

Power Systems Operations

Hydropower Workshop
September 24, 2025

Mike Simonton

Acting Vice President of Operations



Operations

- WAPA's Operations divisions oversee the real-time transmission switching, scheduling, and generation balancing functions in their respective Balancing Authority areas on a 24x7 basis.
- To reliably operate the bulk electric grid, WAPA must constantly balance all loads and generation within its metered boundaries on a minute-by-minute basis.
- WAPA leverages generating units including Glen Canyon for various Ancillary Services such as frequency response, voltage control, black-start capability, and contingency reserves.
- Ancillary Services are necessary to maintain a stable and secure power system, even when unexpected events occur.



What is a Balancing Authority?

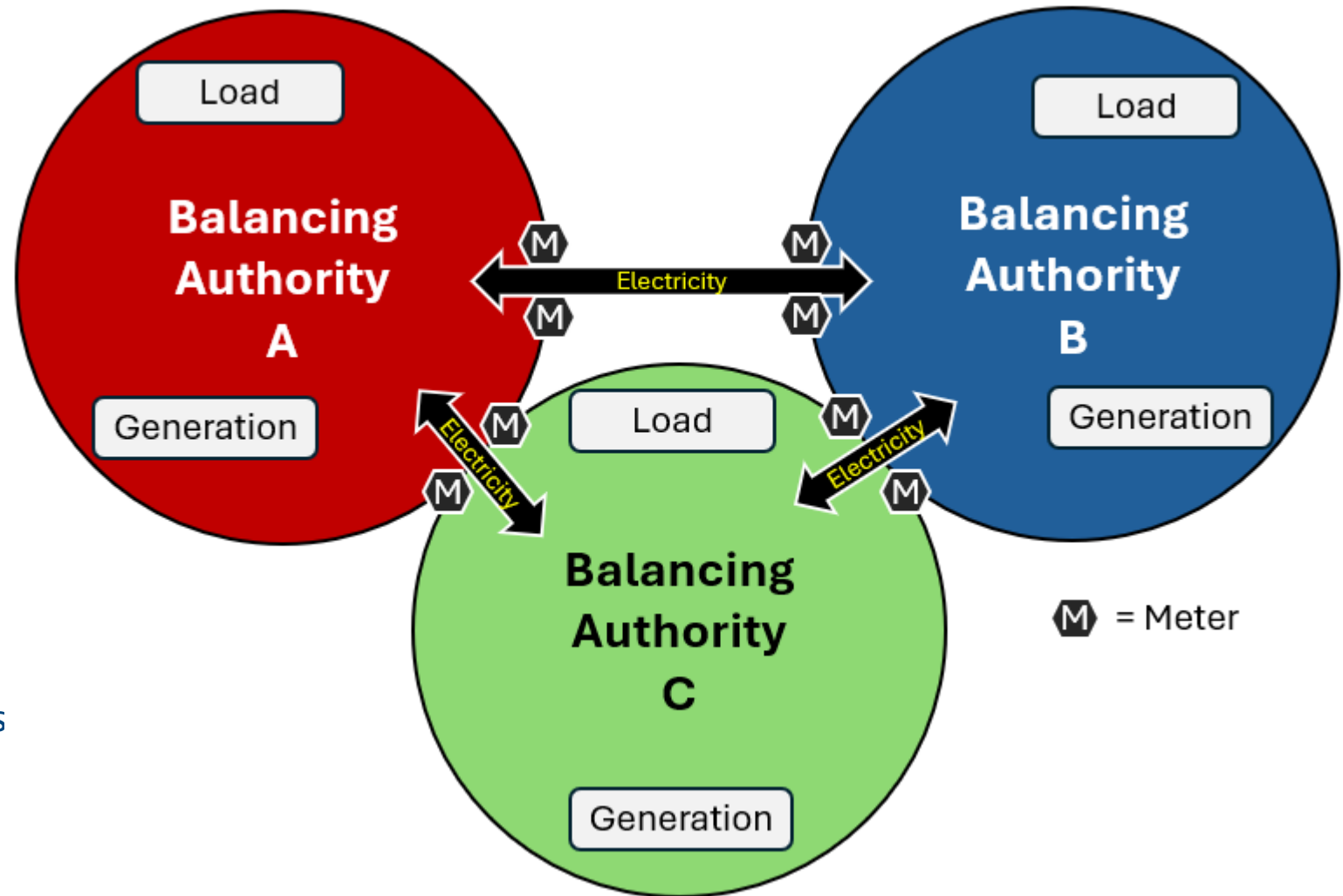
Balancing Authority:

