BP-14 Generation Inputs Workshop

August 8, 2012

Agenda

Introduction

- This is the seventh generation inputs workshop of the BP-14 Rate Case. Another workshop is scheduled in August 2012.
- Workshops will be posted on the BPA agency calendar. Tech Forum notices will inform you of the dates and provide the link to workshop materials.
- These workshops are discussions between BPA and customers and stakeholders prior to BPA crafting an Initial Proposal.

Provision of Balancing Reserves from the FCRPS

Presentation Scope

- Identify sources of uncertainty that affect the general ability of the Federal Columbia River Power System (FCRPS) to provide reserves on a planning basis.
- Identify conditions during which the amount of balancing reserves available from the FCRPS must be limited.
- Provide BPA staff's expert judgment regarding available Balancing Reserves.
- Provide an indication of the difference in reserve availability if BPA were not able to limit reserves or to implement DSO 216.

FCRPS Background

- The FCRPS is a very energy and storage limited system.
  - Federal storage about 30 million acre-feet (Maf), which is a fraction of the annual runoff.
  - The Colorado and Missouri systems can store two to three times the annual runoff on their systems.
  - Limits the ability of the FCRPS to provide flexibility for balancing reserves
    - Flexibility for balancing reserves is either capacity resulting from passing additional water from a dam or storage resulting from holding additional water behind a dam.

FCRPS Background continued

- The US Army Corps of Engineers (USACE) and the Bureau of Reclamation (BOR) operate the federal dams for multiple public purposes while BPA manages to system hydraulic objectives:
  - Flood Control
  - Navigation
  - Fish Operations (Endangered Species Act, Clean Water Act)
  - Irrigation
  - Recreation
  - Resource Integration
  - Reliability
  - Safety
  - “High Priority Objectives” = Flood Control, Fish Operations, Reliability, Safety

Sources of Uncertainty

- Energy production is driven by the need to manage water to meet these objectives, which can often conflict, in the most economic way possible while meeting load obligations.
  - There must be sufficient flexibility in our resources to handle uncertainties.
  - Long-term and short-term energy markets are used to buy and sell energy necessary to shape load to meet operational objectives.
  - Standing ready and holding flexibility for balancing reserves results in a more constrained FCRPS operation.
- **In order to manage the FCRPS to meet operational objectives and load obligations, consideration is given to a number of different sources of uncertainty**
  - Streamflows
    - Variation in the annual runoff volume and shape.
    - Short-term streamflows can rise and drop unexpectedly.
  - Project Operations
    - “High priority” operational objectives can change very quickly.
    - Nonfederal hydro projects interconnected to the FCRPS can change operations unexpectedly.

Sources of Uncertainty continued

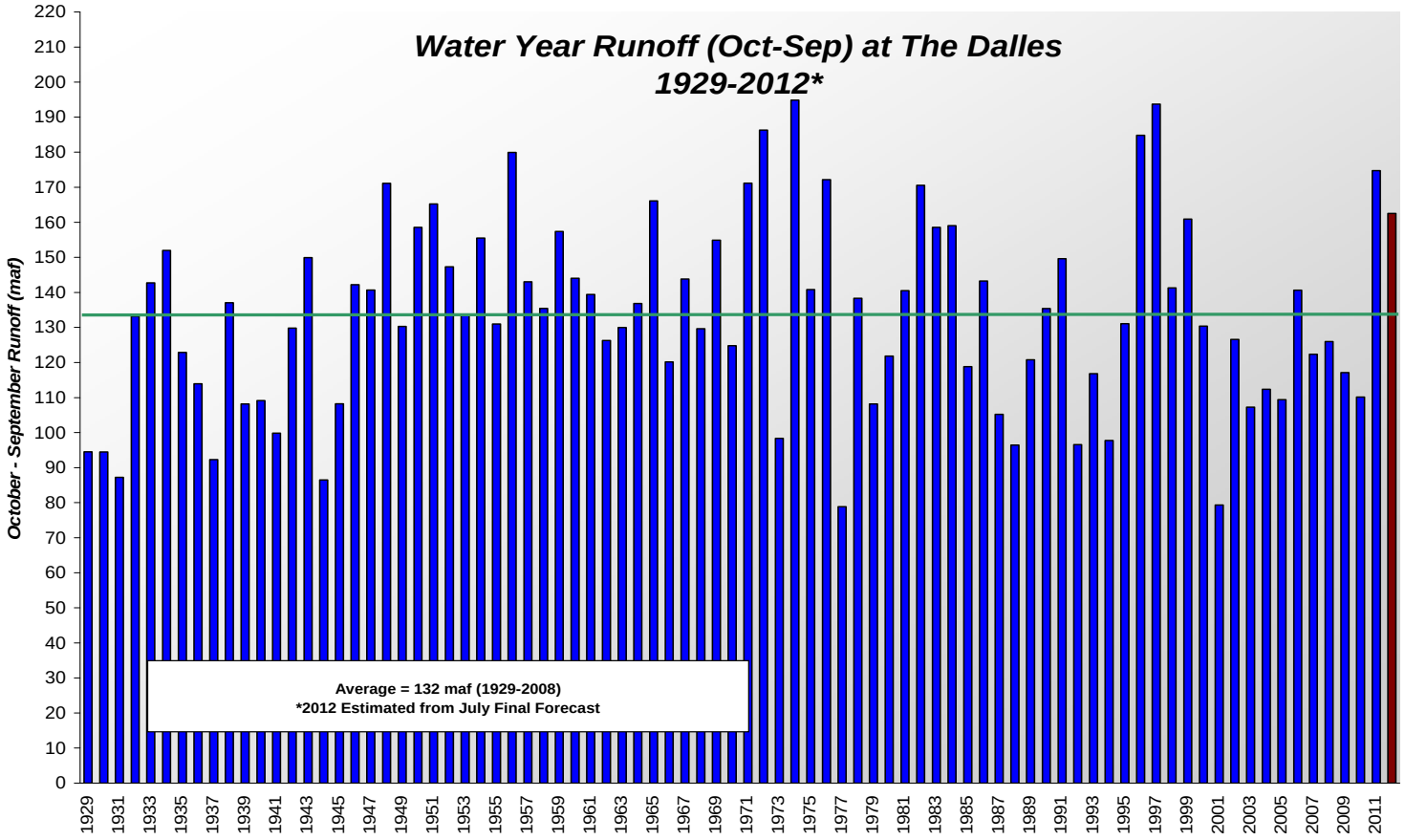
- **In order to manage the FCRPS to meet operational objectives and load obligations, consideration is given to a number of different sources of uncertainty**
  - Loads/Obligations
    - Driven by temperatures which can deviate from forecasts
    - Products offered by BPA (such as Slice) allow for schedule changes up to the hour of delivery.
  - Unpredictable Balancing Reserve Deployment - The pattern of reserve deployments is changing as the fleet grows, customer scheduling and marketing practices change, and BPA offerings evolve.
    - Deployment of balancing reserves may cause FCRPS projects to inadvertently run into hard project limits.
  - Resource Performance
    - Unit Outages
    - Intermittent generation serving BPA load obligations

