additional actions if appropriate.

On a broader level, BPA’s Fish and Wildlife Program has implemented and will continue to implement extensive habitat restoration projects throughout the Columbia Basin that directly and indirectly increase natural greenhouse gas sequestration. This positive effect of the program has been largely unexamined and unquantified. It is possible that by focusing on the greenhouse gas sequestration potential of the existing Fish and Wildlife Program, further positive enhancements could be achieved.

Some actions that may contribute to greenhouse gas reductions and which BPA will continue to fund, either through the biological opinion or other initiatives, are:

- ◆ Revegetating riparian areas with native plants.
- ◆ Improving mainstem and side channel habitat conditions.
- ◆ Protecting and enhancing riparian conditions through livestock exclusion fencing and native revegetation.

- ◆ Acquiring, protecting and restoring off-channel habitat.
- ◆ Protecting and restoring emergent wetland habitat and riparian forest habitat.

In addition to habitat actions in the agency’s Fish and Wildlife Program, BPA has other environmental responsibilities grounded in federal law. Specifically, the National Environmental Policy Act requires that the environmental impacts of all major agency actions be considered prior to implementation. Through NEPA, BPA already considers the greenhouse gas impacts of its actions through air quality and other analyses. However, there may be opportunities to enhance the consideration of greenhouse gas emissions during future NEPA processes, and we will investigate these opportunities.

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## ENVIRONMENT, FISH AND WILDLIFE ACTIONS

- ◆ Enhance agency understanding of contributions of the BPA Fish and Wildlife Program toward natural greenhouse gas sequestration.
  - ◆ Investigate methods for incorporating greenhouse gas emissions into National Environmental Policy Act documents.
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## VII. TECHNOLOGY INNOVATION

As the cost of managing greenhouse gas emissions grows, new technologies will be needed to reduce the region's greenhouse gas footprint. Currently, there is a significant gap between existing technologies and those required to address the coming climate-related business challenges. These technology gaps occur for several reasons: lack of commercially available solutions, lack of current utility scale applications – either globally or in the Pacific Northwest – or lack of any significant development in candidate technologies. Increasing cost pressures from rising commodity prices, increased concerns over global warming generally, tax and other policy incentives, the risk of an expensive cap-and-trade program, and other factors are creating strong incentives to develop new technologies that help address these issues. Fortunately, there are a number of promising new candidate technologies that have the potential to provide significant greenhouse gas reduction benefits in a wide range of contexts and applications in almost every segment of the electric power industry.

Many of the promising solutions proposed to fill gaps between low-carbon power supply and demand are in early-stage development. These solutions will require significant advancement before they are ready for full-scale deployment. It is therefore critical to fund research, development and deployment activities of these technologies at sufficient levels. BPA is committed to increasing its RD&D funding to 0.5 percent of revenues by 2013. Also critical is the need to prioritize funding and policy

decisions according to issues such as technology feasibility and gap filling.

BPA's Office of Technology Innovation uses a technology roadmap to address these issues in allocating its RD&D funds. This roadmap will be updated annually to include greenhouse gas reducing technologies as well as other RD&D efforts to improve services or reduce the cost of providing reliable, low-cost power to our customers.

Currently, BPA is funding the following RD&D technologies with high potential to provide greenhouse gas reduction benefits:

- ◆ Streamflow change measurement.
- ◆ Hydro operations improvements.
- ◆ Wind generation integration.
- ◆ Energy efficiency and demand response.

In the development of technology roadmap revisions to enhance our response to climate change, BPA will examine these additional technologies:

- ◆ Photovoltaics.
- ◆ Concentrating solar power.
- ◆ Enhanced streamflow forecasting.

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### TECHNOLOGY INNOVATION ACTIONS

- ◆ Revise BPA's technology roadmaps to emphasize projects that are climate-change related.
  - ◆ Explore with customers the potential value of increased funding for R&D projects.
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## VIII. ACCESS TO CAPITAL

Some of the possible initiatives and outcomes of the nation's and the agency's response to climate change could place substantial pressure on BPA to make new capital investments in the FCRPS. BPA has limited "self-financing" financial tools that are potentially available to finance construction of assets that can support the agency's climate change strategy.