The responsible entity that ensures the real-time balance between electricity demand and supply within its area, maintaining stable system frequency and reliable operation of the North American power grid.

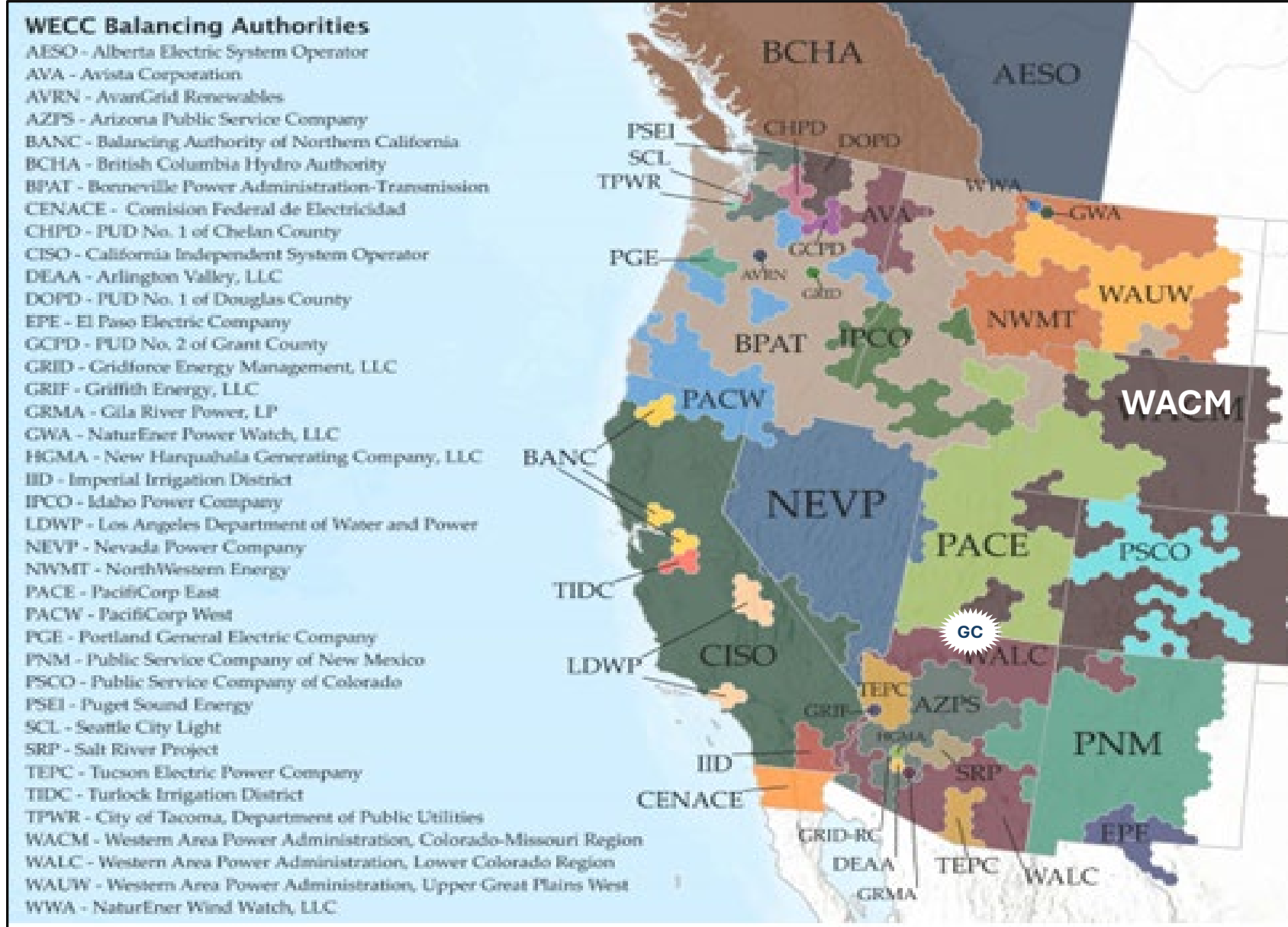
WAPA Balancing Authorities:

