

The Regional Dialogue Slice/Block Product and FCRPS Operating Characteristics

General Description for Prospective Slice/Block Customers

July, 2008



Slice/Block Contract

- The Slice/Block contract is a combination of the Slice product and the Block product. The Slice/Block contract is a Requirements product, meaning the Requirements energy (all Block and the Requirements portion of Slice) is to be used first and foremost to meet a customer's Net Requirement.
 - Slice includes a provision requiring a minimum amount of Slice energy be delivered to a customer's service area each month, with potential penalties [see [section 5.7](#)]
- The Slice product is a resource-based product that provides energy as a function of the federal system output, in terms of both the amount of energy and the shape of the energy. Slice includes both Requirements energy and surplus energy (at times).
- The Block product provides a pre-defined, specified amount of energy in a specified shape.
- On a planning basis, assuming critical water, annual energy available under Slice/Block is designed to be equal to a customer's annual Net Requirement.



Block Product

- The Block product provides a specified annual amount of energy equal to a customer's Net Requirement, less its Slice amount. [see section 4]
- Two shapes of Block are available to the customer
 - Flat annual
 - Flat monthly, shaped to the customer's 2010 Net Requirement [see section 1.2.1.2 of Exhibit C]
 - The selected shape will be fixed for the term of the agreement
- The annual amount of Block will change as needed to absorb changes in customer's High Water Mark and Net Requirement amounts, protecting the Slice percentage from revision [see section 4.4]



Slice Product

- Purchasers of Slice bear an allocation of BPA's costs and risks and receive a commensurate amount of FCRPS energy and hourly scheduling flexibility (Principle #3 from BPA's July 2007 Policy).
 - Slice purchasers pay a specified percentage of BPA's operating costs, regardless of the amount of energy available under Slice.
 - Slice purchasers' rights to energy is a function of the variable output of the FCRPS resources, so generally, the better the water year, the more energy is available under Slice.
 - Slice purchasers are exposed to the risks associated with the FCRPS variable volume runoff (fuel), market price volatility, and resource outages, whether planned or forced (such as CGS, which produces roughly 1100 MW)
- Slice is a sale of power, as a function of federal system energy output, after specified System Obligations are met
- Maximum Slice available to a customer is the amount equal to 70% of the customer's annual Net Requirement
- Total Slice available to all interested customers is 25% of the FCRPS firm critical output (expected to be 25% of 7400 aMW, or 1850 aMW)



Slice Product, cont.

- Slice is not a sale of federal generating resources or a transfer of control of those generating resources
 - BPA and other federal agencies are responsible for the operation of the FCRPS generating resources
- Slice energy is based on aggregated system output. Customers do not select which project(s) the output is delivered from
- The Slice product includes Requirements power and Surplus power (when available)
 - The Requirements portion must be used to meet a customer's retail load
 - The surplus portion may be used as the customer chooses (certain restrictions apply to sales of surplus power [see section 5.6])
- Slice customers are responsible for scheduling all Slice (and Block) energy from the Point of Receipt (BPA bus) to its ultimate destination [see section 1 of Exhibit F]
 - Requires 24-hour scheduling, 365 days / year (more on later slides).



Slice Product, cont.

- Slice is not designed to match a customer's load shape, or necessarily cover their load amounts in any given time frame
 - Each customer is responsible for meeting its load on a hourly, daily, monthly, and annual basis.
 - Each customer is responsible for meeting any deficits and for disposing of any surplus energy
- Slice energy is scheduled in hourly increments and there are no within-hour services (self-supply of operating reserves, energy imbalance, dynamic scheduling, etc) provided under the Slice contract
 - These services may be available from TS or a 3rd Party



Delivery Limits and the Slice Computer Application

- Delivery limits govern the rate at which Slice energy can be scheduled for each hour (Min and Max rates), and the rate at which amounts can change hour to hour (ramping up and down)
- BPA will develop a Slice Computer Application for determining individual delivery limits for each Slice customer, for transfer of information, and for scheduling Slice energy. [see Exhibit M]
- The Slice Computer Application will include a water-routing "Simulator", a "Balance of Slice System" (BOSS) Module, and a "Default User Interface"
 - The Simulator is a water-routing model that will reasonably represent the operating flexibility available at six of the dispatchable projects (Grand Coulee through Bonneville) given the stream flows and Operating Constraints in effect at any given time
 - The BOSS Module computes the energy available from the remaining system