Sources of Uncertainty continued

- In addition to carrying reserves to balance mismatches between generation and load, BPA hydro schedulers establish an "operational buffer" applied in real-time that "stands ready" in case conditions change.
  - FCRPS flexibility is set aside to handle uncertainties.
  - BPA carries a calculated amount of contingency and balancing reserves.
- There must be sufficient flexibility in our resources to handle these uncertainties.
  - To ensure that load and operational objectives are met FCRPS system load is re-shaped in long term and short term energy markets to retain operational flexibility.
    - Short-Term energy markets = day-ahead and real-time hourly energy markets
  - BPA assumes that deployment of balancing reserves will not result in energy storage or use of energy over time. If energy storage or use due to deployment of balancing reserves exhausts the operational flexibility of the FCRPS, flexibility to provide reserves may be limited
  - If these energy markets are not sufficiently liquid, then the amount of flexibility available for balancing reserves at any point in time may be constrained below planned amounts.

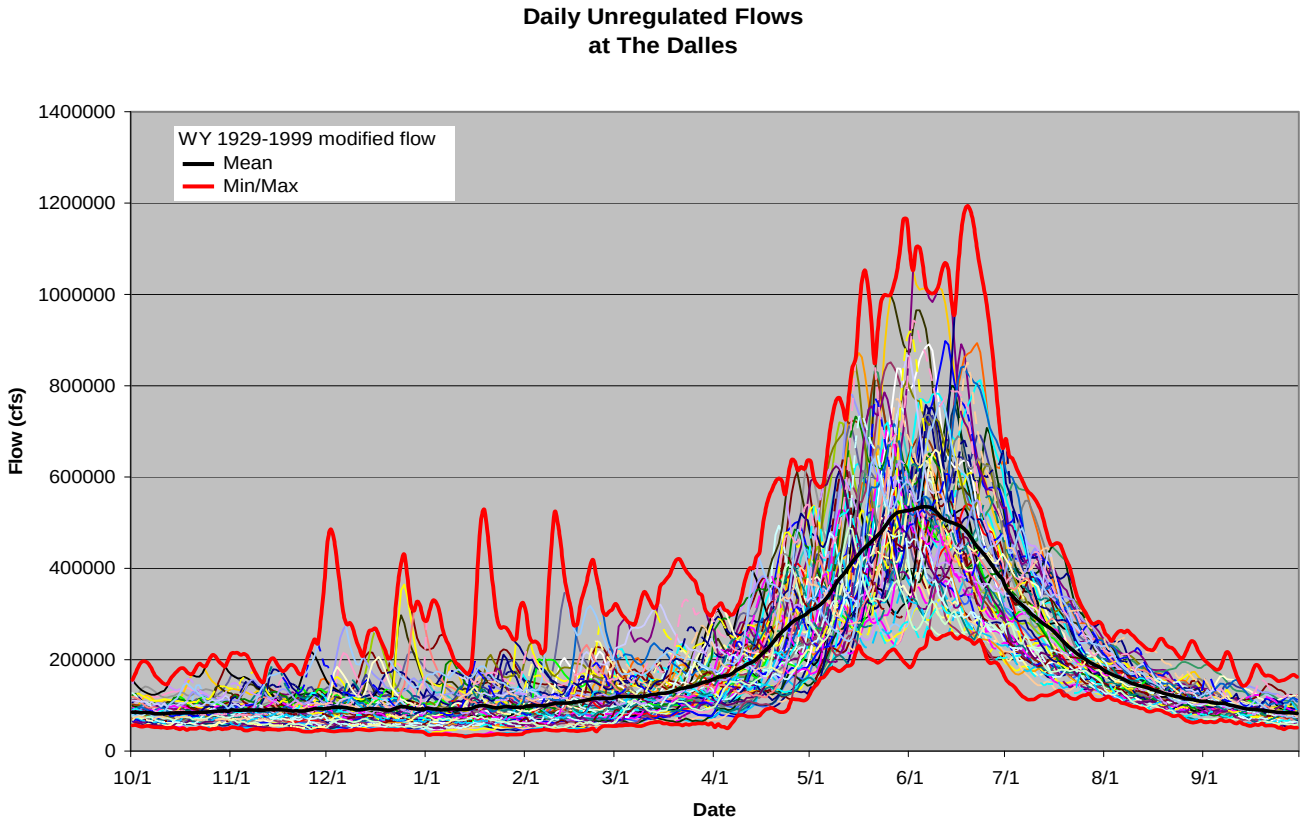
Uncertainty in Runoff Volume

- The annual runoff volume can vary between 79 Maf and 195 Maf
  - 1 Maf is approximately equal to 1000 MW-months but the amount of energy can vary depending upon where in the basin the water comes from.
  - The amount of flexibility available to provide balancing reserves at any point in time is highly dependent on fuel supply.



