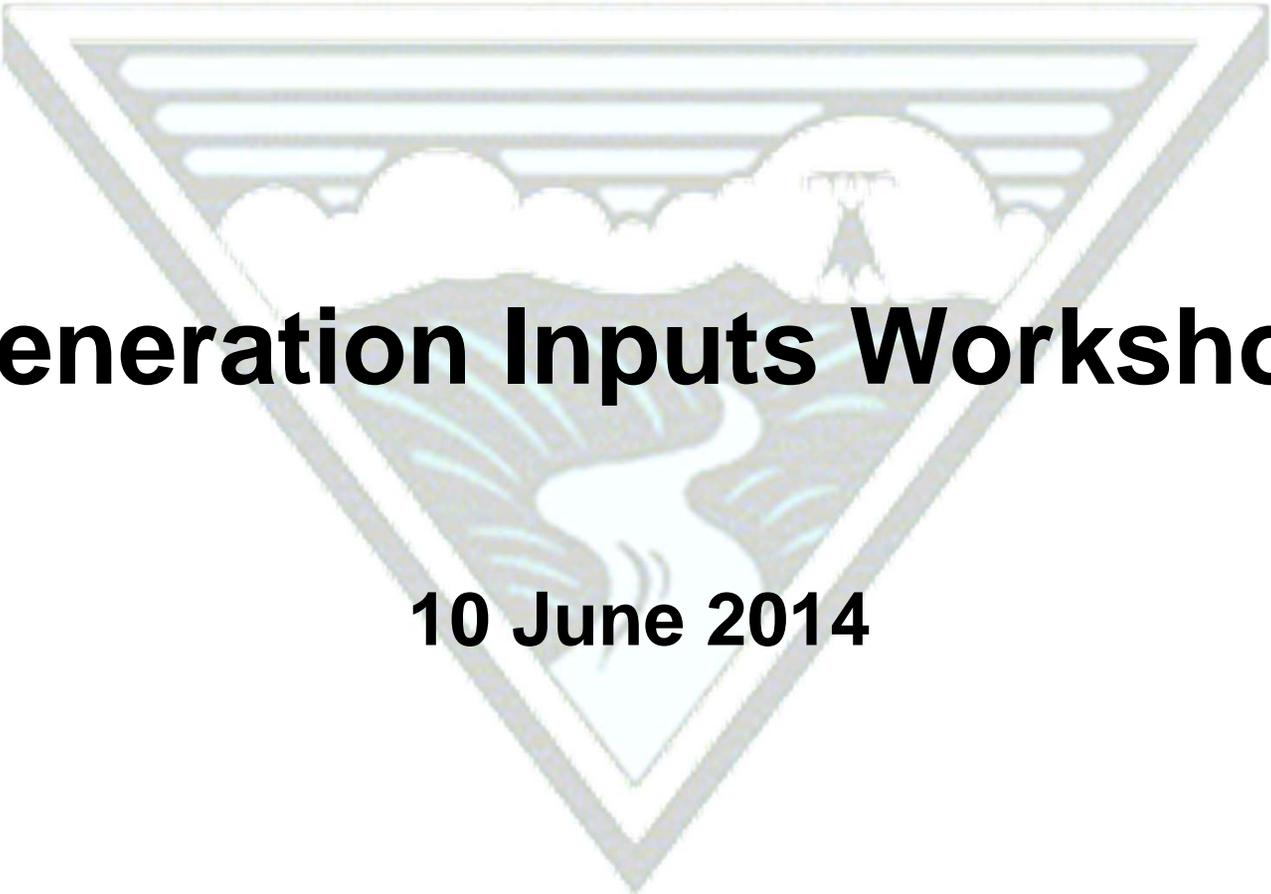


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Generation Inputs Workshop

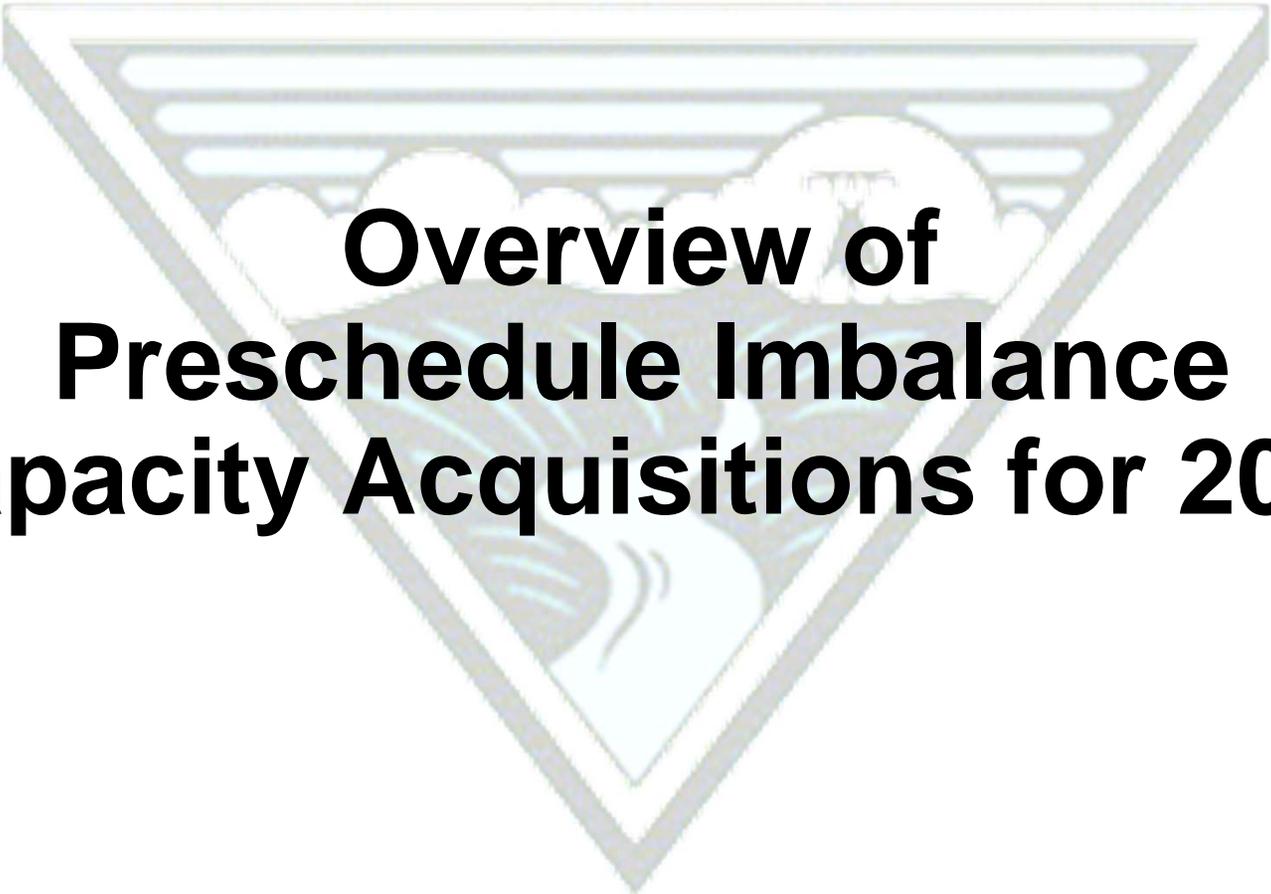
10 June 2014

Agenda for 10 June 2014

- Update on Pre-schedule Acquisitions
- Customer Comments on BPA Staff Straw Proposal Discussion
- Physical Feasibility
- Addressing Spring for BP-16
- Intentional Deviation
- BPA BA Reliability Tool and DERBS and Hydro Resources
- Next Steps



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The logo of the Bonneville Power Administration is a large, inverted triangle. Inside the triangle, there are stylized elements representing a dam, water, and a sun. The text "Overview of Preschedule Imbalance Capacity Acquisitions for 2014" is centered over the logo.

**Overview of
Preschedule Imbalance
Capacity Acquisitions for 2014**

Objectives for Today's Discussion

- Provide a high level overview on the results of the preschedule reserve acquisition program for Operational Acquisitions (Type 2).
- Share high-level information on observed market liquidity for these acquisitions.



Background

- As part of the BP-14 Generation Inputs Rate Case Settlement, BPA committed to hold 900 MW FCRPS INCing capacity.
- In addition to this obligation we agreed to acquire additional reserves known as Planned Acquisitions (Type1) on a quarterly basis to meet Base Service levels of reliability (99.5%).
- As part of the above effort, we also agreed to attempt to acquire from a third-party supplier any capacity shortfall caused by operational constraints. These reserves are called Operational Acquisitions (Type 2).