The Simulator [see Exhibit M]

- The Simulator will represent the theoretical operation of Grand Coulee, Chief Joseph, McNary, John Day, The Dalles and Bonneville hydro projects [3.1 of Ex M]
- BPA will be responsible for input of the project operating constraints and stream flows represented within the Simulator modeling period [3.2 of Ex M]
- Each Slice customer will be responsible for hypothetically routing available stream flow through the hydroelectric projects within the operating constraints in effect at each project (this theoretical operation does not impact the actual operation of the projects) [3.3 of Ex M]
 - The concept behind this approach is to place each Slice customer in a position similar to BPA Power Services' real-time hydro scheduler, who sets generation levels at each of these projects hour to hour in order to maintain the projects within variable operating constraints under changing conditions
 - The purpose of the Simulator is to develop delivery limits for each Slice customer individually, based on their management of water, and to apply to each Slice customer the impact of such water management decisions (for example, the water "released" from Grand Coulee will impact the lower Columbia projects the next day)
- The Simulator will provide about a 10-day prospective modeling period, enabling the customer to "see" what's around the corner



The BOSS Module [see Exhibit M]

- The BOSS Module will have 2 main functions
 - Determine the BOSS Base amount [4.1 of Ex M]
 - Determine the BOSS Flex amount [4.2 of Ex M]
- The BOSS Base amount is the aggregate of the hourly expected generation values from all BOSS Complex projects (all generating resources other than those included in the Simulator) netted with Contract Purchases, Augmentation, and System Obligations
 - Each Slice customer will schedule an amount equal to its Slice Percentage multiplied by such BOSS Base amount
- The BOSS Flex amount represents the amount the Snake projects can be reshaped relative to their expected operation
 - Each Slice customer may schedule up to their share of BOSS Flex, if they so choose. The BOSS Flex must net to zero each day.
- The BOSS Module will also keep track of each customer's BOSS deviation and Additional Energy amounts relative to CGS Displacements [4.3 and 4.4 of Ex M]



The Default User Interface [see section 5 of Exhibit M]

- The Default User Interface is a basic user interface developed by BPA and used by each customer to interact with the Slice Computer Application
 - Access the Simulator
 - Access the BOSS Base and BOSS Flex amounts
 - Communicate information bilaterally
 - Validate “schedules” and E-tags
- Each customer must develop internal systems that enable its use of the DUI as a back-up interface
- Each customer may choose to develop its own customized user interface to access the Slice Computer Application



Fallback Provisions

- If BPA does not complete the Simulator or SCA within specified guidelines, [see section 5.12.4.2] Slice will be implemented pursuant to Exhibit O on an interim basis until they are completed
 - Similar to today's implementation using the current Slice Application
 - BPA determines one set of limits
 - Each customer schedules within those limits
 - New Slice customers will need to enlist the help of current Slice customers in order to interact with the current Slice Application [see Exhibit O introduction]
- If a Slice customer does not complete systems necessary to utilize the Default User Interface within specified timelines, BPA will determine their Slice delivery amounts [see section 5.12.5]



Needed Infrastructure

- Each Slice customer will need to develop the business tools needed to access and utilize the Slice Computer Application
- Slice customers will need to develop 24-hour scheduling capability, or enlist the services of a scheduling agent, including electronic scheduling and tagging systems
 - BPA may limit scheduling agents' access to proprietary operational information
[see section 10 of Exhibit N]
- Slice customers will need to maintain a minimum bond rating or supply a letter of credit [see section 5.15]



Slice Scheduling (electronic tagging)