Western Area Colorado Missouri (WACM)
Western Area Lower Colorado (WALC)
Western Area UGP West (WAUW)

Glen Canyon Dam is located within the Western Area Colorado Missouri Balancing Authority



Western Interconnection Balancing Authorities



The map displays the Western Area Power Administration's transmission network across the Western United States. Key regions and features include:

- Western Area Power Administration Transmission Lines:** The overall network shown, with color-coded lines for different voltage levels.
- Upper Great Plains Region:** Located in the north, covering parts of Montana, North Dakota, South Dakota, and Minnesota.
- Sierra Nevada Region:** Located in the west, covering parts of California, Nevada, and Arizona.
- Rocky Mountain Region:** A large central region covering Wyoming, Colorado, and parts of Utah, Nebraska, and Kansas.
- Desert Southwest Region:** Located in the south, covering parts of Arizona, New Mexico, and Texas.
- Western Area Colorado Balancing Authority (COBA):** Indicated by an orange shaded area, primarily covering the Rocky Mountain Region.
- Western Area Lower Colorado Balancing Authority (WALCBA):** Indicated by a blue shaded area, primarily covering the Sierra Nevada Region and parts of the Desert Southwest Region.
- Legend:**
 - 500 kV (Red line)
 - 345 kV - 360 kV (Green line)
 - 230 kV - 287 kV (Blue line)
 - 161 kV - 115 kV (Purple line)
 - AC-DC-AC Tie Representation (Red line with a crossbar)
 - State Boundaries (Thin grey line)
 - Powerplant (Red square)
 - Powerplant (non-Federal, under construction) (Blue square)
 - CAP Pump (Large) (Blue square)
 - Powerplant (non-Federal) (Green square)
 - Substation (Yellow triangle)
 - Substation (non-Federal) (Blue triangle)

The map displays the Western Area Power Administration's transmission network across the Western United States. Key regions and features include:

- Western Area Power Administration Transmission Lines:** The overall network shown, with color-coded lines for different voltage levels.
- Upper Great Plains Region:** Located in the north, covering parts of Montana, North Dakota, South Dakota, and Minnesota.
- Sierra Nevada Region:** Located in the west, covering parts of California, Nevada, and Arizona.
- Rocky Mountain Region:** A large central region covering Wyoming, Colorado, and parts of Utah, Nebraska, and Kansas.
- Desert Southwest Region:** Located in the south, covering parts of Arizona, New Mexico, and Texas.
- Western Area Colorado Balancing Authority (COBA):** Indicated by an orange shaded area, primarily covering the Rocky Mountain Region.
- Western Area Lower Colorado Balancing Authority (WALCBA):** Indicated by a blue shaded area, primarily covering the Sierra Nevada Region and parts of the Desert Southwest Region.
- Legend:**
 - 500 kV (Red line)
 - 345 kV - 360 kV (Green line)
 - 230 kV - 287 kV (Blue line)
 - 161 kV - 115 kV (Purple line)
 - AC-DC-AC Tie Representation (Red line with a crossbar)
 - State Boundaries (Thin grey line)
 - Powerplant (Red square)
 - Powerplant (non-Federal, under construction) (Blue square)
 - CAP Pump (Large) (Blue square)
 - Powerplant (non-Federal) (Green square)
 - Substation (Yellow triangle)
 - Substation (non-Federal) (Blue triangle)

