

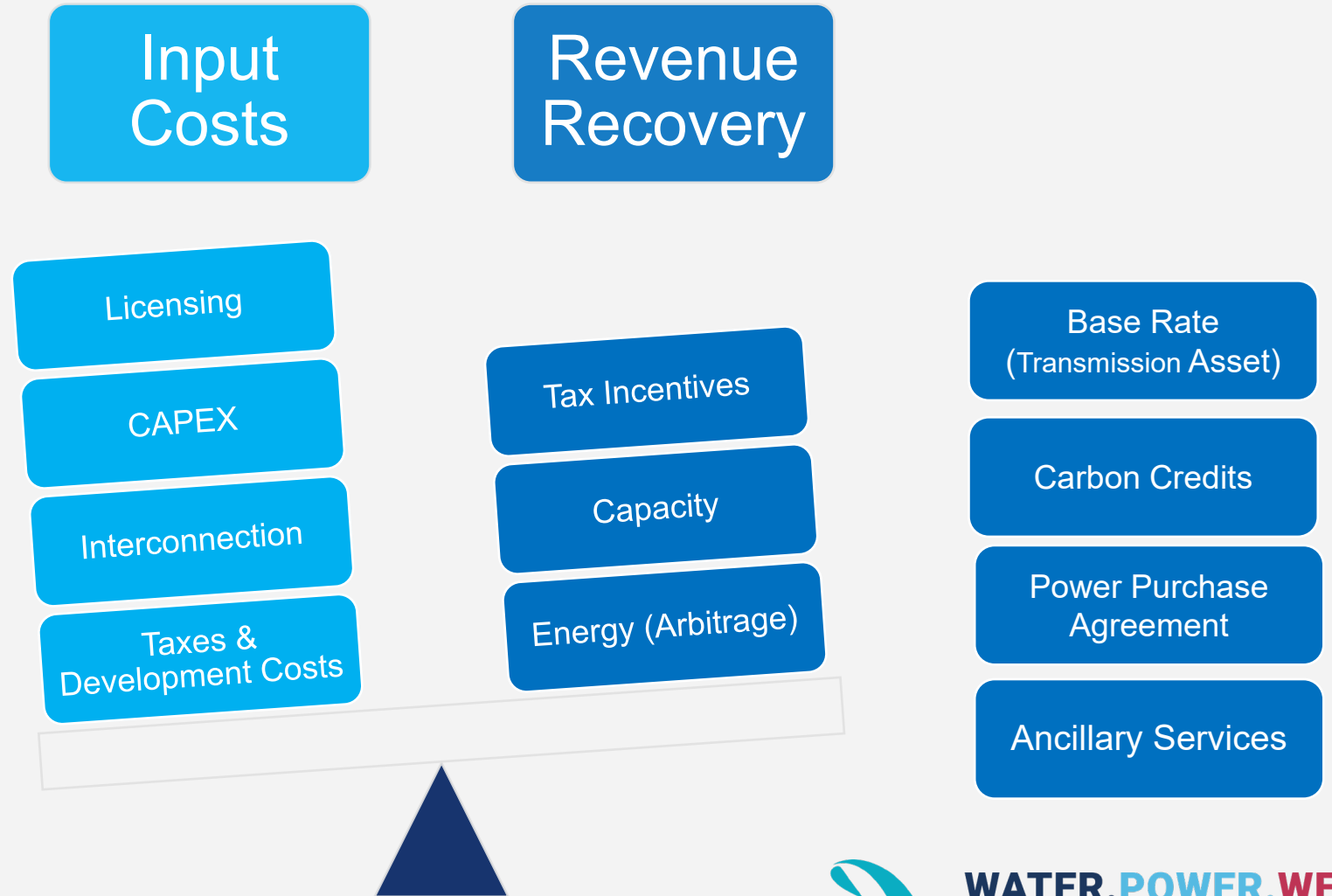
NHA Pumped Storage Revenue Recovery

March 14, 2024



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Market changes are needed for balance



Performance Incentive Payments (Ancillary Benefits Etc.)

Programs

- Ancillary Benefit Payment Structure
 - Frequency Security (NERC Mandate Required)
 - Inertia
 - Voltage Regulation
 - Black Start
 - Ramping
- Peaking
- Optimization of Baseload Resources
- Congestion Relief
- Grid Reliability
 - Availability to support during extreme events

Discussion

- Need to establish value and payment vehicle for services
 - Compare to replacement cost and risk for other technologies
 - Short term market value low
 - Participate in utility planning processes
 - Market modeling that demonstrates value
 - Time horizon and flexibility critical
 - Messaging clarity required
- Work with utilities and policy makers
 - Reliability
 - Resiliency
 - Asset life
 - Long term economics



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Energy Policy Payments

Programs

- State Support to achieve Renewable Portfolio Standards
 - Carbon Offset payment
 - State sponsor pairing with Solar installation
 - Energy Storage Bank
- Green Energy Trading Market
 - Expand Time Based Energy Attribute Certificates (T-EACs)
 - Use storage to provide time of use clean power

Discussion

- Policy could be suitable for any LDES technology
- Storage Bank could be established like environmental mitigation banks
- Need to expand state or regional carbon trading markets

- PJM started offering T-EACs in 2023
- Participation is voluntary – being led by Google and other Corporations
- Generation Attribute Tracking System (GATS) helps to ensure RPS compliance



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Long Term Energy Power Purchase Agreement (PPA)

Programs

- Establish a fixed costs for energy purchase and sales
 - Purchasing green energy to pump, Selling green energy at night
- Establish a cap and floor model
 - Sets cap and floor for energy being purchased or sold for storage
 - Range establishes minimum arbitrage for certainty
- Index Storage Credits
 - Bid in a base cost for storage
 - Payment = Bid/Strike Price – Market Prices
 - Credit = 1MWh purchased daily based on Payment

calculation



Discussion

- Applicable for all LDES technologies
- Supports 24/7 Green Energy
- Example Cap and Floor program being debated in UK
- Some states already using Credits (CA, NY)

Storage as a Transmission Asset

- Socialize Cost for Storage
 - Recovery of CAPEX as part of rate base
 - Buy and sell energy at market rates
 - Dispatch by ISO or Balancing Authority
 - Operation by Owner/Developer
 - Tolling Agreement
- Requires FERC ruling
 - Approval required by local Public Utility Commission
 - Long term revenue for O&M based on arbitrage
 - Tolling Agreement = Fixed payment for right to use asset



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Discussion Items

- Discuss the pros and cons of each approach among your small group.
- In your area/region of the Country, which approach do you see working the best and why?
- In your area/region of the Country, which approach is a non-starter? Why?
- What changes need to occur (regionally/nationally) to make the market change possible?
- What market product is needed to address the retirement of thermal assets?



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