- Slice customers will preschedule their Slice energy consistent with standard preschedule timelines (typically one day ahead of the delivery day, except weekends and holidays, when prescheduling is 2 to 5 days ahead of the delivery day) [see section 2.1 of Exhibit F]
- Slice customers will need to update the Simulator operation, and associated e-tags in real-time in order to comply with changing conditions and constraints [see section 3.3 of Exhibit M]
- Slice customers will need to comply with minimum monthly deliveries of Slice to their respective retail load [RSO Test]
- Failure to update schedules to maintain compliance with changing delivery limits and constraints, or to deliver the minimum monthly energy to retail load will result in financial penalties or forfeiture of energy [see section 4 of Exhibit N]



RD Slice vs Subscription Slice

- In general, the RD Slice product is conceptually the same as the Subscription Slice product
 - Remains a sale of Requirements and Surplus power indexed to the variable output of the FCRPS resources in return for paying a portion of BPA's operating cost
 - Remains a highly flexible product with rights to change scheduled amounts up to 30 minutes prior to each delivery hour, based on a reasonable representation of the operational flexibility of the FCRPS
- Per BPA's July 2007 ROD and Policy documents, the RD Slice product is modified from the current Slice product in the following ways:
 - Dynamic Scheduling rights are removed (never implemented)
 - Self-supply of Operating Reserve and Energy Imbalance is no longer available using the Slice resources (self-supply is available from ones own resources)
 - Refinement in the way Delivery Limits are determined (Simulator approach)