- These purchases (not to exceed the cap total of 900 MW INC) are to be made during times when, due to operational constraints, the FCRPS is unable to provide the reserves required by the 99.5 percent planning standard for VERBS Base Service.



Types of Within-hour Reserve Acquisitions for FY 2014 - 2015

- **Planned Acquisitions* (Type 1)** – Monthly purchases required to cover the shortfall, if any, between the planned FCRPS balancing reserve capacity (900 MW INC, 1100 MW DEC) and the rate case planned balancing needs of base service (99.5% after adjusting for any self-supply of generation imbalance).
- **Operational Acquisitions* (Type 2)** – Purchases needed when BPA is either operationally unable or at risk of being unable to provide the planned FCRPS INC balancing reserve capacity necessary to meet the 99.5% reliability standard.
- **Full Service (Type 3)** – Purchases required to provide reserves for customer electing the VERB's Full Service balancing service plan. These will be made in smaller increments. Costs are charged to the full service customers.
- **Unplanned Service* (Type 4)** – Monthly purchases required to support an unplanned increase in balancing services required by the BPA BA. These costs are directly assigned to the customers that create the unanticipated increase.
- **VERBS Supplemental Service (Type 5)** – Optional monthly service where BPA purchases reserves on behalf of customers requesting an amount they define. This service would be in addition to the base service. Customers may also acquire their own Supplemental Service with less notice for shorter periods. Costs are charged to SS customers.

*these acquisitions are for meeting or maintaining our base level service with the 99.5% reliability standard.