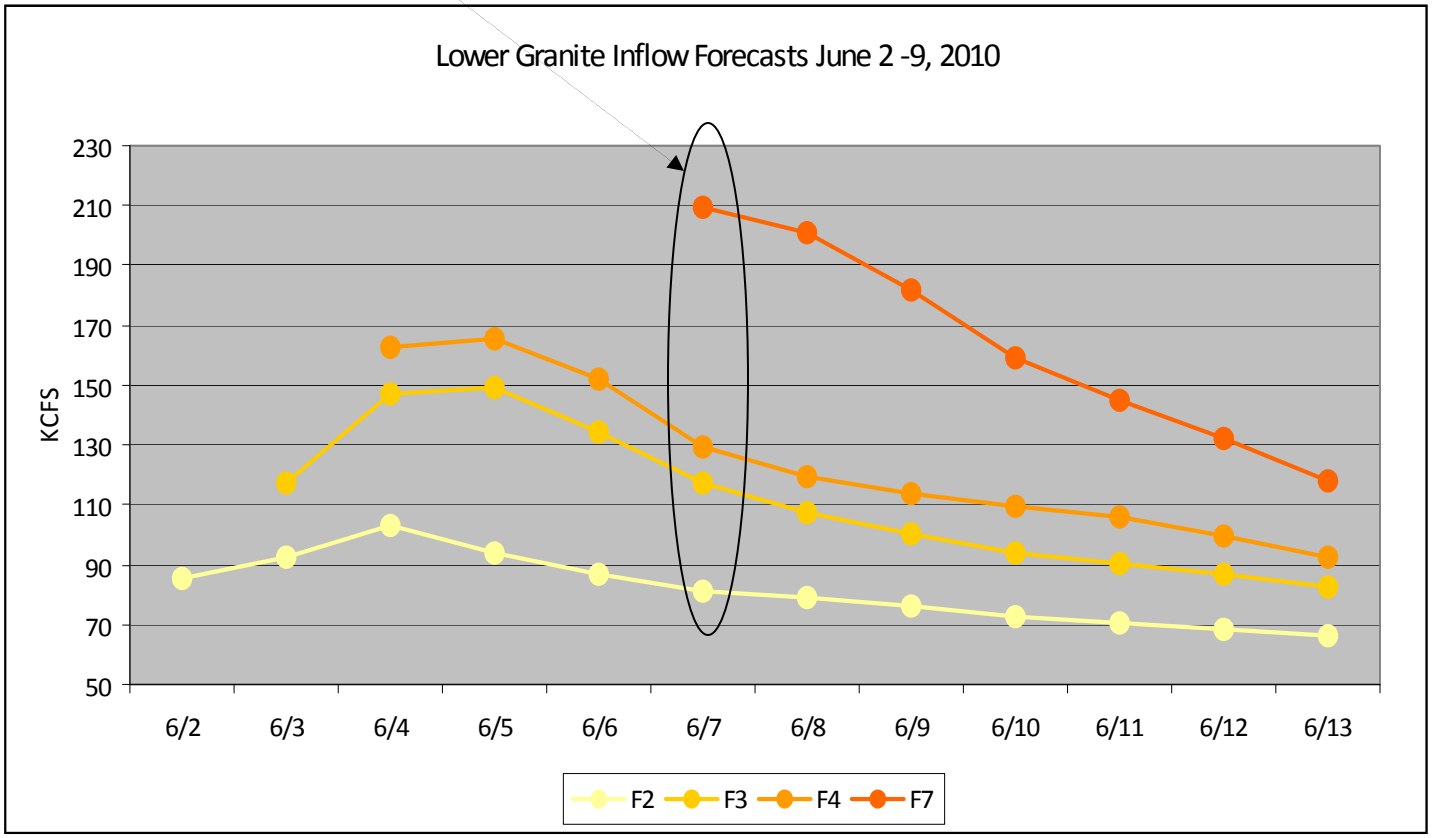
Uncertainty in Runoff Shape

- The timing of when runoff occurs (the “shape”) is a function short-term weather events and the geographical distribution of the snowpack (i.e., southern parts of the basin come off earlier).
  - The amount of flexibility available to provide balancing reserves at any point in time is highly dependent on fuel supply



Uncertainty in Streamflows

- In addition to short-term weather events, changes in upstream project regulation can dramatically change the forecasted flows in the river.
  - The following example of actual BPA Lower Granite inflow forecasts generated in June of 2010 show that the projected inflow into Lower Granite on June 7th ranged from 81 to 210 thousand cubic feet per second (KCFS), nearly 130 KCFS of variation in forecast prior to the event.
  - Short-term streamflow uncertainty can force reliance on short-term energy markets for the purpose of meeting operational objectives. If these energy markets are not sufficiently liquid, then the amount of flexibility available for balancing reserves at any point in time may be limited.



Uncertainty in Project Operations

- The US Army Corps of Engineers (USACE) and the Bureau of Reclamation (BOR) operate the federal dams for multiple public purposes:
  - Flood Control, Navigation, Fish Operations (Endangered Species Act, Clean Water Act), Irrigation, Recreation, Resource Integration, Reliability, Safety
  - BPA coordinates FCRPS operations with the USACE and BOR to meet these public purposes in the most economical way possible
  - However, these operational objectives can change very quickly and dramatically
    - Short-term changes to operational objectives can force reliance on short-term energy markets to reshape load to meet operational objectives. If these energy markets are not sufficiently liquid, then the amount of flexibility available for balancing reserves at any point in time may be limited.