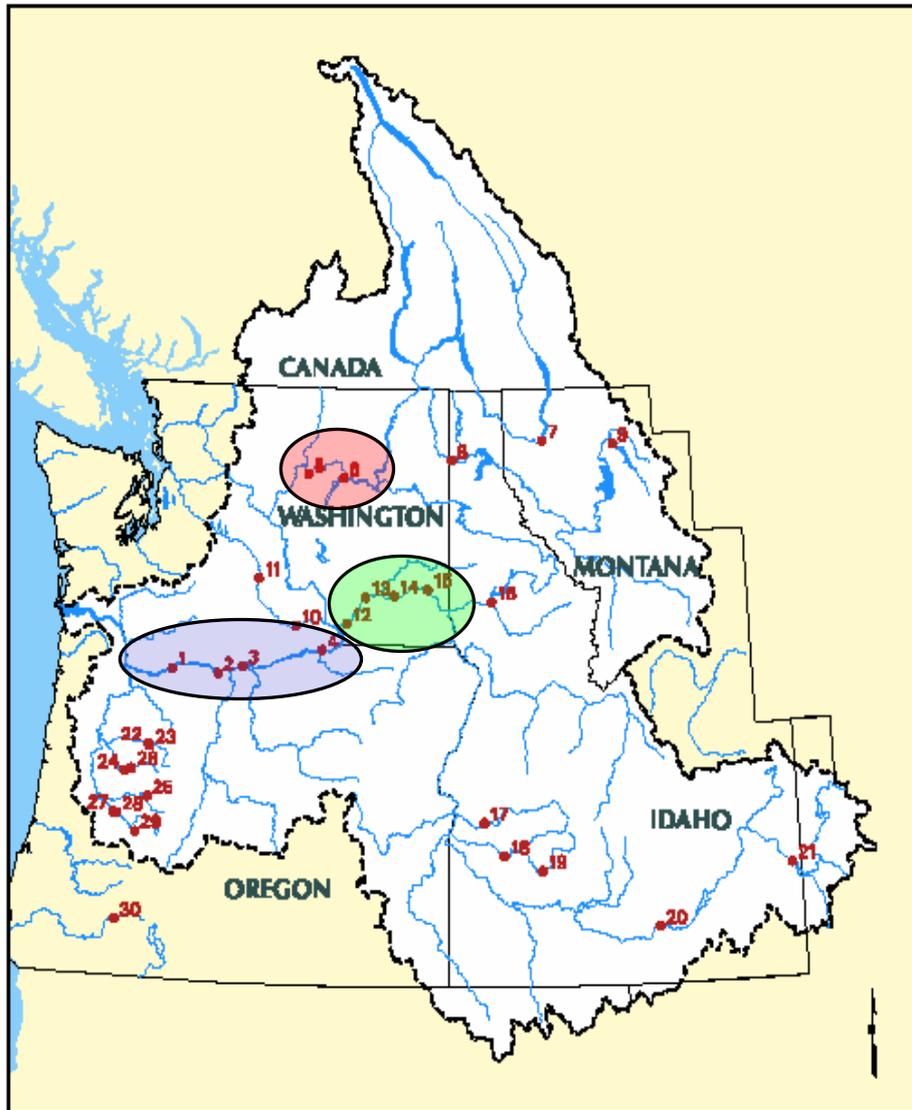


FCRPS Resource Characteristics

- The FCRPS (Federal Columbia River Power System) generating system consists of 31 hydro projects, one nuclear project (CGS), and several miscellaneous projects, such as wind and solar.
- The generating levels at 21 of the hydro projects (and all other projects) are established one or more days ahead of time. These projects are characterized as “non-dispatchable” projects.
 - Prime examples include: CGS (nuclear), Libby, Dworshak, Hungry Horse, and the Willamette projects.
 - The operating flexibility accessible and utilized by BPA at these projects is incorporated into the pre-determined generation schedules (BOSS Base).
- The generating levels at the remaining (ten) hydro projects are established and adjusted on real-time, subject to the limitations and requirements of all applicable operating constraints. These projects are characterized as “dispatchable” projects.



Northwest Federal Dams



- | | | |
|----------------|---------------------|------------------|
| 1 BONNEVILLE | 11 ROZA | 21 PALOUSE |
| 2 THE DALLES | 12 ICE HARBOR | 22 BIG CLIFF |
| 3 JOHN DAY | 13 LOWER MONUMENTAL | 23 DETROIT |
| 4 McNARY | 14 LITTLE GOOSE | 24 FOSTER |
| 5 CHIEF JOSEPH | 15 LOWER GRANITE | 25 COLUEN |
| 6 GRAND COULEE | 16 DAVIS DAM | 26 GREEN PETER |
| 7 LUBY | 17 BLACK CANYON | 27 DEXTER |
| 8 ALDEN FALLS | 18 BOISE DIVERSION | 28 LOOKOUT POINT |
| 9 HUNTER HORSE | 19 ANDERSON RANCH | 29 HILLS CREEK |
| 10 CHANDLER | 20 MINIDOKA | 30 LOST CREEK |



- The dispatchable projects consist of:
- the 4 lower Columbia Projects (#1-4),
- the 4 lower Snake projects (#12-15),
- Chief Joseph (#5), and Grand Coulee (#6)
- There are numerous non-federal projects not shown on this map that are intertwined within the federal projects and impact their operations.

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Operating Constraints and Delivery Limits

- The FCRPS generating projects are subject to numerous operating limitations, referred to as operating constraints.
- Operating constraints come in the form of power constraints and non-power constraints.
- Power constraints are related to project limitations, such as the number and size of generators, forebay operating ranges, and hourly rate of change (discharge) limits.
- Non-power constraints are related to non-power uses, such as navigation, flood control, recreation, and fish requirements.
- Slice delivery limits will reflect FCRPS operating flexibility bounded by operating constraints and prudent operating practices, as determined by BPA.
- Slice will provide flexibility through rights to change hourly schedules as late as 30 minutes prior to the start of each hour within the Slice delivery limits.