BPA uses an array of capital sources to meet its large program initiatives, such as investments in the FCRPS for transmission construction and replacements, replacements and upgrades of FCRPS hydroelectric facilities, large fish and wildlife capital projects, and energy efficiency investments. Some of these programs are described elsewhere in this action plan as integral components of the agency's actions to contribute to reducing greenhouse gas emissions.

BPA's fundamental source of investment funds is BPA's revolving line of credit with the U.S. Treasury. However, BPA access to Treasury borrowing authority is limited, and, according to the agency's most recent Financial Plan of July 2008, BPA's Treasury borrowing authority could be fully utilized by 2016.

BPA continues to explore strategies for maximizing its current Treasury borrowing authority, is using its other authorities such as its lease-purchase authority for transmission system improvements and is exploring potential new alternatives that might be developed. As that process continues, greenhouse gas issues are likely to become an increasingly important

factor in both ongoing discussions about BPA's access to capital, as well as decisions on where best to deploy its capital dollars.

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### ACCESS TO CAPITAL ACTIONS

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- ◆ Investigate opportunities for incorporating greenhouse gas issues into further analyses related to BPA's access to capital borrowing, the adequacy of funding sources and allocation of capital across agency programs.
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## IX. INTERNAL OPERATIONS

BPA operates under broad responsibilities for environmental stewardship. Current actions are part of a continuous focus to reduce our environmental footprint. The backbone of the current internal effort is to comply with Executive Order 13423, which addresses internal infrastructure activities to reduce the federal government's energy use and minimize climate change impacts.

### ENVIRONMENTAL STEWARDSHIP IN BPA'S MISSION AND OBJECTIVES

BPA's vision statement says explicitly: "BPA will be an engine of the Northwest's economic prosperity and environmental sustainability." In 2008, BPA adopted a new strategic business objective addressing greenhouse gas mitigation.

As part of its new objective, BPA will engage with the region to support greenhouse gas mitigation and will integrate greenhouse gas mitigation considerations into all relevant internal decisions and processes to ensure internal compatibility. We will include greenhouse gas emission implications as an important criterion in evaluating and selecting strategies and actions for meeting our other environmental and fish and wildlife objectives. Additionally, we will track and report our greenhouse gas emissions.

### COMPLIANCE WITH EXECUTIVE ORDER 13423

On Jan. 24, 2007, President Bush signed Executive Order 13423, Strengthening Federal

Environmental, Energy, and Transportation Management. The new executive order strengthened key energy efficiency goals for the federal government. As the nation's single largest energy user, the federal government is obligated to lead by example to meet the president's agenda to reduce dependence on foreign oil and conserve resources.

The order calls for:

- ◆ Reduction of greenhouse emissions.
- ◆ Increased on-site renewable energy generation.
- ◆ Reduction of water consumption.
- ◆ Use of sustainable environmental practices.
- ◆ Reduction of toxic and hazardous chemicals.
- ◆ Reduction of fleet consumption of petroleum products.
- ◆ Assurance that new construction and major renovations comply with new standards.
- ◆ Compliance with the Environmental Protection Agency's Electronic Product Environmental Assessment Tool (EPEAT) and EPA/DOE Energy Star requirements for new products. The executive order requires agencies to acquire EPEAT-registered electronic products for at least 95 percent of electronic product acquisitions, unless there is no EPEAT standard for the product.

The Department of Energy wants to:

- ◆ Be the first agency to meet all the goals and requirements of the president's executive order.
- ◆ Exceed the executive order goal in several key areas, including reduced energy intensity and greenhouse gas emissions,

building efficiency, clean energy production and use and fleet management.

- ◆ Lead all federal agencies in overall environmental, energy and transportation management.

## DOE TEAM INITIATIVE

The Secretary of Energy has established a Transformational Energy Action Management (TEAM) Initiative. He urged all DOE facilities to have contracts in place and signed with Energy Services Companies (ESCOs) by Sept. 30, 2008, to finance actions required to meet executive order goals. Note: Energy dollar savings will be paid to the ESCOs to recoup their investment, and therefore there will be no reduction in energy costs until sometime in the future.

**BPA EXEMPT FROM TEAM:** Due to BPA’s unique authorities, we are exempt from the DOE TEAM Initiative. However, BPA is committed to help the president and the secretary achieve the goals of Order 13423. These goals are consistent with BPA’s new strategic business objective S9 – Greenhouse Gas (BPA encourages and implements integrated, cost-effective policies which lead to greenhouse gas emission reductions). As with previous executive orders, BPA will implement this executive order using sound business judgment and within existing operating budgets established by our rate cases.