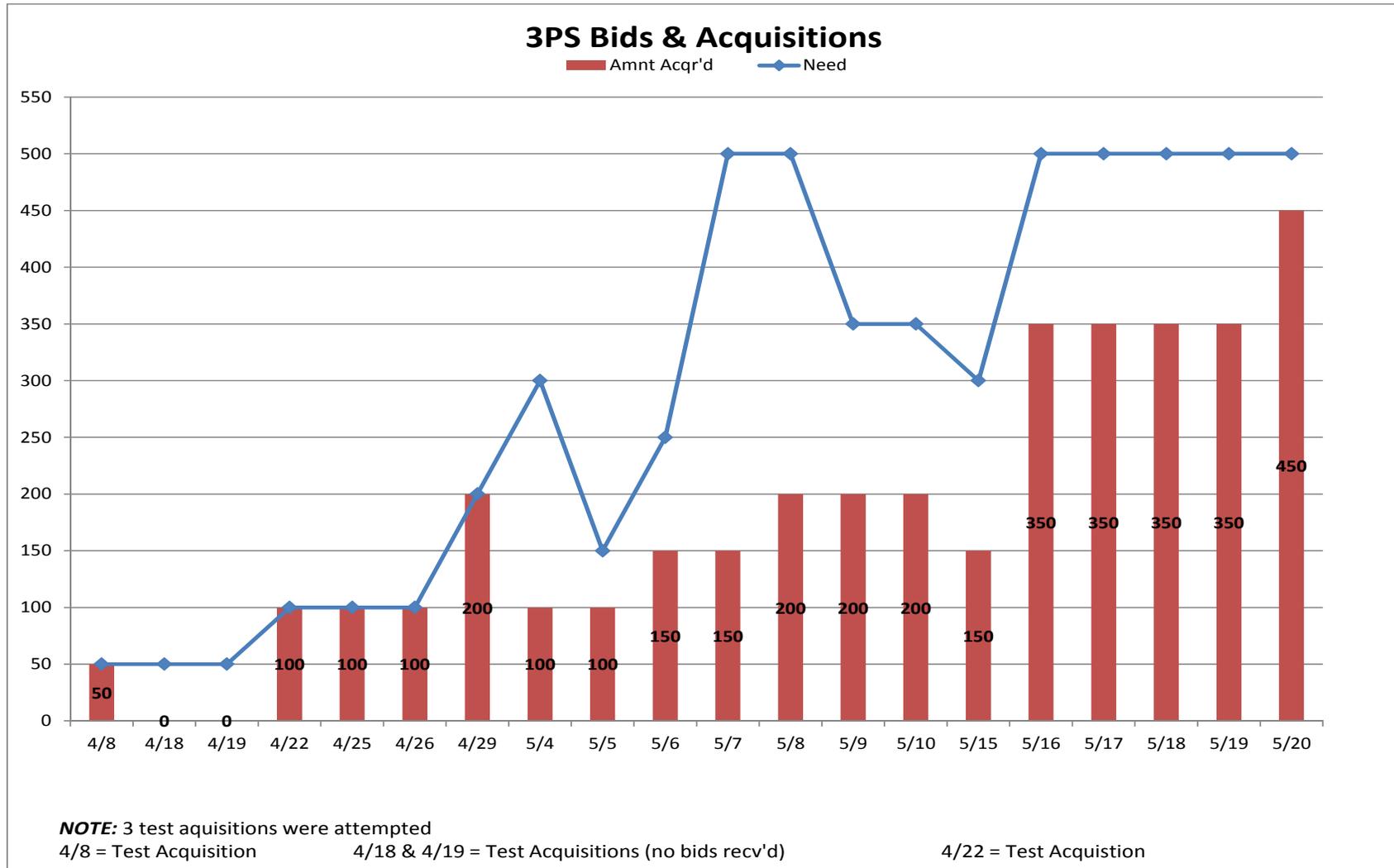


Results of Actual Operational Acquisitions

- BPA has issued 15 Request for Offers (RFOs) for Imbalance Capacity, counting the three Beta test RFOs. Four of those RFOs were for multiple-day offers.
- During this period, the targeted amount of Imbalance Capacity has ranged from 50 MW to 500 MW.
- Notwithstanding the Beta test acquisition phase, each RFO issued has received bids. However, when seeking larger amounts of Imbalance Capacity, to date BPA was frequently unable to acquire sufficient capacity to completely mitigate reducing INC reserve levels.
- Fewer counterparties participated than anticipated, despite significant outreach efforts.
- A total of 4 different counterparties submitted offers during the preschedule purchasing period.



Summary of Need vs Offers



General Observations

- We experienced insufficient market liquidity given the amount of Imbalance Capacity we attempted to purchase in the preschedule time frame.
- To date, thermal units expressed little interest in bidding on short-term capacity RFOs, at least during this time of year.
 - Specific feedback solicited from thermal advocacy groups has suggested that a minimum of at least one month would be required to solicit interest in participation.
- Many suppliers appear to have already made longer term capacity sales which effectively takes them out of the market for shorter term offers on most days.
- At least one investor-owned utility has stated that as a general rule, they never bid on capacity RFOs because company policy doesn't allow them to sell Calls without special Executive approval
- Both Northwest and Northern California system conditions have physically impacted a number of counterparties' ability to participate in the RFO process this spring.



General Observations (continued)

- Feedback on BPA's acquisition process has suggested that breaking the RFOs into HLH and LLH pieces may enable additional counterparties to participate.
- The average price that BPA paid for imbalance capacity across the entire purchase period was \$0.55/kW-day.
- When purchasing capacity across a multiple-day period (such as a Friday/Saturday) separate RFOs were required when the need varied each day.
- Additional feedback suggested that longer notification periods before bids were due would increase participation.