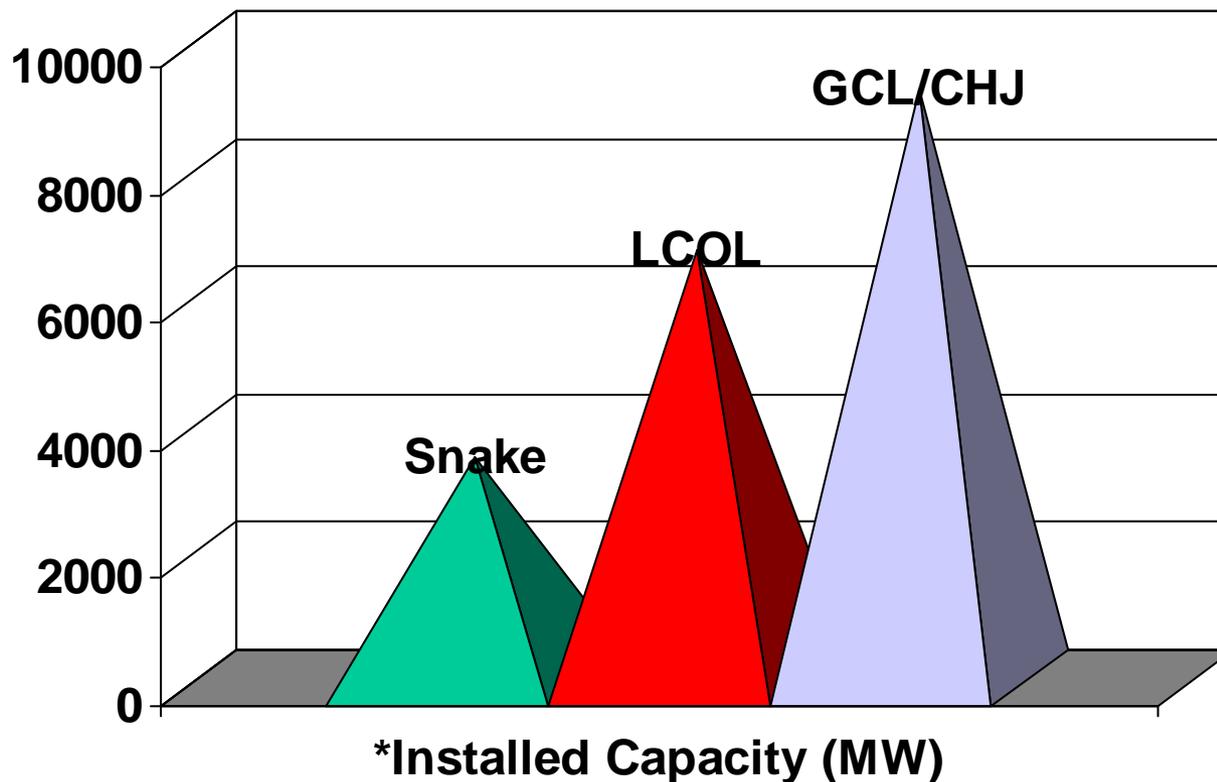


Dispatchable Project Flexibility

- Of the ten dispatchable projects, nine are run-of-river projects with limited, short-term storage capability. The remaining project (Grand Coulee) is a large reservoir with significant storage capability. Access to Coulee's storage varies throughout the year due to operating constraints (see Slides 8 and 9).
- The four lower Snake run-of-river projects are subject to numerous operating constraints, are close in proximity to one another, and have little storage capability (small ponds).
- The four lower Columbia run-of-river projects are also subject to numerous operating constraints and are close in proximity to one another, but have more storage capability than the Snakes.
- The storage reservoir (Grand Coulee) and its re-regulating project (Chief Joseph) are generally subject to fewer operating constraints. These projects typically provide significant amounts of operating flexibility.
- The following graphs illustrate relative capabilities of Coulee/Chief (GCL/CHJ), the lower Columbia (LCOL), and the Snake complexes.