The map displays the Western Area Power Administration's transmission network across the Western United States. Key regions and features include:

- Western Area Power Administration Transmission Lines:** The overall network shown, with color-coded lines for different voltage levels.
- Upper Great Plains Region:** Located in the north, covering parts of Montana, North Dakota, South Dakota, and Minnesota.
- Sierra Nevada Region:** Located in the west, covering parts of California, Nevada, and Arizona.
- Rocky Mountain Region:** A large central region covering Wyoming, Colorado, and parts of Utah, Nebraska, and Kansas.
- Desert Southwest Region:** Located in the south, covering parts of Arizona, New Mexico, and Texas.
- Western Area Colorado Balancing Authority (COBA):** Indicated by an orange shaded area, primarily covering the Rocky Mountain Region.
- Western Area Lower Colorado Balancing Authority (WALCBA):** Indicated by a blue shaded area, primarily covering the Sierra Nevada Region and parts of the Desert Southwest Region.
- Legend:**
 - 500 kV (Red line)
 - 345 kV - 360 kV (Green line)
 - 230 kV - 287 kV (Blue line)
 - 161 kV - 115 kV (Purple line)
 - AC-DC-AC Tie Representation (Red line with a crossbar)
 - State Boundaries (Thin grey line)
 - Powerplant (Red square)
 - Powerplant (non-Federal, under construction) (Blue square)
 - CAP Pump (Large) (Blue square)
 - Powerplant (non-Federal) (Green square)
 - Substation (Yellow triangle)
 - Substation (non-Federal) (Blue triangle)

The map displays the Western Area Power Administration's transmission network across the Western United States. Key regions and features include:

- Western Area Power Administration Transmission Lines:** The overall network shown, with color-coded lines for different voltage levels.
- Upper Great Plains Region:** Located in the north, covering parts of Montana, North Dakota, South Dakota, and Minnesota.
- Sierra Nevada Region:** Located in the west, covering parts of California, Nevada, and Arizona.
- Rocky Mountain Region:** A large central region covering Wyoming, Colorado, and parts of Utah, Nebraska, and Kansas.
- Desert Southwest Region:** Located in the south, covering parts of Arizona, New Mexico, and Texas.
- Western Area Colorado Balancing Authority (COBA):** Indicated by an orange shaded area, primarily covering the Rocky Mountain Region.
- Western Area Lower Colorado Balancing Authority (WALCBA):** Indicated by a blue shaded area, primarily covering the Sierra Nevada Region and parts of the Desert Southwest Region.
- Legend:**
 - 500 kV (Red line)
 - 345 kV - 360 kV (Green line)
 - 230 kV - 287 kV (Blue line)
 - 161 kV - 115 kV (Purple line)
 - AC-DC-AC Tie Representation (Red line with a crossbar)
 - State Boundaries (Thin grey line)
 - Powerplant (Red square)
 - Powerplant (non-Federal, under construction) (Blue square)
 - CAP Pump (Large) (Blue square)
 - Powerplant (non-Federal) (Green square)
 - Substation (Yellow triangle)
 - Substation (non-Federal) (Blue triangle)

 500 kV
 345 kV - 360 kV
 230 kV - 287 kV
 161 kV - 115 kV
 AC-DC-AC Tie Representation
 State Boundaries
 Powerplant
 Powerplant (non-Federal, under construction)
 CAP Pump (Large)
 Powerplant (non-Federal)
 Substation
 Substation (non-Federal)

— 345 kV - 360 kV

— 230 kV - 287 kV

— 161 kV - 115 kV

AC-DC-AC Tie Representation

— State Boundaries

- **Powerplant**

Powerplant (non-Federal, under construction)

☐ CAP Pump (Large)