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**Overview of
Customer Comments**

BPA Requested Customer Comment on Straw Proposal

- At the May 13 workshop, BPA staff solicited comments from customers regarding its BPA Staff Straw Proposal for a balancing service definition and related issues for the upcoming FY 2016-2017 rate period.
- BPA received comments from a number of parties.



Definition of Balancing Service

- General support for a service design that provides a single high-quality balancing service to all customers, although more information and details are needed to determine if that impression will be borne out.
- Some concern that this proposal fails to establish an appropriate path forward for BPA with respect to balancing service. In short, BPA should (1) project, on a planning and operational basis, the amount of reserves needed for imbalance service, (2) set rates for imbalance service in the applicable section 7(i) proceedings, and (3) provide, on a planning and operational basis, imbalance service, to the extent it is physically feasible to do so, from its own resources or from resources available to it.



Balancing Service Standard

- INCs:
 - In general, there was supports for BPA's proposal to hold incremental reserves to provide for 99.7% of schedule error.

- DECs:
 - Whether the proposed confidence interval of 99.0% for provision of decremental balancing reserves (dec reserves) is appropriate or acceptable, however, is not clear at this time.

 - More information is needed before parties could support reduction of DEC reserves to a 99.0% standard.



Scheduling Elections and Election Period

- General support for the continued offering and cost differentiation for the scheduling elections for wind and solar (30/15, 40/15, 30/60, and uncommitted):
 - A better understanding of acceptable forecasting metrics and the costs associated with providing services based on those metrics is needed.

- Most parties requested that a mid-rate period election be included:
 - Variable energy resource integration is rapidly changing in the West, and it is believed that it is still prudent to offer customers the flexibility to promptly transition to new tools, such as 15-minute scheduling, as the familiarity and liquidity in these new markets increases.



BPA Balancing Authority Area Reliability Tool

- There was general support for development of a Reliability Tool to replace DSO 216.
- However, there were requests for more information and for customer involvement in the development of the tool.
- Concern expressed for Cogeneration resources, which may not be able to respond to reliability or curtailment orders:
 - Should they be exempt from the application of the proposed reliability tool?