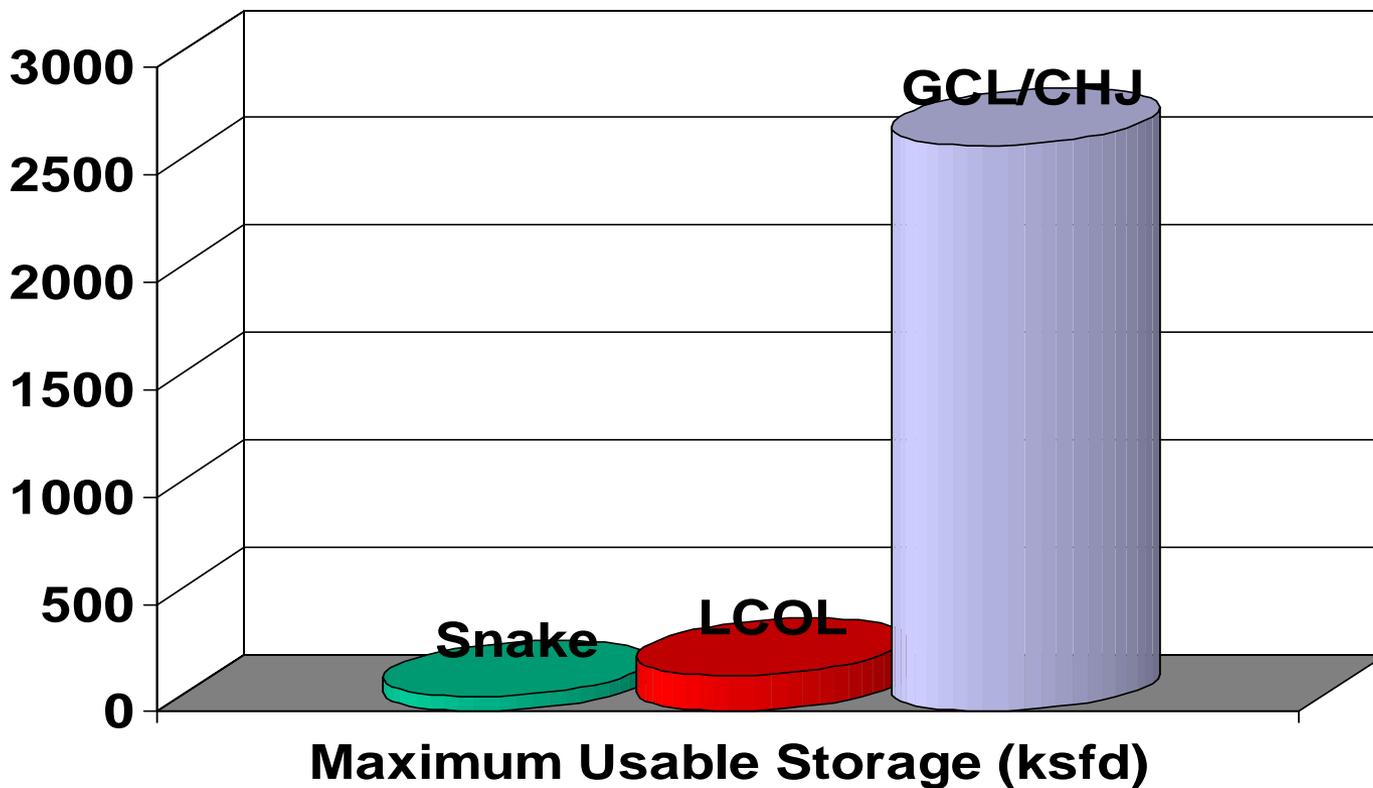
Dispatchable Project Capacity



*Caution: "Installed Capacity" represents 115% of nameplate power ratings for all installed units, which is unattainable. This graph is for relative comparison purposes only.