- Powerplant (non-Federal)

 Substation

▲ Substation (non-Federal)

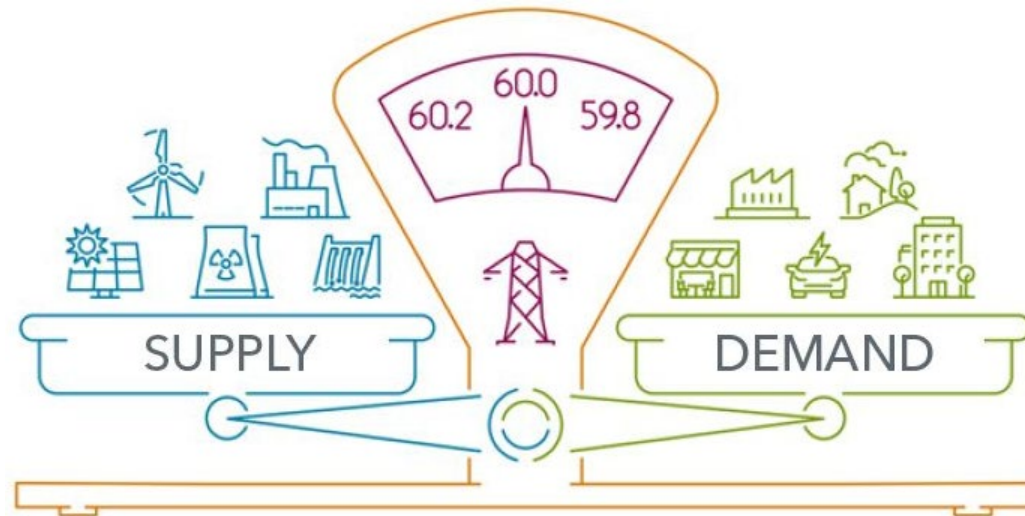
Ancillary Services

Generation capacity from Glen Canyon is used for the following ancillary services:

- Frequency Regulation and Response = capacity that is automatically responsive to Automatic Generation Control or Frequency, which is sufficient to match generation to load in real-time.
 - Frequency of the power grid serves as a vital indicator of the balance between total electrical power being generated and consumed
 - Overload or High Frequency is when generation exceeds demand – potential damage to generators and protective disconnects
 - Underload or Low Frequency is when power consumption exceeds generation – potential load shed or blackouts
- Contingency Reserves = capacity held in reserve to respond to contingencies and restore frequency.
 - When experiencing unplanned events, such as equipment failure, other generation units in the system may need to respond timely to avoid system degradation, damage, or blackouts.
 - WACM participates in the Northwest Power Pool Reserve Sharing Group. A membership organization of approximately 48 utilities that collectively manage contingency reserve obligations by committing to shared responses.