Uncertainty in Project Operations continued

- Example: Grand Coulee (GCL) April 30th Flood Control Elevations for 2012

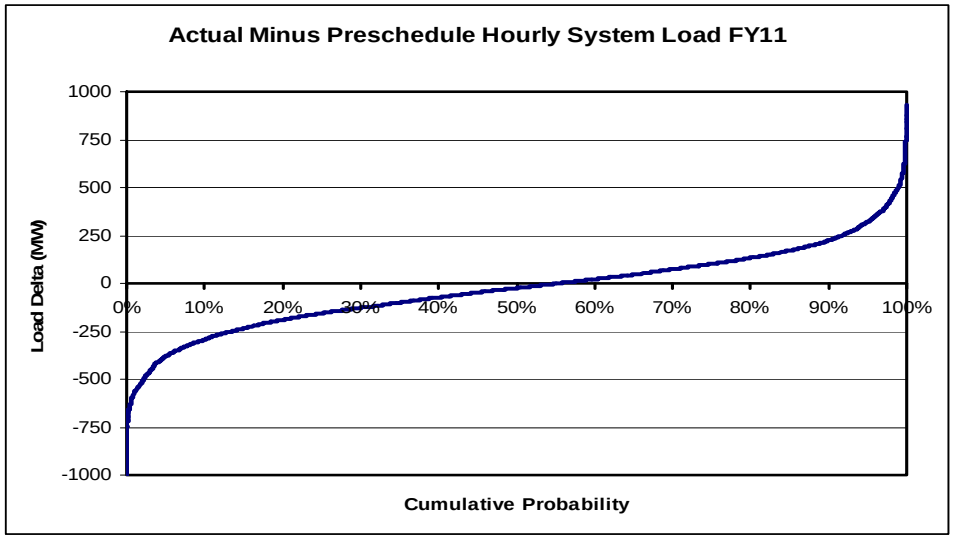
Forecast Month	GCL April 30 FCE
January	1276.2 feet
February	1253.9 feet
March	1237.0 feet
April	1220.2 feet

  - On April 25th, the USACE requested a halt to GCL draft at 1227.3 feet due to flooding concerns downstream in a significant decrease in GCL outflows for the remainder of the month.

- Non-Federal projects are scattered across the FCRPS and, while there is some coordination, these projects operate to meet their own objectives while dealing with their own uncertainties.
  - Canadian projects, Mid-Columbias, Hells Canyon complex, Pend Oreille projects

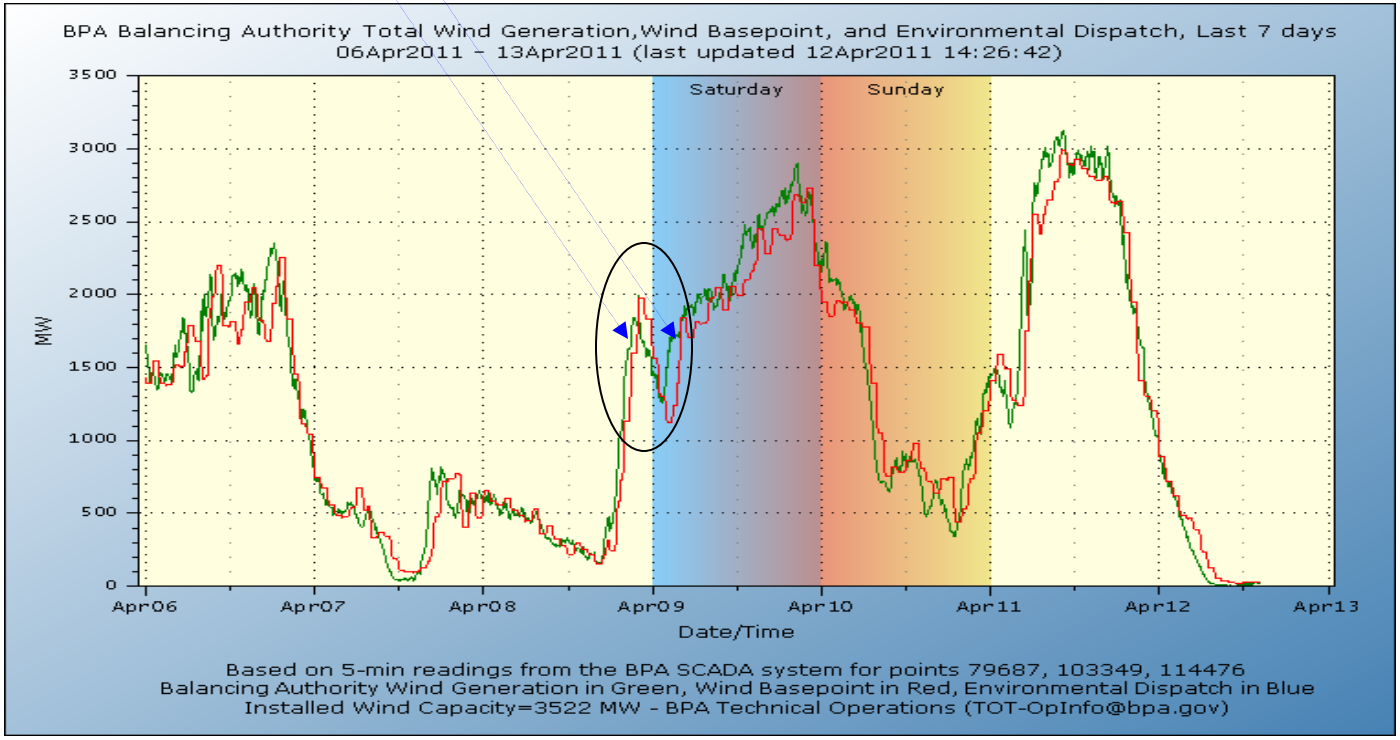
Load/Contracts Uncertainty

- A portion of FCRPS load obligations are load following and therefore temperature-driven, so error in temperature forecasts results in errors in system load forecasts.
  - The majority of this forecast error is resolved prior to the hour and is therefore different from regulation and load following, which are within-hour concepts.
- Some products offered by BPA (such as Slice) allow for schedule changes up to the hour of delivery.
  - Analysis of historical data scaled up to the new Slice percentages indicates that this uncertainty is +/- 125 MW with a 95% confidence band.
- Short-term load uncertainty can consume FCRPS flexibility in meeting operational objectives. If energy markets are not sufficiently liquid, then the amount of flexibility available for balancing reserves at any point in time may be limited.