Dispatchable Project Storage



For Regional Dialogue Discussion
Purposes Only -- Pre-decisional

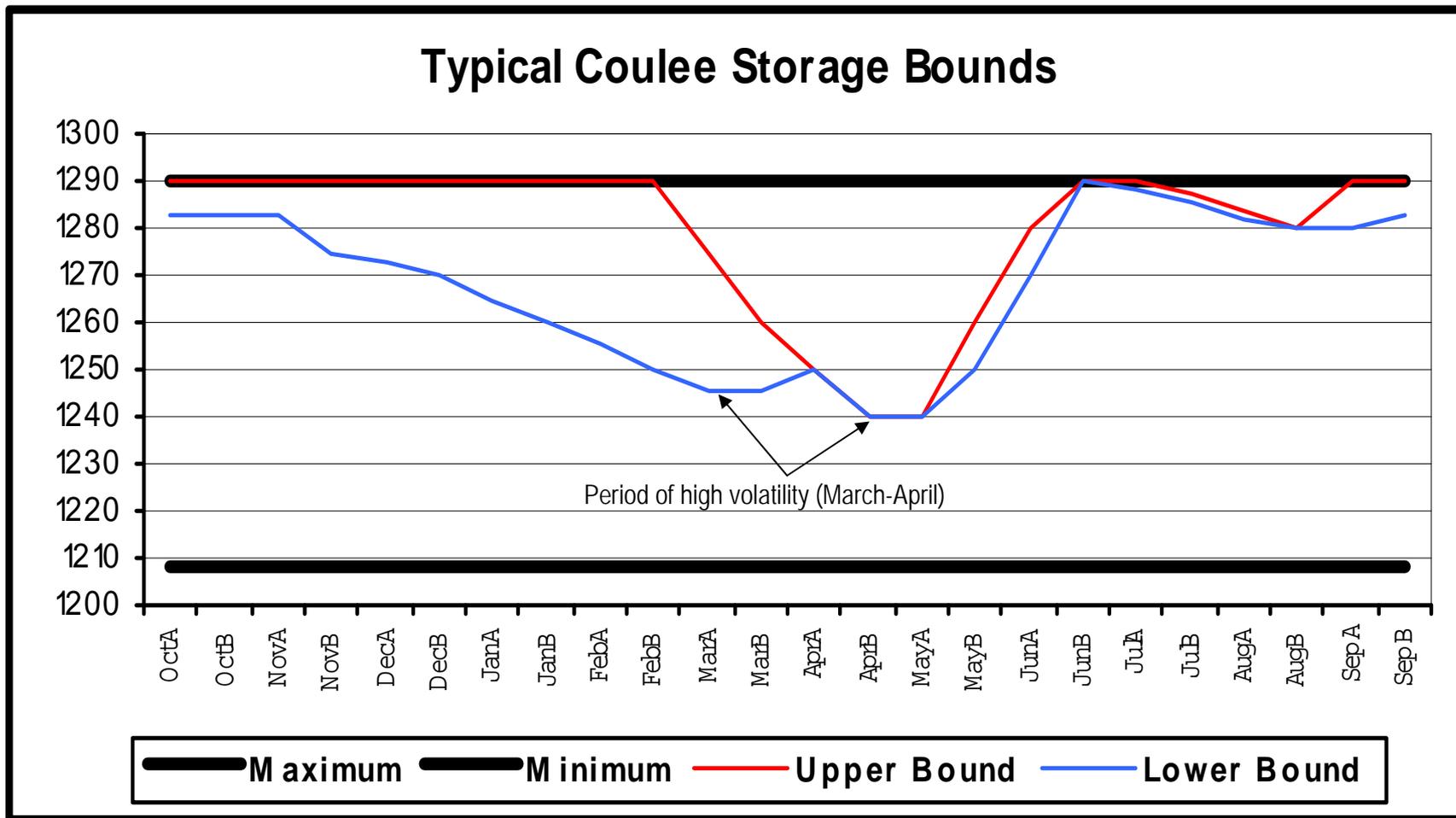


Grand Coulee Storage Characteristics

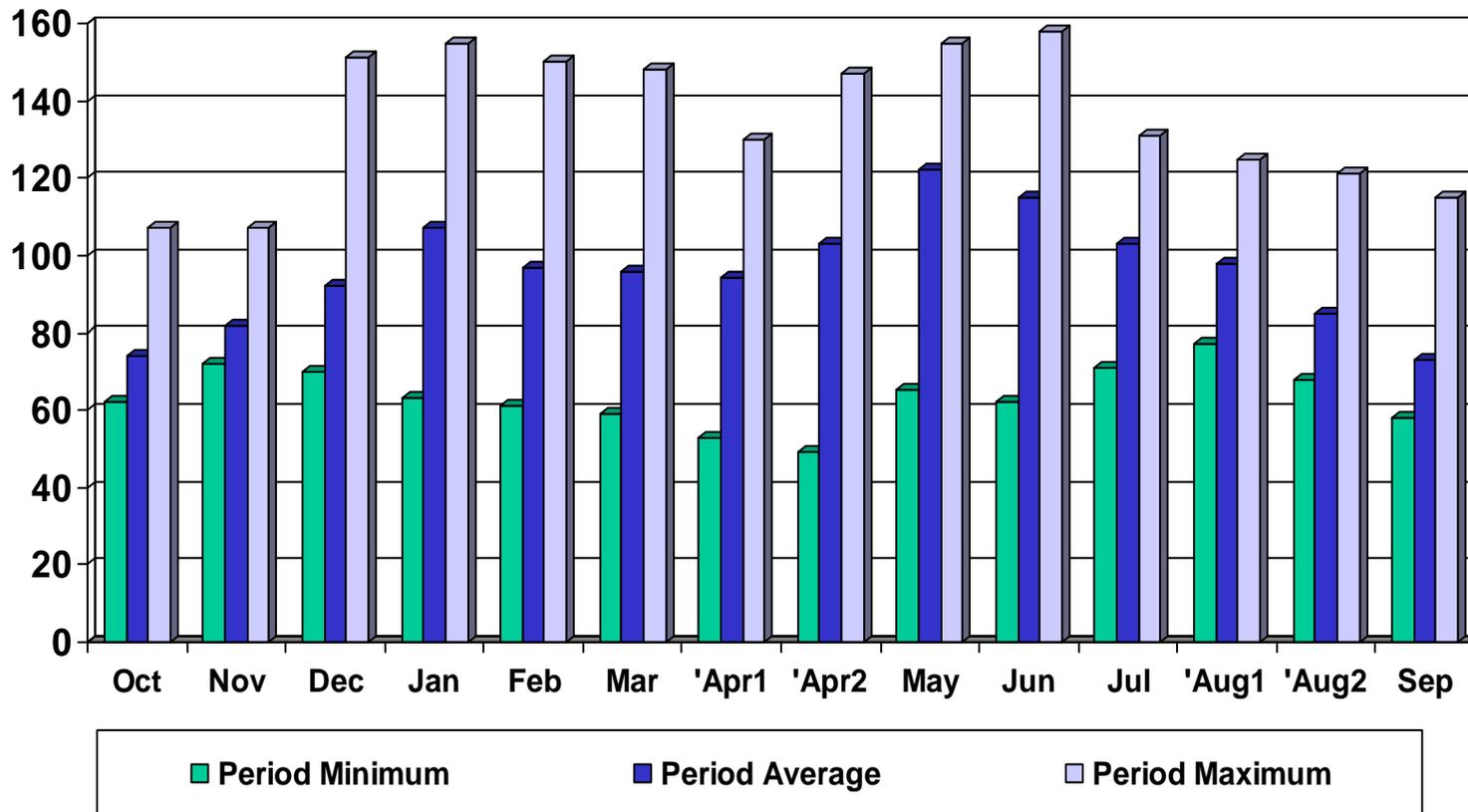
- Grand Coulee has roughly 5 Million acre-feet (Maf) of active storage space
- In most years, only 3 or 4 Maf of storage space is utilized (evacuated and refilled)
- Coulee is generally operated in the following annual cyclical pattern (based on current operational constraints, which are subject to change):
 - June 30, or the first few days of July, the reservoir will “touch” full elevation (refill)
 - July/August, drafts 10 to 12 feet by August 31 (fish flow augmentation)
 - Sept 30, fills to within 7-feet of full and holds that elevation through mid-Nov (resident fish)
 - Late November through January, modest draft ahead of flood control draft season
 - February through April, variable draft for flood control, based on the snowpack, typically reaching it deepest draft point April 30
 - April 10, draft no lower than flood control to maximize water for fish season (Bi-Op)
 - April 30, achieve flood control elevation and hold through mid-May (flood control)
 - Mid-May through June, the project refills, usually reaching full over July 4 weekend (refill)
- Because Coulee is constrained as described above, and its discharge affects flows into the lower Columbia system, operational requirements dictate BPA’s surplus/deficit condition a good portion of the time (the shape of the FCRPS generation does not match the shape of BPA’s loads)



Storage Limits



*Energy Volatility per 1% Slice



* Caution: Data is based on 70-Yr historical stream flows and current operating constraints. Actual stream flows and operating constraints will vary.