Frequency



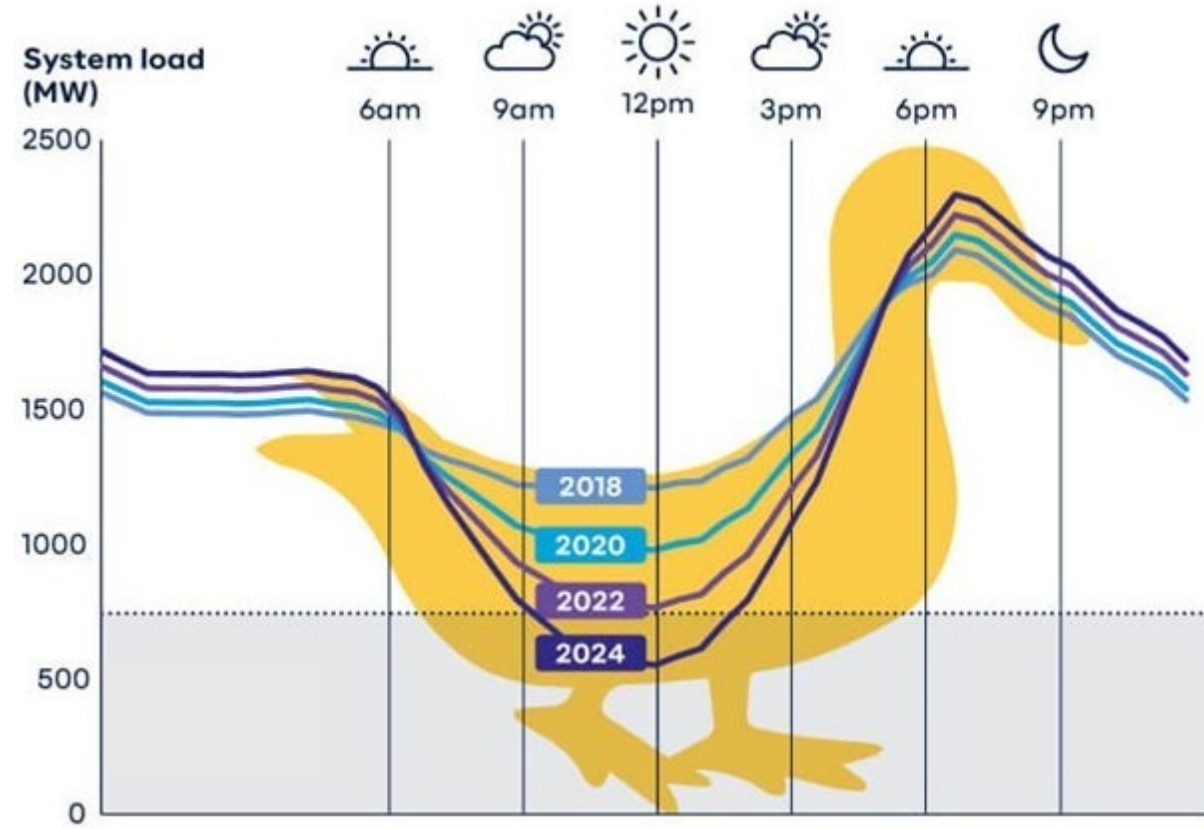
Ancillary Services, continued

Generation Capacity from Glen Canyon is used for the following Ancillary Services:

- Ramping = adjusting power output from power plants to match fluctuations in demand
- Voltage Control = units used to maintain specific voltage levels on the grid which is crucial for efficient power transmission.
- Black Start Capability = the power plant's ability to restart the grid from a total shutdown, without relying on external power.