**COMMITMENT TO ENERGY EFFICIENCY:** BPA has been committed to energy efficiency for more than 20 years under the Northwest Power Act and has made significant progress in achieving the energy efficiency goals of the region and the federal government. Since BPA’s Energy Efficiency Group is a DOE approved

and authorized UESC (Utility Energy Services Company), we will use our own energy efficiency expertise in lieu of an ESCO to achieve strategic business objective S9.

BPA has been recognized for its many energy efficiency achievements. In July 2007, the City of Portland’s Office of Sustainable Development presented BPA with a BlueWorks award for BPA’s commitment to going above and beyond the norm with its waste reduction, recycling and sustainability practices. In 2006, the American Council for Energy Efficiency recognized BPA as a national “Champion of Energy Efficiency.” In 2005, BPA was named a “Star of Energy” by the Alliance to Save Energy; the Natural Resources Defense Council nominated BPA for its work in non-wires alternatives and in conservation. In November 2004, BPA was recognized as a gold partner in the Federal Electronics Challenge pilot, whose members seek to reduce environmental and energy impacts of federal government acquisition, use and disposal of electronic equipment. In 2003, the Leadership in Energy and Environmental Design (LEED) Green Building Rating System™ funded LEED Certification for the AMPERE building and gave BPA a Silver rating.

## RECENT INTERNAL ACTIONS

BPA’s commitment to sustainability and environmental stewardship starts at home. Here are highlights of recent related activities at our facilities.

**COMPLETING PCB CLEANUP:** Summer 2008 marked the completion of our Polychlorinated BiPhenyls (PCBs) Capacitor Replacement Program. Since 1991, we have replaced more than 100,000 capacitors

containing PCBs on our transmission system at a cost of over \$102 million. The program grew out of an agreement we signed with the Environmental Protection Agency in 1985. At the time, we committed to conduct a planned and organized approach to toxic waste clean up.

The agreement did not specifically mention capacitors, but BPA took the additional step of not returning PCB capacitors to a yard that had been cleaned up. This is in line with our vision and core values of responsible environmental stewardship.

**REDUCING DEPENDENCE ON FOSSIL FUELS:** All of our diesel-fueled vehicles can run on bio-diesel. We also have 275 ethanol (E85) vehicles in our fleet. A fueling station at the Ross Complex provides both bio-diesel and E85. We are working to add alternative fuel availability to field locations or, where that isn't possible, find alternative fuels sources in local communities.

We have six local-use electric vehicles at our Ross Complex that are 100 percent electric – that is, they are plugged in at night and can run, depending on the vehicle, between two-to-six hours each day. We also have three hybrid vehicles in the motor pool with five more on order. We have one propane vehicle.

**CUTTING ENERGY CONSUMPTION AT HEADQUARTERS:** A 12 percent reduction since 2000 has resulted in \$50,000 annual savings. Hallway lighting was reduced 50 percent; cooling tower energy consumption was cut in half by upgrading to induced draft fans; pump motor energy consumption was reduced 25 percent by upgrading to variable frequency drives and motion detectors were added to meeting room lights. Half the elevators

are turned off weekends, holidays and off-peak working hours. Motion detectors shut off power to soda machines at night and on weekends, and the computer that controls after-hours lighting was re-commissioned.

**REPLACING HVAC SYSTEMS AT SUBSTATIONS:** More energy-efficient heating, ventilating and air-conditioning systems have been put into 80 substations in the last decade. This has reduced energy consumption by over 15 percent, while making our control and communication systems more reliable.

**BUYING GREEN POWER FOR OUR BUILDING:** Today, 12 percent of the energy for our headquarters comes from renewable wind power. BPA is a “Blue Sky Champion,” which is the highest level of participation in PacifiCorp’s green program. PacifiCorp is the retail utility that serves headquarters.

**CURRENTLY CONDUCTING UPGRADES AT ROSS:** Ross is the central complex for our transmission facilities. Work includes upgrading lighting, installing motion-activated faucets, waterless urinals, two-flush toilets, variable drives for electric motors, non-CFC refrigerant in all replacement HVAC equipment, and ensuring all new heat pumps are high efficiency units with free cooling (e.g., 100 percent outside air when conditions are appropriate).