Reserve Deployment Uncertainty

- Balancing Reserves
  - Incremental (*inc*) reserves: capacity that is reserved for when generation drops or falls below the schedule within an hour or loads are higher than scheduled within the hour.
  - Decremental (*dec*) reserves: generation above minimum that is reserved for when generation increases or is above the schedule within an hour or loads are lower than scheduled within the hour.
  - For May 2012 with a wind fleet of over 4500 MW installed capacity, the amount of balancing reserves sourced from the FCRPS are 750 MW *inc* and 958 MW *dec*
  - Accumulation of balancing reserve deployment can store or draft energy from the FCRPS which can limit the ability of the FCRPS to provide balancing reserves in subsequent hours.



Resource Performance Uncertainty

- The mainstem FCRPS hydro projects have about 160 generating units that range in size from 16 MW to 825 MW.
  - Since the FCRPS is fuel-limited, the ability to generate all available units at their rated value is rare.
  - In addition, BPA manages the output of the Columbia Generating Station worth about 1100 MW.
- Forced unit outages can happen at anytime.
  - Contingency reserves are deployed in these events and can cover the outage for up to 90 minutes.
  - However, after the time window for deploying contingency reserves, FCRPS system flexibility and/or the short-term market must be used to cover the lost energy, which may limit the amount of balancing reserves that are available. Currently capacity cannot be replaced.
  - The bigger the unit that is forced out, the bigger the limit on FCRPS system flexibility available for providing balancing reserves.
- Intermittent generation that is difficult to forecast impacts both FCRPS system flexibility and the depth of short-term markets.
  - BPA has acquired the output of approximately 300 MW of wind generation.

Conditions When FCRPS Cannot Provide Balancing Reserves

- The FCRPS cannot provide balancing reserves beyond what is needed for load when one of the following occur:
  - "High Priority" operational objectives cannot be met
    - Project limits (minimum/maximum flow, elevation, etc…),
    - Biological Opinion (fish passage spill, 1% limits, etc…)
    - Spill within acceptable Total Dissolved Gas (TDG) standards
    - Flood control objectives
    - Project and Human Safety
    - These limitations on balancing reserves may result from hitting these constraints "now" or the need to position flexibility for existing obligations in future periods.
  - System reliability is jeopardized
    - Conflicts with required contingency reserves.
- The ability of the FCRPS to provide balancing reserves is limited by the uncertainties discussed earlier in this presentation.
  - FCRPS system flexibility must be held to manage the uncertainties.

Reserve Deployment and Conflicts with Operational Objectives

- Some examples of operational constraints which limit reserve availability:
  - Grand Coulee
    - Draft limits can constrain the ability to carry reserves –1.5 foot draft limit protects the forebay from sloughing.
    - Tailwater ramp limitation restricts the rate of reduction in discharge to protect banks below the project from sloughing.
  - Reserve deployment may cause anomalous forebay readings when project discharge is changed rapidly
    - At John Day, this can cause the forebay readings to fluctuate by as much as a foot that cycles every few hours and can take as long as a day to dissipate
  - Carrying reserves at projects which spill for fish passage can result in missing the spill amount specified in the Biological Opinion and creates risk of operating outside of the specified 1% efficiency range.
    - Variances from these spill amounts are reported monthly during fish passage season to the US District Court.
    - Hydro schedulers are instructed to avoid these conditions

Reserve Deployment and Conflicts with Operating Objectives continued

- Some examples of operational constraints which limit reserve availability (continued):
  - Carrying reserves in high flows limits the amount of generation that can be produced by the FCRPS
    - During high flows in the past two springs, *inc* reserves have been reduced when TDG levels exceeded the Washington water quality standards
    - However, a minimum amount needs to be carried for load balancing
      - *Inc* reserves were reduced to 400 MW for several weeks in 2011 and 2012.
    - Looking at HYDSIM rate case studies for FY 2014 and an estimate of the amount of spill that equates to the Washington water quality standard, it is possible to determine the impact of carrying *inc* reserves on spill due to lack-of-turbine for each month of the 80 year water year set.
      - With 900 MW of *inc* reserves, there is about a 1-in-5 chance that the Washington water quality standard would be exceeded for at least a month.
    - As BPA has gained experience operating in constrained conditions reserve management strategies have been refined to minimize reductions.

Insufficient Spinning Reserves

- A fast deployment of balancing reserves may leave the system in a condition where there are insufficient spinning capability for contingency reserves as determined by Western Electricity Coordinating Council (WECC) and North American Electric Reliability Corporation (NERC).
  - The Generation and Reserves Dispatch (GARD) model has been modified to analyze running into this condition.
    - The model records for each month and water year the lowest 10-minute average "surplus" spinning reserve observed while deploying balancing reserves.
    - The average of all the surplus spinning values is then taken across all months and water years by heavy load hour (HLH) and light load hour (LLH).
    - Model results show that carrying a 900 MW *inc* and 1100 MW *dec* balancing reserve obligation results in at least one month in every water year when the lowest surplus spinning reserves is between -19 MW and + 46 MW assuming no consumption of flexibility for prior to hour uncertainty.
  - We have seen examples in real operations where dealing with all of the uncertainties and deploying *inc/dec* reserves may have left us with very limited spinning capability for contingency reserves.

Transmission Limitations That Affect FCRPS Operations

- For reliability reasons carrying all reserves at one or two projects is not advisable.
  - Geographical diversification of generation resources carrying reserves ensures delivery.
- Projects capable of being armed for Remedial Action Schemes protecting transmission are limited.
  - Insufficient generation dropping availability leads to transmission curtailments.
  - Elevated generation levels at key projects reduces reserve flexibility but maintains transmission capability.
- Generation restrictions due to outages or congestion on paths and flowgates limit project output that may “strand” planned reserve capacity and leaves BPA short of reserves.
- Redispatch to support transmission congestion management can also use system flexibility that would otherwise be used to provide reserve capacity.

Recommendations

- Given the myriad of factors influencing FCRPS flexibility for providing balancing reserves, BPA has determined the amount of available reserves through a combination of model analysis supplemented by applying judgment based on operating experience over a variety of conditions experienced during the past several years.