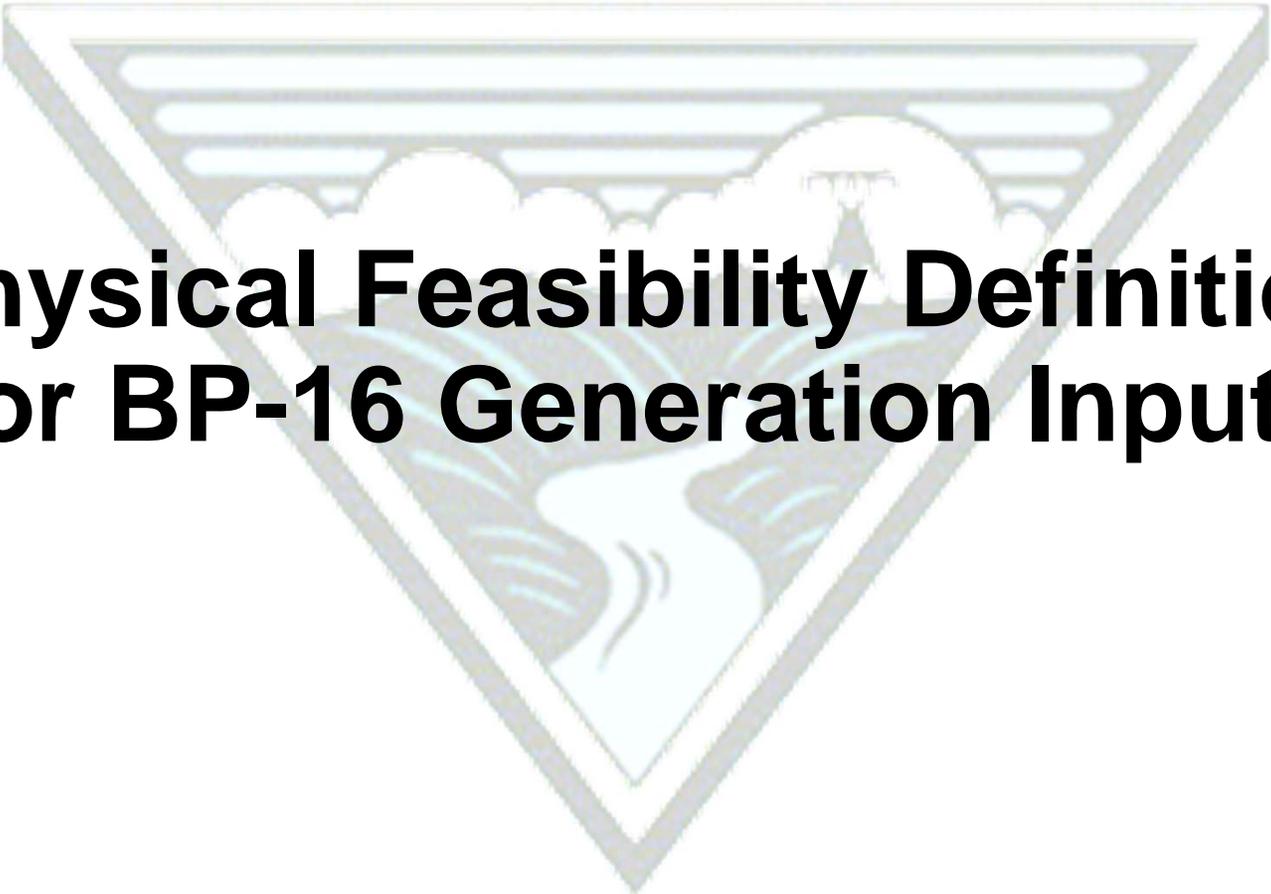
Intentional Deviation

- General request for more information:
 - Support for this concept will be affected by further information, including particularly what BPA would find to be acceptable timeframes of forecasting metrics.
 - Significantly more analysis and detail are needed to assess the impact and appropriateness of the penalty.

- If BPA were to establish such an incentive mechanism, such mechanism should recognize and take into account deviations that occur in connection with the commencement and cessation of curtailments of transmission schedules or generation output.



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**Physical Feasibility Definition
for BP-16 Generation Inputs**

Spring Time Limit

- As mentioned in previous Rate Cases, limited FCRPS flexibility may necessitate the need to reduce INC balancing reserves:
 - In high flow conditions, excess spill can be harmful to fish listed under the Endangered Species Act (ESA) by increasing the concentration Total Dissolved Gas (TDG) in the river which can cause gas bubble trauma in fish.
 - Operations for fish listed under the ESA require that all practicable steps be taken to reduce the amount of spill when TDG limits are being exceeded.
 - Reducing the amount of INC balancing reserve capacity frees up generating capacity that can be used to pass additional water through turbines rather than spilling.
 - TDG conditions are regularly monitored by the US Army Corps of Engineers, who supply BPA with a list of spill limits that are intended to keep TDG limits within state water quality standards.



Spring Time Limit (continued)

- There may also be conditions when DEC balancing reserves may need to be reduced:
 - Accumulated imbalance of DEC reserves can result in a significant amount of energy being stored into the FCRPS.
 - When this stored energy results in FCRPS operational objectives being jeopardized, DEC reserves will be reduced:
 - During the Spring, the FCRPS operational objective may be achieving a specific outflow at Grand Coulee.
 - The current practice in high flows is to reduce DEC reserves when the 4-hour accumulated DEC imbalance exceeds 1500 MW-hrs:
 - When the rolling 4-hour imbalance reaches 0, normal DEC levels are reinstated.



Spring Time Limit (continued)

- In Springs of 2011 – 2014, INC/DEC balancing reserves were occasionally reduced in order to minimize total dissolved gas (TDG):
 - 2014 data is through June 2
 - During 2011-2014 INC balancing reserves were never reduced in August-March, but DEC reserves were reduced 31 times

APR-JULY ONLY						
YEAR	HOURS OF REDUCED RESERVE		AVERAGE RESERVE HELD		AVERAGE RESERVE NEED	
	INC	DEC	INC	DEC	INC	DEC
2011	1396 hrs	1408 hrs	608 MW	-625 MW	799 MW	-977 MW
2012	1145 hrs	579 hrs	609 MW	-815 MW	730 MW	-932 MW
2013	171 hrs	11 hrs	730 MW	-951 MW	747 MW	-953 MW
2014	702 hrs	45 hrs	781 MW	-1076 MW	942 MW	-1100 MW



BPA Thoughts on BP-16 Initial Proposal

- For April – July, initial assessment of planned amount of INC reserves supplied from the FCRPS would be the amount necessary for reliability:
 - The current practice maintains at least 400 MW of INC balancing reserves.

- For August – March, initial assessment of planned amount of INC reserves supplied from the FCRPS would be 900 MW:
 - Initial assessment indicates that BPA should be able to operationally provide this amount but will be revisited when additional assessments are completed.



BPA Thoughts on BP-16 Initial Proposal (continued)

- The initial assessment of planned amount of DEC reserves supplied from the FCRPS would be a constant amount for all months of the rate period:
 - The exact amount will depend on the outcome of the 99% vs. 99.5% discussion.
 - The current practice of reducing DEC reserves when the 4-hour accumulated DEC imbalance exceeds 1500 MW-hrs has significantly reduced the number of DEC limitations in 2013 and 2014.
 - Resources that are overgenerating have the ability to limit their own generation when the FCRPS reduces DEC reserves.

