Hybrid Resources discussion

Gabe Murtaugh
Senior Infrastructure & Regulatory Policy Developer

Market Surveillance Committee Meeting
General Session
May 29, 2020

Definitions

- Co-located Resources – Multiple Resource IDs behind a single point of interconnection
  - Each resource is modeled and submits bids to the ISO independently
  - ISO will model state of charge, VER forecasts, heat rates independently as appropriate
- Hybrid – Single Resource IDs, with multiple mixed-fuel components behind a single point of interconnection
  - ISO receives one bid curve from the hybrid resource which should include any internal optimization
  - Resource should always be able to respond to any dispatch instruction from the ISO

Hybrid resources will be subject to the same market principles as other resources

- Hybrid resources will bid a single bid curve into the DA and RT markets
- Hybrid resources are required to respond to dispatch instructions from the ISO
  - Hybrids must manage state of charge and variable output from any/all underlying components
- Hybrids will not be classified as VER resources
  - ISO plans to use the NGR model for most hybrids
  - ISO will continue to collect MET station and forecast data for hybrids
- The proposal develops a ‘dynamic limit’ tool to alert the ISO when generation is unavailable
  - ISO needs to know when total output is reduced due to less variable output or from resources charging without visibility for dispatch
  - These may be updated every five minutes

New tools will be required in order for hybrid resources to operate and perform in the market

- Hybrid resources will have many of the same challenges as existing resources
  - Variable generation capability for certain hybrid components
  - State of charge for storage components
- Dynamic limits will established for storage resources
  - Hybrid resources will have the ability to manage variable output through a ‘dynamic limit tool’
  - This tool will be based on similar technology that the ISO already uses for variable energy resources
- Dynamic limits will be submitted by the SC to the ISO
  - Data is provided for 5-minute intervals
  - Data for 3 hours of duration will be submitted
- No requirement to submit limits for all intervals

Co-located resources will no longer be subject to the current constraint restricting Pmax values

- The ISO constrains co-located resources today

$$\Sigma Pmax < POI$$

- Proposal relaxes this rule and implements an aggregate capability constraint (ACC)
  - Constraint precludes the total generation from co-located resources to the POI limits
  - This constraint will be implemented for energy only in fall 2020
  - A full implementation (inclusive of AS) will be developed in fall 2021
- Resources will be priced behind the point of interconnection, rather than behind the interconnection

The aggregate capability constraint initially implemented will limit total energy dispatch

$$MAX\left[0, \sum_{i \in S} (EN_i)\right] \leq UL$$

$$MIN\left[0, \sum_{i \in S} (EN_i)\right] \geq LL$$

Where:

i	Resource
S	Set of co-located resources
EN	Energy schedule
UL	Upper limit
LL	Lower limit

The aggregate capability constraint eventually implemented will include ancillary services

$$MAX\left[0, \sum_{i \in S}(EN_i + RU_i + SR_i + NR_i + FRU_i)\right] \leq UL$$

$$MIN\left[0, \sum_{i \in S}(EN_i + RD_i + FRD_i)\right] \geq LL$$

Where:

RU	Regulation up award
RD	Regulation down award
SR	Spinning reserve award
NR	Non-spinning reserve award
FRU	Flex ramp up award
FRD	Flex ramp down award

The pricing inconsistencies for co-located resources is a concern for the ISO

- Resources could be receiving high prices but not be dispatched at Pmax
- This results in an incentive for resources to produce beyond instructions from the ISO dispatch
- ISO is proposing safeguards to ensure output is consistent with dispatch
  - All co-located resources will be required to follow dispatch instructions
  - Co-located resources that do not follow dispatch instructions may lose eligibility to use the aggregate capability constraint and would revert back to the current methodology where ΣPMax <= POI
  - Resources will continue to be required to have physical or electronic controls at interconnection to limit flows to contract levels
  - The shadow price will not be applied to co-located resources
- ISO exceptional dispatch tools do not include POI constraints
  - ISO is requiring that all co-located resources be operated by the same scheduling coordinator, so that exceptional dispatch instructions will never exceed POI constraints
- May update operating controls to accommodate for this in the future

Timeline for hybrid policy

Date	Item
April 29	Post second RSP, Final for co-located resources
May 29	Market Surveillance Committee meeting
July 22	**Board of Governors meeting for co-located**
July 29	Publish draft final proposal
Oct 6	Publish final proposal
Nov 18	**Board of Governors meeting**
Fall 2020	Implementation of co-located constraint (Energy only)
Fall 2021	Remaining implementation for hybrid policy

Stakeholder feedback asked for specifics to protect ITC credit and a new tool for the non-VER components

- ITC credit is essential for funding storage projects
  - It is important that these resources have a mechanism to not charge from the grid
  - DMM noted it is best to do this economically
- Tool to allow storage to make up the difference between solar output and forecasts
- Track SOC for hybrid resources, for monitoring
- Make it easier to transition from a hybrid resource to a co-located resource
- Do not bifurcate the solution over two years
- Move swiftly to develop a market solution

Investment tax credit for storage located at the same site as existing solar resources

- ITC is awarded to co-located storage projects
  - Tax credit may generally be up to 30% of the cost of annualized capital costs for a storage project, paid during the initial 5 years of operation
  - Credit phases out over 5-year period: credit is 100% in year one, 80% in year 2, 60% in year 3...
  - Model for the tax credit is that these resources charge from on-site solar and deliver energy during the peak
  - ITC clawed back when storage charges from grid
  - ITC clawed back completely if the storage resource charges more than 25% from grid
  - ITC may include a 10-20% “developer premium”

Investment tax credit - Example

- Suppose a co-located storage project costs $30 million
  - Storage can produce +/- 25 MW and store 100 MWh
- ITC credit is $10 million
- Modelling implies that the resource cycles once per day
  - 100 MWh * 365 = 36.5 TWh/year
- Assume 10% charging from the grid
  - Resource loses $1 million from 3.7 TWh, or $270/MWh

- The costs reduce by 20% each year, because of decreasing credit amount

There are a number of ways that resources could achieve no/limited charging from the grid

- A new (un-proposed) mechanism explicitly preventing such dispatch
- Storage resources could self-schedule to ensure that charge only occurs when solar is online
  - Self-schedules could be placed in the real-time market after receiving day-ahead awards from economic bidding
- Use of the minimum and maximum end of hour state of charge parameters (ESDER 4 feature for storage)
  - Storage can specify what the state of charge will be at the end of the hour, but this may not ensure that there is no grid charging
- Economic bids
  - Prices in the markets today imply that charging would happen generally during solar hours
  - If the actual loss from the ITC is $160/MWh (in year 3), then a resource could bid into the RT market with a ~$190/MWh price spread

Current proposal requires co-located resources follow dispatch instructions, even when paired with VERs

- VER resources today are allowed to generate ‘as capable’ unless they receive a downward dispatch or operator instruction from the ISO
- Storage resources are not required to follow dispatch
- Co-located resources would be treated the same way
- Request from stakeholders: allow storage resources to generate/charge the difference between VER output and forecast
  - Market does not make allowances for non-VER resources to not follow dispatch today