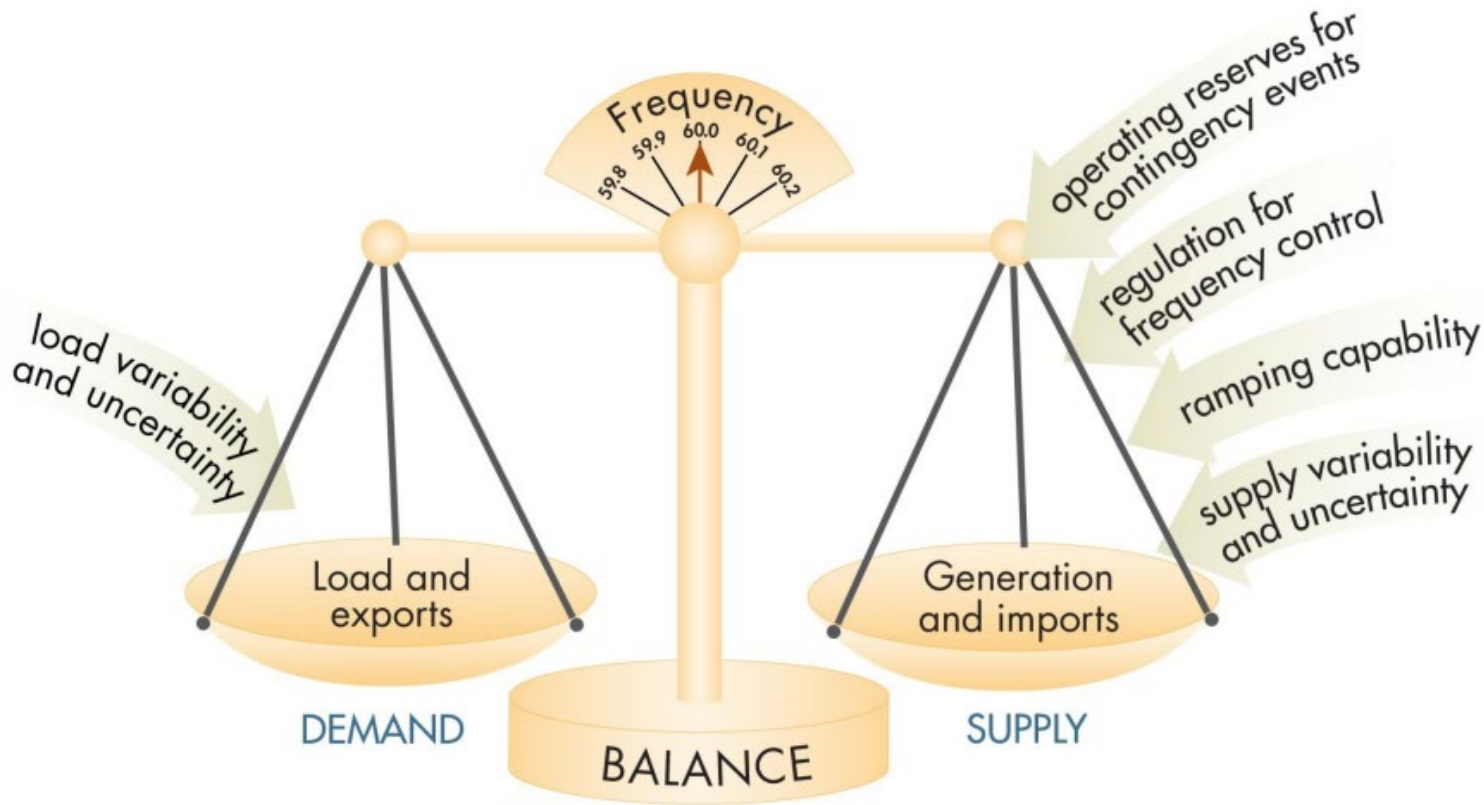


Ramping demands are changing



Reliability Impacts of Glen Canyon Capacity

Reductions and/or limitations on the use of Glen Canyon generation capacity reduces the tools in WAPA’s toolkit to manage these collective Ancillary Services. As capacity falls, we have less capacity at our disposal to manage minute-by-minute system fluctuations and diminished capabilities to recover from system contingencies on our power system and with our neighboring utilities.



LAP	Generation Plant	Nameplate kW
	Big Thompson	4,500
	Estes	45,000
	Flatiron	94,500
	Green Mountain	26,000
	Mary's Lake	8,100
	Pole Hill	38,238
	Alcova	41,400
	Seminole	51,750
	Guernsey	6,400
	Boysen	15,000
	Fremont Canyon	66,800
	Glendo	38,000
	Kortes	36,000
	Yellowtail	287,496
	Buffalo Bill	18,000
	Heart Mountain	5,000
	Shoshone	3,000
	Spirit Mountain	4,500
	Pick Sloan	789,684
CRSP	Lower Molina	5,589
	Upper Molina	9,936
	Blue Mesa	86,400
	Crystal	31,500
	Flaming Gorge	151,500
	Glen Canyon	1,320,000
	Morrow Point	173,334
	Deer Creek	4,950
	Elephant Butte	27,945
	Fontenelle	10,000
	McPhee	1,283
	Towaoc	11,495
	Total>>	2,623,616
	Glen Canyon Percentage>	50.3%

Mike Simonton
Simonton@wapa.gov
602-605-2675



www.wapa.gov