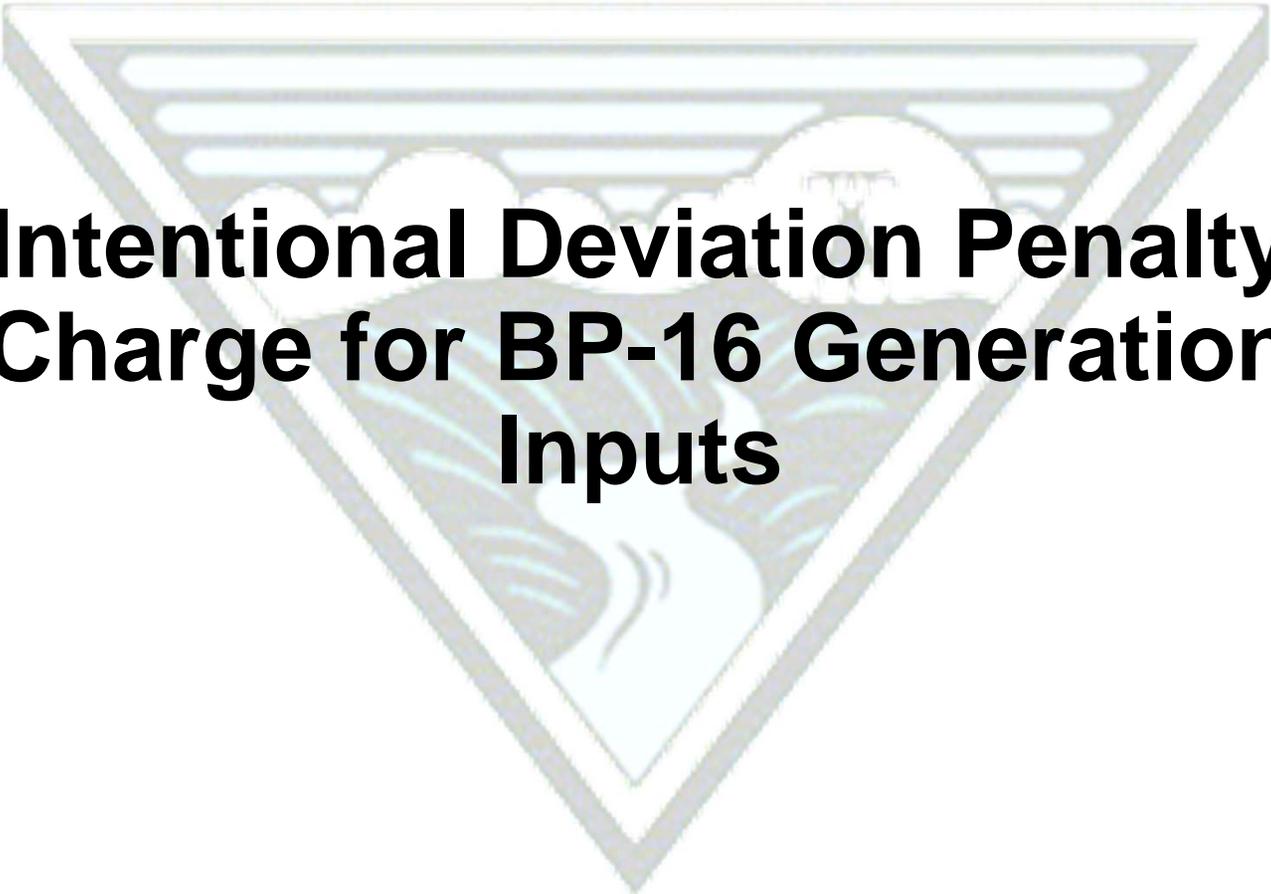


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Addressing Spring for BP-16



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**Intentional Deviation Penalty
Charge for BP-16 Generation
Inputs**

Intentional Deviation Penalty Charge

- **Why is BPA exploring an Intentional Deviation Penalty Charge?**
 - BPA is continuously looking for more effective methods to minimize energy accumulation on the FCRPS and to motivate resources to schedule accurately.
 - The goal of this proposal is to encourage a better link between a resource's scheduling behavior and its designated generation forecasting methodology.
 - Customer feedback regarding the applicability of the Persistent Deviation Penalty Charge (PD).
 - Customer feedback questioning PD's effectiveness.



Intentional Deviation Penalty Charge

- **What is an Intentional Deviation?**
 - *Draft concept:* An Intentional Deviation is when a resource operating in the BPA BAA schedules its output in a manner that deviates from a designated forecasting methodology.



Intentional Deviation Penalty Charge

- **How will BPA know the customer's designated generation forecast methodology?**
 - Through scheduling elections, a customer would be required to designate the generation forecast methodology it intends to utilize to establish its generation schedule.
 - Committed Scheduling program
 - BPA's Super Forecast Methodology
 - BPA's Super Forecast is an algorithm that selects the best forecast for predicting generation from several vendor-provided forecasts for a particular project based on historical performance for the upcoming meteorological conditions. The customer may submit its forecast for use by the model, and its forecast will be used if it performs best under the upcoming conditions. BPA will deliver the model results to the customer each scheduling period electronically.



Intentional Deviation Penalty Charge

- **What is meant by “Other BPA agreed-to Forecast methodology” in the Straw Proposal?**
 - BPA staff is evaluating whether to include an option for customers to use their own generation forecast. Approval of the use of customer-supplied forecast data requires a number of considerations:
 - Minimum accuracy standards – such as requiring 60/60 versus 90/60
 - Lack of error bias
 - Accuracy relative to actual output
 - Determining whether the forecast will need to be incorporated into BPA’s Super Forecast Methodology to automate the forecast verification process
 - Processing the forecast and the determining the costs associated with verification on a day-to-day basis.
 - Determining the balancing reserve capacity requirement of the forecast to establish the VERBS rate.