- The current amount of balancing reserves sourced from the FCRPS is approaching the limit of what the FCRPS can provide.
  - Considering the issues discussed in this presentation and recent operating experience, the amount of balancing reserves currently provided from the FCRPS goes beyond what could be considered as reasonably possible on a high probability basis.

- Assuming BPA is able to use DSO 216 to continue to limit reserves and to ensure that reserves are not overdeployed in order to meet "high-priority" objectives associated with operating a large, multi-purpose river system.:
  - BPA has the potential to offer 900 MW *inc* and 1100 MW *dec* reserves sourced from the FCRPS.
  - BPA needs the ability to reduce the amounts if "high priority" objectives cannot be met.

- Absent the ability to limit reserve deployment:
  - BPA is comfortable only offering a minimum amount for load balancing reserves sourced from the FCRPS given the risk to non-power constraints and existing load requirements.
  - BPA would need to augment with large amounts of 3rd party supplied reserves.

Percent of Time FCRPS Balancing Reserves Allocation Provided (including Environmental Redispatch and Oversupply Management Protocol)

	FCRPS Balancing Reserves Allocation (MW)		% of time with full reserves		% of time in ER/OMP state
Month	INC	DEC	INC	DEC	
Jan-11	779	-951	100.0%	100.0%	0.0%
Feb-11	780	-952	100.0%	100.0%	0.0%
Mar-11	784	-957	100.0%	100.0%	0.0%
Apr-11	799	-977	**99.7%**	100.0%	0.0%
May-11	798	-975	**50.7%**	**47.8%**	**11.0%**
Jun-11	798	-976	**0.0%**	**0.0%**	**10.6%**
Jul-11	798	-976	**60.0%**	**60.0%**	**2.8%**
Aug-11	798	-976	100.0%	100.0%	0.0%
Sep-11	813	-998	100.0%	100.0%	0.0%
Oct-11	650	-813	100.0%	100.0%	0.0%
Nov-11	658	-824	100.0%	100.0%	0.0%
Dec-11	658	-824	100.0%	100.0%	0.0%
Jan-12	635	-791	100.0%	100.0%	0.0%
Feb-12	637	-796	100.0%	100.0%	0.0%
Mar-12	650	-815	100.0%	100.0%	0.0%
Apr-12	713	-905	**95.6%**	**95.3%**	**2.2%**
May-12	726	-923	**79.0%**	**70.9%**	**1.7%**
Jun-12	739	-941	**68.4%**	**73.5%**	**0.1%**
Jul-12	750	-958	**4.3%**	**90.7%**	**6.6%**

Percent of Time FCRPS Balancing Reserves Allocation Provided (excluding Environmental Redispatch and Oversupply Management Protocol)

	FCRPS Balancing Reserves Allocation		% of time with full reserves (ER/OMP		% of time in ER/OMP state
Month	INC	DEC	INC	DEC	
Jan-11	779	-951	100.0%	100.0%	0.0%
Feb-11	780	-952	100.0%	100.0%	0.0%
Mar-11	784	-957	100.0%	100.0%	0.0%
Apr-11	799	-977	**99.7%**	100.0%	0.0%
May-11	798	-975	**55.2%**	**53.6%**	**11.0%**
Jun-11	798	-976	**0.0%**	**0.0%**	**10.6%**
Jul-11	798	-976	**61.7%**	**61.7%**	**2.8%**
Aug-11	798	-976	100.0%	100.0%	0.0%
Sep-11	813	-998	100.0%	100.0%	0.0%
Oct-11	650	-813	100.0%	100.0%	0.0%
Nov-11	658	-824	100.0%	100.0%	0.0%
Dec-11	658	-824	100.0%	100.0%	0.0%
Jan-12	635	-791	100.0%	100.0%	0.0%
Feb-12	637	-796	100.0%	100.0%	0.0%
Mar-12	650	-815	100.0%	100.0%	0.0%
Apr-12	713	-905	**95.8%**	**97.4%**	**2.2%**
May-12	726	-923	**80.4%**	**72.1%**	**1.7%**
Jun-12	739	-941	**68.5%**	**73.5%**	**0.1%**
Jul-12	750	-958	**4.6%**	**96.9%**	**6.6%**

DERBS Rate Design

DERBS Rate Design

Look-Back at DERBS revenue as of 8/2/12:

MONTH	$
October	388,618
November	563,637
December	456,345
January	345,997
February	335,963
March	362,224
April	246,178
May	112,994
June	118,003
	2,929,959

The annual revenue requirement for DERBS capacity for the FY2012-2013 is $5,753,443.

With 75% of the year billed as of 8/2/12, the revenues are 49% of the annual revenue requirement.

DERBS Rate Design

Dispatchable Energy Resource Balancing Service:

The current rate uses the highest one-minute average station control error (SCE) that exceeds 2 MW for each hour:

Inc Reserves = $14.50 / MW

Dec Reserves = $3.60 / MW

Using the revenues to date from one-minute SCE, we calculated an implied rate for 5 and 10 minute SCE to achieve the same revenues:

	5 Minute Max Ave SCE	10 Minute Ave SCE
Inc Reserves	$14.65	$20.65
Dec Reserves	$3.68	$5.01

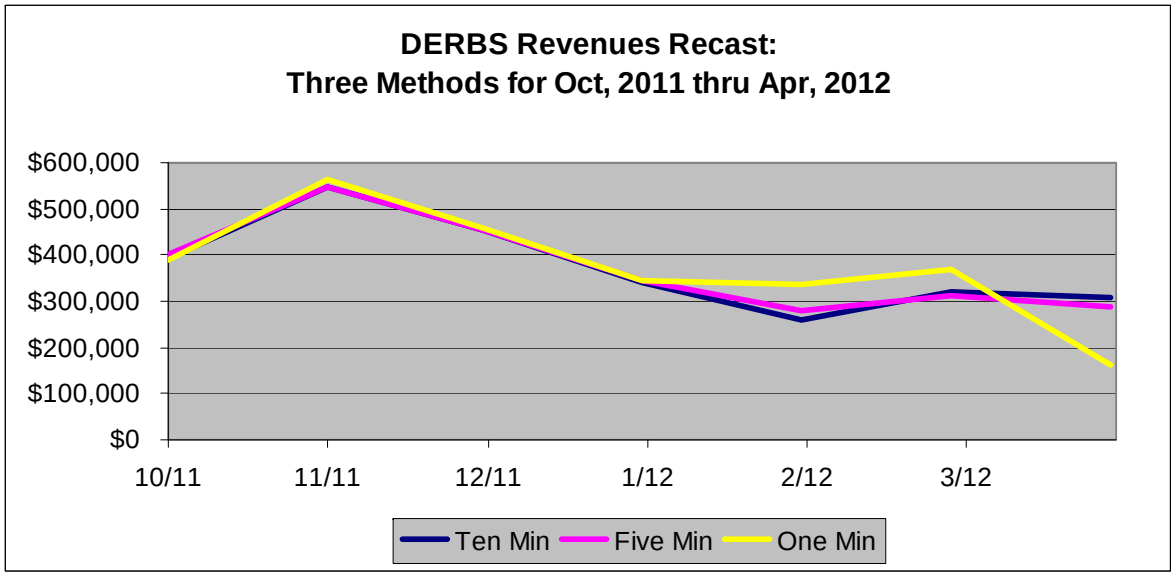
DERBS Rate Design

Some individual generators could see a difference in their monthly bill if we move to 5 or 10 minute max SCE. The total collected for DERBS from all generators would not change, but there are revenue shifts between generators.

Some generators generally pay less with 5 minute SCE than they would for 10 minute, while others benefit from 10 minute SCE. For some generators, the time average that results in the lower bill varies from month to month.

A number of factors could contribute to monthly bill differences, including how often the facility starts and stops and how closely they follow the ramp on starts, stops, and schedule changes.

DERBS Rate Design



DERBS Rate Design

As mentioned at a previous workshop, staff will propose to remove SCE averaged periods where system frequency excursions are likely to exceed droop settings and cause a plants power output to vary.

VERBS Service Options

Agenda

- Identify initial list of service options for discussion for the Initial Proposal
- Obtain participants' feedback on which options to pursue

Initial Proposal Timeline

- BPA's Initial Proposal will be published in November 2012. In order to provide time to prepare the Initial Proposal, BPA will have to decide what balancing reserve service options to propose by September 15th.
- Based on the generation inputs workshops and BOATT 2 conversations, the following is staff's current thinking regarding the direction of the Initial Proposal absent an agreement or something new surfacing before the middle of September.
- BPA plans to contact customers either by phone or e-mail to get preliminary leanings on the scheduling and service option that might be selected. These preliminary leanings will inform the Initial Proposal.

Potential VERBS Scheduling and Service Options

- Balancing Service options can be defined according to three different variables:
  - **Expected likelihood of curtailment events** (such as today's 0.25% based on 99.5% level of service)
  - **Scheduling parameters** (commitment to a scheduling approach/accuracy level and time period)
  - **Who is responsible for acquiring capacity** (FCRPS only or FCRPS + BPA acquisitions or self-supply)
- BPA staff used these three variables to lay out a set of customer options that provide a balance between customer choice and rate design complexity, including options for "firm" schedules and 15-minute scheduling.
- *Note: This presentation focuses on the Inc portion of balancing reserve services.*

Expected Likelihood of Curtailment Events What is Firm?

- BPA believes that the region needs to come to agreement on the risk of schedule curtailment that can be associated with “firm” schedules.
- The regional conversation on this topic is taking place in the BOATT 2 process. Both source and sink balancing authorities as well as sellers and purchasers of wind energy will need to be involved in that conversation.
- As a conversation starter, BPA has used the value 99.96% in the BOATT 2 process as the definition of firm service. However, using this for a working assumption is not intended to imply that BPA would cover any remaining risk without using DSO 216 or a similar mechanism.
- 99.96% is equivalent to 100% coverage. The remaining 0.04% of data, that has been excluded in the 99.96% numbers, are the extreme anomalies in the dataset that were not removed due to large volume of data used. These COULD include contingency events (prior to being declared), meter errors, communication errors, etc. The volume of data is too vast and complex to investigate each of these anomalies.

Scheduling Parameters
Type of Scheduling
Options Based on Type of Scheduling

- **Uncommitted Scheduling Option**
  - This service would be subject to curtailments similar to today's service.
  - If parties choose not to commit to a scheduling process, BPA must make an assumption about their scheduling in order to estimate a reserve capacity requirement. The amount of reserves needed for this option would be set on historical hourly schedules or an assumed 60/60 scheduling behavior for resources without a scheduling history.
  - Using the incremental standard deviation approach, a reserve requirement would be allocated to this group of users. However, BPA would not associate that with an expected probability of curtailment, since unpredictable scheduling behavior increases the risk of curtailment.
  - Parties electing this option would not be able to communicate the risk of curtailment to their Load Serving Entity and sink Balancing Authorities.
  - Pooling uncommitted schedulers together has the effect of pooling the expected schedule imbalances as is currently the case with standard VERBS. Overall, we would expect this to be a more costly service than current VERBS as those who are willing to commit to a scheduling option are removed from the uncommitted pool so the overall expected imbalances are greater than 30/60 for the uncommitted pool.
  - The reserves for self supply of generation imbalance participants would be equal for all scheduling type options, as the scheduling type option affects only the generation imbalance portion of the balancing reserves.

Scheduling Parameters
Type of Scheduling
Options Based on Type of Scheduling

- **Committed Scheduling Options**
  - 30/60 based on centralized forecast, 30/30 persistence based, 30/15* persistence based.
  - Committed scheduling approaches are expected to be automated.
  - Consequences of failure would be defined in a business practice
  - BPA has conducted preliminary studies on several types of committed scheduling, based on persistence metrics.
  - Capacity requirements may change for 30/60 scheduling may decline in final studies depending on how many parties elect each type of scheduling how much better the centralized forecast performs relative to persistence scheduling.