**MANAGING TRANSPORTATION:** This effort includes encouraging mass transit, carpooling, telecommuting programs and use of renewable fuel. BPA participates in Tri-Met’s bus and light-rail PASSport program, in which more than 650 employees at headquarters take advantage of the agency-sponsored annual passes to ride the bus or light rail to work. This is about 20 percent of the workforce.

BPA encourages carpooling by offering building parking for carpoolers, and more than 100 employees participate in the program.

Complimentary racks have been set up for 70 bicycles in the basement parking area with capacity for 20 more bicycles on outside racks. Bike commuters have use of storage lockers adjacent to inside racks. Twenty-five slots for motorcycle/scooter commuters see over 60 percent use.

### ENCOURAGING EMPLOYEE

**SUGGESTIONS:** While preparing to meet the challenges of Executive Order 13423, BPA sought the input of employees for potential actions that would help reduce the agency’s environmental footprint. BPA will create an ongoing employee forum to solicit and discuss ways to implement new greenhouse gas reduction ideas.

### COMPETENCY GAP ANALYSIS

As greenhouse gas reduction efforts mature, BPA will need to increase its expertise in managing effective greenhouse gas-related programs. Obviously, in some areas, such as energy efficiency, BPA’s skill in developing greenhouse gas-compatible strategies and programs is well honed. However, in other areas, such as trading greenhouse gas emissions credits, we may need to develop additional expertise. Similarly, we may need additional expertise to develop an aggressive program to create, manage and market greenhouse gas “carbon credits” that can be sold to offset the costs of buying carbon emission credits. As a first step in developing expertise in these areas, BPA will continue to track and understand regional and federal legislation and the potential impacts on the Northwest and on BPA. BPA

employees are actively engaged in analyzing these legislative and regulatory proposals and will continue to do so in support of identifying gaps in BPA's staff-level competencies. Additional expertise also may be needed for the following activities.

- ◆ Accurately assessing BPA’s greenhouse gas footprint to minimize its exposure to “cap-and-trade” risk.
- ◆ Pricing and trading carbon credits and Renewable Energy Credits to manage BPA’s greenhouse gas compliance and reduction programs.
- ◆ Auditing compliance.
- ◆ Maximizing benefits of operating a low-carbon hydro and nuclear generating system.
- ◆ Reducing BPA’s greenhouse gas cost exposure when it has to rely on purchases from a market that includes greenhouse gas emitting resources.
- ◆ Maximizing the revenue from selling surplus, low-carbon-content power.
- ◆ Deploying capital in ways that minimize greenhouse gas emissions over time when building infrastructure.
- ◆ Managing our vehicle and aircraft fleet.
- ◆ Managing a large, complex power system.

It’s difficult to overstate the impacts that greenhouse gas emission limits could have on the electric sector. The energy consulting firm E3 has noted that meeting greenhouse gas reduction targets will require the Western Electricity Coordinating Council to add 440,000 aMW of non-emitting resources to its resource base by the year 2020. WECC notes that this would necessarily include the

integration of expensive resources such as solar energy in California and Arizona. Gas prices are likely to rise significantly as developing world growth creates new energy demands, while the developed world searches for low-carbon energy options. Greenhouse gas limits could affect the industry in the following ways.

- ◆ Reduced generation options.
- ◆ Potential fuel switching to electric from transportation fuels (i.e., plug-in hybrid electric vehicles).
- ◆ Strong upward pressure on the price of lower-emission fuels (liquefied natural gas, natural gas).
- ◆ Changed Renewable Energy Credit/ Renewable Portfolio Standard rules.
- ◆ New demands for R&D investment in clean energy options.
- ◆ Increased imperative to invest in energy efficiency, smart metering, high-efficiency transmission, etc.
- ◆ Increased pressure to organize transmission management/sales through regional transmission organizations (due to the pressure to optimally dispatch resources).
- ◆ Development of new, high-value markets for greenhouse gas emission permits.

BPA needs to be prepared to optimally participate in this new clean-energy future, preserving the value of our existing system while anticipating new demands on the region's generation and transmission resources. To ensure that BPA is prepared for this future, BPA's Human Capital Management group will complete a Greenhouse Gas Competency Gap Analysis by the end of calendar year 2008.