Intentional Deviation Penalty Charge

- **What resources would the Intentional Deviation Penalty Charge apply to?**
 - The Intentional Deviation penalty charge would replace PD for variable energy resources.
 - PD would continue to apply to load and dispatchable energy resources.

- **How would the Intentional Deviation Penalty Charge be applied?**
 - BPA will compare the resource schedule to that resource's designated generation forecast.
 - When a resource's scheduled value is different from the value produced by its designated forecast methodology, the resource will be subject to an Intentional Deviation Penalty Charge.



Intentional Deviation Penalty Charge

- **Is there a performance waiver for accurate scheduling?**
 - BPA staff is evaluating whether a waiver from the Intentional Deviation Penalty Charge should be allowed when a resource schedules to a value other than the designated generation forecast methodology, and its station control error (SCE) for the scheduling period is within a predefined performance standard.
 - Band Performance – maintain SCE within Generation Imbalance Band 1 for the schedule period
 - Less than Otherwise – maintain SCE less than what would have otherwise occurred had the BPA Super Forecast Methodology or Committed Scheduling been used
 - Fixed Value by Scheduling Period – maintain SCE less than x MW for hourly schedules, x MW for half-hour schedules, or x MW for 15-minute schedules



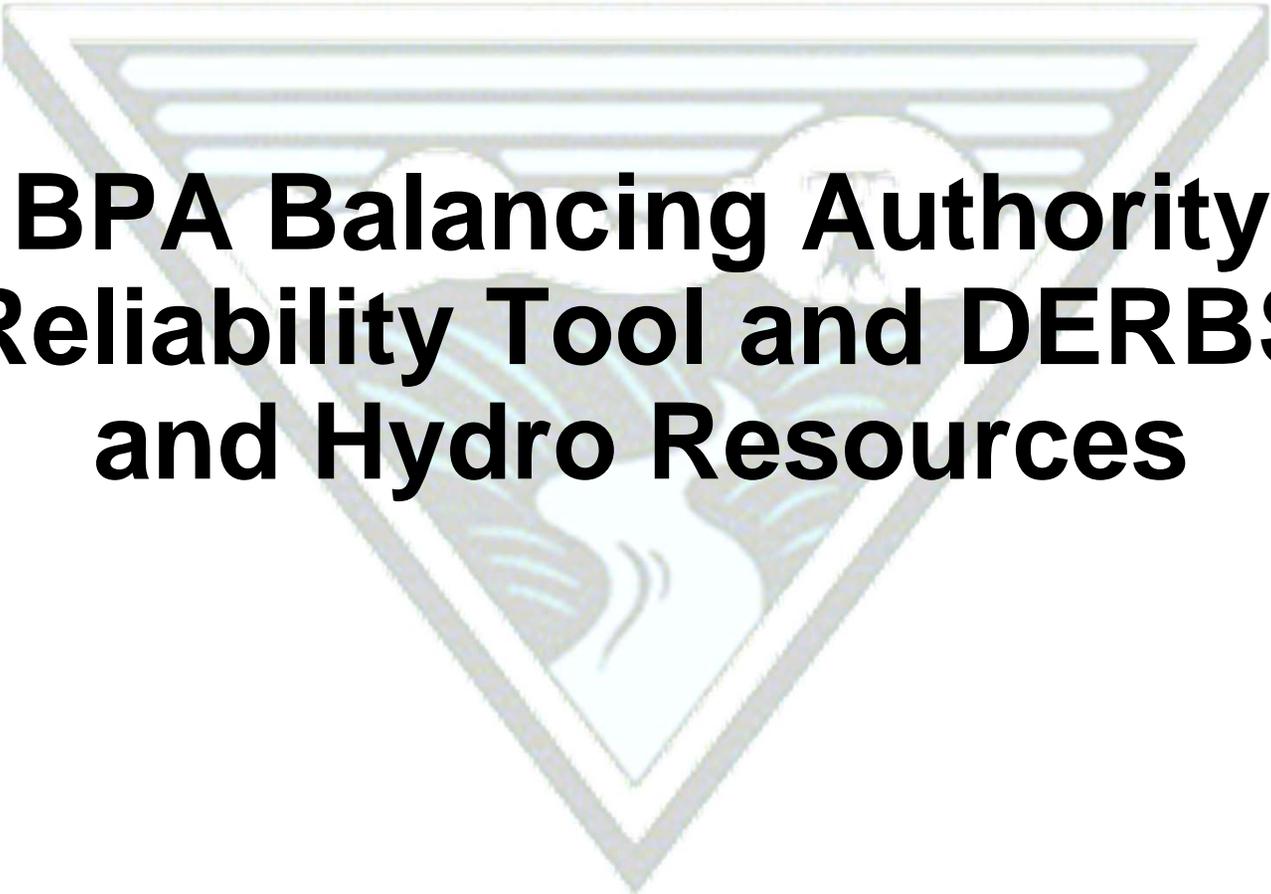
Intentional Deviation Penalty Charge (continued)

- **What kind of rate structure is BPA looking at?**
 - BPA staff is evaluating potential rate structures to incentivize accurate scheduling:
 - Index – x% multiple of highest of day energy index used for EI/GI
 - Fixed Value – fixed at xx mills per kilowatt hour
 - Greater Of – greater of Index or Fixed Value

- **What if a resource schedules on a shorter period than its designated generation forecast?**
 - Reason for the schedule change is to lower GI charges.
 - If SCE is maintained within the performance standard (TBD) then the Intentional Deviation Penalty Charge is waived.
 - Other incentives?



