Black Start Fuel Assurance Proposal for Run of River and Pumped Storage Hydro

Version 1: 4/1/2022 Special Session

Run Hour Requirements:

Hydro units provide fuel diversity and flexible operation down to zero load during restoration events. As such they provide value during a restoration and existing units will remain in the current restoration plan as non-fuel assured resources. There will be no set run hour requirement for either existing Run of River or Pumped Storage Hydro. Hydro units that choose to offer Black Start MWs with a 16 hour minimum run time with a 90% confidence (equivalent to the 90% EAF of a CT) will be considered fuel assured and will be eligible for a greater Black Start Annual Revenue Requirement when on the Base Formula Rate.

Proposal for determining amount of Black Start MWs at a Hydro Station:

Non-Fuel Assured Hydro Units

Run of River Hydro with or without Storage shall use the sum of the current ICAP of the Black Start unit(s) (Status Quo) at the station. Black Start revenues will continue to be calculated using the unit's ICAP in accordance with the current rules for Hydro units in Schedule 6A of the Tariff. On a five year basis in coordination with the 5 Year RTO Wide RFP, PJM shall perform a historical flow analysis of all Run of River Hydro units simultaneously operating using the data provided to PJM for the unit's ELCC analysis to determine the confidence level the unit is capable of providing the unit's ICAP for 16 hours. PJM will use this confidence level times the unit ICAP to determine the unit's Black Start MWs used in the Black Start Calculator.

Pumped Storage Hydro with shall use the sum of the current ICAP of the Black Start unit(s) (Status Quo) at the station. Black Start revenues will continue to be calculated using the unit's ICAP in accordance with the current rules for Hydro units in Schedule 6A of the Tariff. On a five year basis in coordination with the 5 Year RTO Wide RFP, PJM shall perform a storage analysis of all Pumped Storage Hydro units simultaneously operating using the data provided to PJM for the unit's ELCC analysis to determine the MWs that the unit is capable of providing for 16 hours. PJM will use this MW value times an availability factor (account for pumping time - TBD) to determine the unit's Black Start MWs used in the Black Start Calculator.

Fuel Assured Hydro Units

Run of River Hydro with or without Storage can offer a fuel assured MW value based on a historical flow analysis with all units simultaneously operating using the data provided to PJM

for the unit's ELCC analysis that supports a 16 hour minimum run hour requirement. The Black Start MW calculation shall be based on river flows of 90% Confidence level to correspond to the current average PJM CT Equivalent Availability Factor (e.g. - for a BS commitment of 100 MW assume 100 MW would be available, for 16hrs, 90% of the time based on historical river flows and daily storage). The calculated Black Start MW value shall be used in both the unit's annual revenue calculation and in the Black Start Calculator.

Pumped Storage Hydro shall maintain sufficient pond level to support all units simultaneously operating for a 16 hour minimum run requirement at full load of the assigned black start MW. This Black Start MW value shall be used in both the unit's annual revenue calculation and in the Black Start Calculator.

Black Start Hydro Annual Revenue Requirements:

Hydro Units on Base Formula Rate

*Revenue = ((Net CONE * Black Start Unit Capacity * X) + Variable BSSC + Training) * (1 + Z)*

Non-Fuel Assured Hydro Units (Status Quo)

Net CONE = Cost of New Entry ($/MW year) for the CONE Area where the Black Start Unit is located.

Black Start Unit Capacity = Black Start Unit's installed capacity (ICAP)

X = Black Start Service allocation factor = 0.01

Variable BSCC = Black Start O&M Costs including NERC Reliability Standard Compliance Cost

Training = Black Start Training Cost = $3,750.

Z = Black Start Incentive Factor = 10%

Fuel Assured Hydro Units (Proposed Changes)

Black Start Unit Capacity = Black Start MW calculation based on ELCC data provided river flows with 90% Confidence level that correspond to a 16 minimum run time.

X = .02 for 16 hour min run commitment

Hydro Units on Capital Cost Recovery Rate

*Revenue = ((Incremental Black Start Capital Cost * CRF) + Variable BSSC + Training) * (1 + Z)*

Non-Fuel Assured and Fuel Assured Hydro Units (No proposed changes - Status Quo)

Incremental Black Start Capital Cost = Black Start conversion Cost

CRF = Capital Recovery Factor based on the age of the unit

Annual Revenue Calculation Examples:

Hydro Resource with 100 MWs ICAP

Capable of providing 70 MWs for 16 hours with 90% confidence

Net CONE = $264.40/MW-Day

Non-Fuel Assured	Formula Rate	Result
BS Capacity	100 MW	
BS Calculator MW	70 MW	
Fixed BSSC	100 MW * $264.40 * 365 days * 0.01	$ 96,506.00
Annual Revenue	($96,506 + ($100,000 * 0.01) + $3,750) * 1.10	$111,381.60

Fuel Assured	Base Formula Rate	Result
BS Capacity	70 MW	
BS Calculator MW	70 MW	
Fixed BSSC	70 MW * $264.4 * 365 days * 0.02	$135,108
Annual Revenue	($135,108.40 + ($100,000 * 0.01) + $3,750) * 1.10	$153,844.24

Monthly Black Start Revenue Calculation:

For Pumped Storage Hydro Black start resources, monthly revenues will be withheld for months in which water level falls below the run hour requirement. Monthly revenues will not be withheld if the water levels falls below the run hour requirement as a result of a regulatory requirement, an approved outage, PAI event, or restoration event. ~~If water levels fall below the run hour requirement during a PAI event, monthly Black Start revenues will be foregone.~~

Summary:

	Non-Fuel Assured Hydro	Fuel Assured Hydro
Black Start MW	ICAP	ICAP * 90% confidence of 16 hours
Minimum Run Time	None	16 hours
Black Start Calculator MW	ICAP * confidence level for 16 hours	ICAP * 90% confidence of 16 hours
Revenue Calculation MW	ICAP	ICAP * 90% confidence of 16 hours
X factor	0.01 (status quo for Hydro)	0.02 (same as CT)
Z Factor Incentive	10%	10%
Penalty for lack of water	None	Pumped storage only if they fail to maintain 16 hours of storage

Notes

1) Hydro confidence levels calculated on 5 year basis in coordination with Five Year RTO Wide RFP
2) Confidence levels are calculated based on all black start units at a plant operating simultaneously for 16 hours