** The committed 30/15 scheduling option is dependent on the necessary scheduling systems being in place.*

Impact of Service Elections on Exposure to Persistent Deviation Penalties

- BPA staff has proposed that parties who choose one of the committed scheduling practices identified by BPA will be exempt from Persistent Deviation penalties provided they meet the performance metrics of that scheduling practice.
- Parties electing uncommitted scheduling will continue to be subject to Persistent Deviation penalties.
- Loads and non-Federal thermal generators will continue to be subject to Persistent Deviation penalties.
- BPA will continue to consider requests for waiver of specific deviation penalties for unforeseen and unavoidable events that affect parties ability to schedule accurately.

Balancing Service Option Summary

		Scheduling Assumption	Applicable to Persistent Deviation Penalty	Rate Case Forecast Balancing Reserve Coverage Provided by BPA
1	FCRPS Only/1	Historical if available	Yes	depends
2	FCRPS + Planned Acquisitions	Committed 30/60	No	99.96%
3	FCRPS Only	Committed 30/60	No	depends
4	FCRPS + Planned Acquisitions	Committed 30/30	No	99.96%
5	FCRPS Only	Committed 30/30	No	depends
6	FCRPS + Planned Acquisitions	Committed 30/15*	No	99.96%
7	FCRPS Only	Committed 30/15*	No	depends

/1 FCRPS Only means share of Rate Case planned FCRPS availability. No planned acquisitions made by BPA if the FCRPS is determined to be able to provide the minimum amount of balancing reserves needed to maintain reliability..

*The committed 30/15 scheduling option is dependant on the necessary scheduling systems being in place.

Estimates of Balancing Reserve Capacity Need for BP-14 Under Various Customer Choices

	99.5% Level of Service Assumption			
	Balancing Reserve Capacity Quantity (MW)		Wind's Share of Balancing Reserve Capacity as a % of Installed Wind Capacity	
Scheduling Accuracy Assumption	*inc*	*dec*	*inc*	*dec*
VERBS				
30/60	700	-884	14%	18%
30/30	527	-650	11%	13%
30/15	455	-540	9%	11%
DERBS				
30/60	61	-74		
Load				
30/60	312	-352		
Balancing Reserve Total				
Wind under 30/60 case + DERBS and Load	1073	-1310		
Wind under 30/30 case + DERBS and Load	900	-1076		
Wind under 30/15 case + DERBS and Load	828	-966		

The June 2012 Installed Wind Forecast of 4871 MW was used for these estimates.

Estimates above do not include any self supply.

Forecast of 1505 MW of installed capacity participating in self supply.

Forecast of balancing reserve reduction for self supply at 99.5% would be 151 MW for 30/60,

93 MW for 30/30, and 69 MW for 30/15.

Observations from Preceding Slide

- **At the 99.5% level of service without self supply, the 900 MW inc from the FCRPS would be sufficient over the rate period only if all wind scheduled at 30/15.**
- **Though on an annual average basis it appears the FCRPS without self supply would be able to provide 900 MW inc if all wind scheduled 30/30, actually the limit would be reached in summer 2014.**
- **At the 99.5% level of service with self supply, the 900 MW inc from the FCRPS would be sufficient over the rate period only if all wind scheduled at 30/30.**
- **At the 99.5% level of service with self supply, the 900 MW inc from the FCRPS would be reached in the summer of 2014 if all wind scheduled at 30/60.**

Additional Options

- In addition to the levels of service analyzed already, parties may:
  - self supply one or more components of VERBS,
  - use Enhanced Supplemental Service (ESS), or
  - request dynamic transfer.
- ESS provides the ability to acquire balancing resources in shorter time intervals (but some time ahead of the delivery hour) to support renewable integration.
  - BPA – Allow for the flexible acquisition of non-federal *inc* and *dec* resources to augment FCRPS resources providing balancing reserves.
  - Wind Generators – Allow for the flexible acquisition of *inc* and *dec* resources in addition to that provided by the BPA.

VERBS Rates are Dependent on Customer Elections

- Customers elections of these options will impact the amount of reserves BPA needs and the rates BPA charges to collect its costs.
- Ideally, customers would have the rates prior to making elections.
- Unfortunately, rates are dependent on customer elections.
- BPA will make an assumption on customer elections for the Initial proposal. This will provide a limited amount of information to customers on the impact their elections has on the rates BPA charges. BPA's assumption will be informed by the preliminary leanings provided by customers.
- The official date to elect service is April 1st 2013.
- In order to help allow customers to make better informed elections, BPA staff requests a second indication of party election leaning by December 15th so that a better representative study can be conducted and provided externally before customers need to make their final election.
- It is unclear at this time how many choices customers may want or BPA can actually provide. The range of options for the Initial Proposal may be different than the list for this initial discussion.

Request for Wind Generation Data

- BPA is requesting sub-hourly values for the total Potential Generation for all Wind Plants, who have or can calculate and archive such data, connected to the BPA system in the smallest time increment available (one minute average preferred) for the period of October 1, 2009, to Present. If data is unavailable for this entire time period, please provide whatever data you do have.

- For those that are able to provide data to BPA immediately, please provide it (MW) in digital format (via email or mail a CD/DVD) to BPA in one of the following formats: comma separated variable (*.csv), Excel (*.xls or *.xlsx), MatLab (*.mat) or text (*.txt).
  - Provide data to Frank Puyleart: frpuyleart@bpa.gov
- A Official Request Letter was sent out on April 16, 2012 through the Transmission Account Executives.
- Please fulfill this request ASAP for inclusion in the BP-14 Rate Case.
  - The letter required delivery by May 1, 2012; While a majority met this deadline, many still need to respond.
- Please contact Frank Puyleart at frpuyleart@bpa.gov with questions.

Customer Feedback or Discussion on Generation Inputs Issues

Next Steps

- Next Generation Inputs discussion workshops planned:
  - 22 August 2012
  - Late September 2012
  - Tech Forum announcement will be sent to confirm dates and times.