

The Framework

December 5, 2007

Under the future Slice contract, there is a desire to more accurately reflect within Slice delivery limits the detailed operating characteristics and constraints of the Federal System projects. Currently, the Slice delivery limits reflect a number of operating limits, including hourly, HLH, LLH, and daily minimum and maximum generation limits, storage limits, and ramping limits, among others. The schedule parameters are based on a combined generation schedule for the whole system with an incremental generation schedule for the Lower Snake projects. There are times when a specific project's flexibility limits do not easily flow into the current Slice delivery limits, especially as operating constraints and conditions change through time.

Some of the concerns raised regarding the Slice product could be addressed through more detailed modeling of the Federal System. In particular, models for the Coulee/Chief complex and the Lower Columbia complex (4 projects) could prove useful. For example, detailed modeling of the Lower Columbia complex should address some of the concerns related to uncertainty buffers.

Customer-specific schedules could then be created for each complex that meet delivery limits reflecting project limitations and constraints as represented in the input parameters and determined by the models. The Lower Columbia model could also adapt to each customer's GCL/CHJ operation by assigning an adjusted Priest Rapids discharge proportionate to their GCL/CHJ schedules. Output from the Lower Columbia model would include the hypothetical water routing associated with the customers' energy schedule and a determination that the schedule is within the delivery limits. Ongoing accounting would be maintained for each of the customers representing their cumulative deviation from the Lower Columbia actual operation. It is possible that the models could be implemented as a shared web-based model to which both BPA and the customer each have access (with different defined permissions for edit/changes and data manipulation). Alternatively, the models could also be completely housed at BPA with working copies provided to the customers for their internal use.

This outline contains additional details about how more detailed models would be used under the future Slice product concept:

Objectives

1. BPA and the Slice customers will work together to ensure Slice delivery limits are reasonably reflective of the system capability:
 - a. The Slice customers' delivery limits will be based upon the same operational constraints (hard and soft limits) the BPA-PS marketer must adhere to.
 - b. BPA will provide guidance on operational objectives related to meeting the various non-power requirements of the system to the Slice customers who will strive to meet those objectives.

Lower Columbia Projects

1. There will be a detailed 4-project water routing model of the Lower Columbia Projects (McNary through Bonneville)
 - a. It will run on an hourly time step for a 48-hour forward-looking time period and should run through the next preschedule day, although potentially in some other time increment besides hourly. It is expected that the model will be updated nearly every hour. Since the model is updated every hour, the differences between projected and actual conditions should be smaller and easier to address, although a mechanism for truing-up to actual will need to be included in the modeling
 - b. BPA will set the following model parameters. Prudent operating practices will factor into the inputs generated by BPA.
 - i. Project operating limits (forebay/tailwater/discharge limits/etc), reflecting normal and special operations.
 - ii. Inflows
 - iii. Project efficiencies and turbine capacities
 - iv. Fish spill requirements
 - v. System wide requirements (e.g. Vernita Bar, Reserves). The system wide obligations may be handled in different manners depending on how the detailed modeling develops. As an example, the reserves may be applied as a reduction in usable capacity at the projects where BPA intends to carry the reserves for that hour. There are other methods for ensuring reserves are accounted for and the detailed discussions should include this topic.
 - c. The model will produce the necessary information for the customer to determine whether they are within the delivery limits. Two options for communicating between BPA and the customers are **[DECISION POINT]**:
 - i. BPA may run the model and publish delivery limits
 - ii. BPA and the customer may share access to the model and the customer tests their schedules against the limits.
 - d. The customer will set hourly schedules compliant with the delivery limits.
 - i. The customer's inflows will be adjusted by their prior day's GCL/CHJ schedule.
 - ii. The schedule will reflect customer's expected schedule rather than preschedule +/- purchases/sales already executed.
 - iii. Spill past loaded and unloaded turbines will need to be addressed in the model.

Grand Coulee/Chief Joe

1. BPA will set operating parameters and other inputs to a detailed GCL/CHJ model (similar to LCOL). The model will be a detailed water routing model of the two projects. It shall either **[DECISION POINT]**:
 - a. BPA may run the model and publish contract limits representing the combined energy/capacity capability of the projects, or

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- b. The customer may run the model to produce hourly schedules that could be met with the two-project capability.
2. Model should reflect all relevant operating limitations in effect at Grand Coulee/Chief Joe, including rolling 24-hr elevation limits & ramp rates.
 - a. Mid-C operational constraints need to be reflected appropriately in the GCL/CHJ model (to the extent they impact BPA's operational flexibility).
 - b. Inflow estimate to GCL will need to factor in incremental flows, Canadian releases, and the impact of Banks Lake pumping.
 - c. PNCA impacts to be recognized – In Lieu, Provisional Draft, etc.
3. The GCL/CHJ model will need to have a 48-hour forward-looking hourly time step component similar to the LCOL model that extends through the next preschedule day. It should also include a 5-7 day forward-looking model. Modeling beyond the 48-hour period may not require hourly time intervals.
4. Customer storage energy accounting will be required. One option, similar to the current process is to define a Customer Deviation Account that compares the customers' GCL/CHJ energy schedule to their percentage of the actual GCL/CHJ generation (similar to current SSDA) to determine the cumulative deviation from the physical system storage position.
5. Model must link to LCOL model:
 - a. Downstream linkage – the customer's GCL/CHJ schedule on Day 0 will be used to set the customer's share of PRD discharge (MCN inflow) on Day 1.
 - b. Downstream flow requirements will limit the range of discharges allowed from GCL/CHJ.

Rest of System

1. ROS will include system obligations (such as those contained in current Exhibit L) netted against the expected operation of non-dispatchable system for each hour.
2. The discretionary flexibility that is available in the ROS needs to be addressed (HGH, LIB, Canadian, Non-Treaty, DWR).
 - a. One method to address this would be to allow customers to request additional energy/capacity above the ROS delivery limits and BPA could determine if the energy/capacity is available.
 - b. Another option would be to develop procedures and accounting needed to manage customer requests for discretionary storage use in a manner similar to measures BPA is required to follow.
3. Treatment of Snake projects needs to be addressed.
 - a. Expected operation rolled into Rest of System (with or without flex),
 - b. Incorporated into the LCOL model process, or
 - c. Separate modeling, scheduling, and accounting.

Scheduling Mechanics

1. Timelines for setting delivery limits and submitting schedules will conform to the prevailing scheduling requirements of the Control Area Operator (Balancing Authority, etc.) The current timelines for setting delivery limits and schedules:

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- a. Delivery limit (section 1(c) above) for HE(X) set by beginning of HE(X-1) (e.g., delivery limits for HE 1300 will be set no later than 1100).
 - b. Schedules typically submitted by the customer no later than 30 minutes after for the next clock hour (e.g., schedules for HE 1300 will be submitted by 1130).
 - c. Changes required by Balancing Authority will be accommodated in a non-punitive manner.
 - d. Large changes in delivery limits will be communicated to the customers ASAP.
 - e. Schedules are firm for the hour.
 - f. Preschedule information in the models may be different from the realtime information.
 - g. If the Federal System is scheduled nodally on the grid, the determination of sources for the schedules will be separately determined from the modeling and scheduling process. This recognizes the right BPA has to optimize the overall operation of the federal system regardless of how customers may optimize their water routing strategy for their own contract.
2. The customers will be responsible for tagging and scheduling the power as appropriate.