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**BPA Balancing Authority
Reliability Tool and DERBS
and Hydro Resources**

Thermal Plant Summary

- All non-Federal thermal plants in DERBS
 - 28 plants; 4,000 MW total nameplate
- About half are industrial generation (CoGen)
 - 13 plants; 416 MW
- Only 3 of 28 plants have two-way communication
 - (GenICCP) for Reliability Tool to automatically reduce generation toward schedule.
- Some plants don't have schedules, just Generation Estimates
 - “Behind-the-meter”, 10 plants, 206 MW



Issues: Communications

- GenICCP is two-way communication required for BPA to issue an order to reduce generation levels.

- Needed for Reliability Tool to automatically move generation toward schedule:
 - Decs only for Reliability Tool (Incs if 3PS)
 - Incs done via automatic Schedule Reduction from BPA

- Issues with communication equipment:
 - Costs to plant
 - Time to implement (well beyond Oct 2016)
 - Will have significant implementation issues / planning



How Might Reliability Tool Work?

- Need an Station Control Error (SCE) threshold at plant (similar to process used for wind) before Reliability Tool acts
 - Threshold per plant:
 - Greater of x MW or y % nameplate

- INC: IF (SCE > Threshold) AND (Reserves Deployed Over XX%), THEN:
 - Schedule or Gen Estimate > Gen: Decrease schedule



Issue: Thermal Plant DECS

- DEC: Concerns with applying automatically to thermals
- Communications equipment: Only 3 thermal plants have GenICCP, adding could be significant costs to smaller customers, long lead times to install
- Generation tied to industrial processes leads to risks (plant, safety, loss of load, ...)
- Ramping concerns: Conflicts between automatic DEC order and plants that are ramping up



DERBS Plants: Non-industrial Gen

Plant Name	Name-plate	Generation Type	Behind Meter?	Indust Gen?	Two-way Comms?
Boardman (BPA Share)	60	coal	FALSE	FALSE	FALSE
Centralia (excl Big H)	1640	coal	FALSE	FALSE	FALSE
Clatskanie Wauna-Loki	11	gas	TRUE	FALSE	FALSE
Coffin Butte	6	gas	FALSE	FALSE	FALSE
Columbia Ridge Landfill	7	biomass	FALSE	FALSE	FALSE
Finley Butte	3	biomass	FALSE	FALSE	FALSE
Frederickson (BPA Share)	135	gas	FALSE	FALSE	TRUE
Georgia Pacific Mill	35	gas	FALSE	FALSE	FALSE
Grays Harbor Energy	650	gas	FALSE	FALSE	TRUE
Klamath CoGen+Peaker*	688	gas	FALSE	TRUE	FALSE
Olympic View	6	gas	TRUE	FALSE	FALSE
Oregon Street	45	gas	TRUE	FALSE	FALSE
River Road	248	gas	FALSE	FALSE	TRUE
Riverbend	5	biomass	FALSE	FALSE	FALSE
Roosevelt Landfill	39	biomass	FALSE	FALSE	FALSE
* Only part is Industrial Generation					

DERBS Plants: CoGen (Industrial Generation)

Plant Name	Name-plate	Generation Type	Behind Meter?	Indust Gen?	Two-way Comms?
Cosmopolis Specialty Fibers	15	biomass	TRUE	TRUE	FALSE
Hampton Lumber Mill	8	biomass	TRUE	TRUE	FALSE
Harbor Paper	17	biomass	TRUE	TRUE	FALSE
James River Wauna	36	biomass	FALSE	TRUE	FALSE
Kapstone Longview	55	biomass	FALSE	TRUE	FALSE
Nippon Biomass	20	biomass	FALSE	TRUE	FALSE
Port Townsend Paper	11	biomass	TRUE	TRUE	FALSE
Seneca Sawmill	22	biomass	TRUE	TRUE	FALSE
Sierra Pacific Sawmill	19	biomass	TRUE	TRUE	FALSE
Simpson Tacoma Kraft	64	biomass	FALSE	TRUE	FALSE
Univ. of Oregon CoGen*	11	gas	FALSE	TRUE	FALSE
Intn'l Paper Springfield	52	biomass	TRUE	TRUE	FALSE
Weyerhaeuser Longview	87	biomass	FALSE	TRUE	FALSE
* Only part is Industrial Generation					



FCRPS Station Control Error

Non-AGC Federal Resources

Roza
Chandler
Hungry Horse
Albeni Falls
Libby
Dworshak
Big Cliff
Detroit
Foster
Green Peter
Cougar
Dexter
LookOut Point
Hills Creek
Lost Creek
Green Springs
Cowlitz Falls
Columbia Generating Station
Jame River Biomass

3498 MW Installed

Balancing Reserve Context

- SCE associated with these resources was found to be small.
- The balancing requirement for these resources is contained in the Load Error signal for Rate Case allocation and cost.
- Most errors associated with these resources are contingency reserve related.



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Next Steps

Customer Comments

- Next steps:
 - We are requesting written comments on these draft concepts by June 20, 2014. Please submit comments to techforum@bpa.gov and include “Generation Inputs” in the subject line.

