Potential Approach to Dispatch of Hydro with Storage

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Dispatch Simulation for Hydro with Storage

- The dispatch simulation for ROR Hydro with storage will be a reliability-preserving simulation with foresight that meets the physical constraints of such units on a plant basis. Operation of a hydro facility with storage is based on meeting the peak net load by reducing generation and ponding in the low load hours to have full storage available for the subsequent high load hours.
- Establish Min MW levels and Max MW levels that will be fixed for each month of the year.
- Model a daily budget based on a fixed number of daily MWhs for each month of the year, using:
  - Monthly average hourly streamflow from 2012 to 2019
  - Model a certain number of MWhs of normal daily storage for moving MWhs from one hour to another. Normal daily storage shall be based on a fixed number of daily MWhs for each month of the year. Based on plant megawatt limits (Min and Max MW) and the MWh of storage, hydro plant storage will be represented in a 4 hour class, 6 hour class, or 10 hour class, with linear derating.
- Model an “exigent storage reserve” capability that can add incremental generation beyond the daily budget on days with extraordinarily high net load hours. Under exigent storage operations, hydro facilities will be able to maximize their ability to generate during extraordinarily high net load hours. Exigent storage reserves would be replenished from incoming streamflow net of outgoing generation.
- Exigent storage capability from an upstream hydro facility can be utilized by a downstream hydro facility by relying on cascading storage and flows.

Required parameters

- Min and Max MW
- Hourly inbound streamflow in MWh (monthly average for 10 years since 2012)
- Daily storage capability in MWh (varies by month)
- Exigent storage capability in MWh
- Any cascading relationships among plants on related river systems with shared ownership

Example for Hydro with Storage

- 10 MW minimum power, 100 MW max power.
- Pondage/storage inventory: July = 200 MWh, August = 300 MWh.
- 500 MWh of exigent reserve.
- Hourly incoming streamflow of 25 MWh all the time.
- ELCC model would put the plant at 10 MW during low net load period (storing up 15MWh per hour in pondage).
- During high net load hours, ELCC model would assess the duration of required discharge and stretch the available pondage inventory (and, if necessary, exigent storage inventory) across the duration, without exceeding the max power limit.
  - Simplistic example 1: with a 4 hour event in July that is not a load shed risk, 200 MWh could be stretched evenly across 4 hours therefore adding 50 MWh to the 25 MWh available from incoming streamflow, for 75 MWh total each hour.
  - Simplistic example 2: with a 4 hour event in **August** that is not a load shed risk, **300 MWh** could be stretched evenly across 4 hours therefore adding 75 MWh to the 25 MWh available from incoming streamflow, for 100 MWh total each hour.
- In hours that require additional energy to avoid load shed, the ELCC model would deploy the “exigent reserve”, which would effectively simulate the draw down of the upstream river level to below normal operating levels.

Documentation Support for ELCC Model Parameters for Hydro w/ Storage

Owners of hydro plants with storage must provide documentation to support the parameters provided for dispatch modeling. This documentation must support both their plants' physical capabilities and show full authorization from FERC and any other applicable authorities to meet those capabilities.

Other ELCC Solution Items

- Performance Adjustment TBD, ideally should be commensurate with dispatch method.