BPA will:

- ◆ Identify skills that the agency will need to operate in a greenhouse gas-restricted future (perhaps consulting with European utilities that are already subject to greenhouse gas restrictions and emission permit requirements).
- ◆ Assess the degree to which BPA staff are already proficient in greenhouse gas knowledge/skills and the degree to which there are greenhouse gas reduction skill proficiency gaps at BPA.
- ◆ Determine the best way to fill any gaps, whether through training and development of existing employees, recruiting new employees and/or incorporating greenhouse gas reduction skills in workforce planning.

Appendix A shows, as a point of reference, a preliminary consideration of greenhouse gas reduction skill and information needs.

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## INTERNAL OPERATIONS ACTIONS

- ◆ BPA will create an ongoing employee forum to solicit and discuss ways to implement new greenhouse gas reduction ideas.
- ◆ Conduct a greenhouse gas competency gap analysis by the end of calendar year 2008.

### EXECUTIVE ORDER 13423

- ◆ Help DOE achieve its goals, consistent with BPA's new S9 business objective and within existing operating budgets.
  - ◆ Identify where BPA might do more at low cost consistent with budget and other financial objectives.
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- ◆ Determine the baseline on BPA’s energy use.
  - ◆ Determine the amount of energy reductions already achieved.
  - ◆ Establish any additional energy reductions needed to comply with the executive order.
  - ◆ Update the schedule for further energy audits for BPA’s significant facilities.
  - ◆ Finalize action items for complying with the order.
  - ◆ Identify major facilities where there are 10 or more employees and water facilities are metered (14 sites).
  - ◆ Determine actual water use for baseline year 2007.
  - ◆ Conduct water audits at Portland and Vancouver.
  - ◆ Review other sites included in major facilities list.
  - ◆ Determine further action steps to reduce water use.
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## X. CONCLUSION

### THE PATH FORWARD

This BPA climate change initial roadmap has been created at a dynamic time in the understanding of climate change and in the regulatory setting. As such, BPA views this roadmap as a “living document” to be regularly reviewed and updated as significant new circumstances arise. BPA expects that climate change issues will be a growing source of challenges the agency faces and has prepared this roadmap as a first step in preparing to meet those challenges.

## APPENDIX

### PRELIMINARY GHG SKILL/KNOWLEDGE NEEDS BY FUNCTION

FUNCTION	GHG SKILL/KNOWLEDGE NEEDS
Power Pricing	Understand impacts of GHG limits on cost of market purchases. Understand impacts of GHG limits on value of market sales. Understand impacts of GHG limits on gas/fuel prices. Understand new markets for emission permits.
REC/Renewables Trading	Understand potential impacts of GHG policy on value and nature of RECs.
Power Traders	Understand impacts of GHG limits on demand for hydro. Understand impacts of GHG limits on value of market sales. Understand how to participate in markets for emission permits.
Transmission Planning	Understand impacts of GHG limits on the demand for transmission construction, integration of renewables, reliability, etc.
SF6 Management	Understand impacts of GHG limits on the demand for shared information on BPA's exemplary SF6 management program.
Rates / Contracts	Understand how to best incorporate CO <sub>2</sub> costs into rate making and contracts.
Facilities Management	Understand how to best incorporate cost of CO <sub>2</sub> emissions in facilities management/operations.
Constituent Account Executives	Understand new legislative proposals, impacts on customers and states.
Transmission Account Executives	Understand new legislative proposals, impacts on customers, reporting requirements, etc.
Power Account Executives	Understand new legislative proposals, impacts on customers, reporting requirements, etc.
Risk	Understand whether to include GHG cost as an enterprise risk.
Environment, Fish & Wildlife	Understand: GHG Inventory options. CO <sub>2</sub> sequestration benefits. Fish impact and mitigation measures.
Hydro Ops	Understand potential impacts of climate change on hydro supply, timing and impacts on fish and wildlife.
Communications	Be able to respond to questions about new regulations, impacts on BPA, hydro impacts, etc.
Legal	New demands on contracts.
Energy Efficiency	Be prepared for new pressures to increase EE activities.
National Relations	Understand new legislative proposals.
Strategy and Governance	Understand new policies, potential impacts on BPA, etc.
Technology Innovation	New R&D demands for new GHG-limited environment.