Clean Energy Caucus Package

Reactive Power Compensation Task Force

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Overview

- Recap of CEC Package To Streamline The Process
- Respond To Issues Raised With CEC Package
- Respond To Comments Raised About PJM Package

Reason For Reactive Capability - Reliability

- The transmission grid in PJM cannot function without reactive support.
- Part of the problem with the massive blackout that occurred 20 years ago was a lack of adequate resources to provide reactive support to the grid during low grid voltage emergency events.
- In PJM, reactive resources are located on the transmission grid and with generation.
- Transmission owners in PJM are collecting a cost-based rate for the full investment plus a return on equity in the transmission rate base for the reactive resources they own that are located on the transmission grid.
- Utility and Independent owners of generation in PJM also are collecting a cost-based rate on a partial investment basis plus a return on equity through Schedule 2 of the PJM Tariff. All these rates have been based on FERC's *AEP* methodology.
- The *AEP* methodology compensates the resource for its investment in reactive capability – as needed; it is not based on the reactive supply that is delivered or provided. This is because it is reliability based.
- This compensation process has ensured that adequate reactive resources are available for PJM's use 24/7 and when emergency events arise.

Reason For Reactive Capability - Reliability

FERC emphasized the value of inverter-based resources (wind, solar and storage) (“IBRs”) at its November 17, 2022 Open Meeting, discussing measures to require access to more IBRs via NERC for reliability:

Chairman Glick: “Are there aspects of IBRs that offer reliability advantages compared to traditional generation?

Staff from FERC Office of Electric Reliability:

> “Yes. IBRs can provide a variety of reliability benefits. . . .
>
> IBRs can react nearly instantaneously to changes in grid conditions. . . .
>
> IBRs can ramp up and ramp down at least 1000 times faster than synchronous resources in a matter of seconds. . . .
>
> IBRs are more flexible and can switch from real to reactive power almost instantaneously. IBR flexibility and speed is extremely beneficial when the grid is experiencing potential voltage collapse. . . .
>
> IBRs can be reprogrammed to do whatever is needed to support reliability.”

Issue Charge – Eliminate Perpetual And Lengthy Process At FERC

- Rates for every generator in PJM for the past 20+ years have been based on application of the *AEP* methodology adopted by FERC and required a cost-based filing at FERC for every generator.
- This is an extremely time-consuming process with market participants involved in lengthy and costly settlement and hearing processes at FERC.
- The CEC Package proposes to eliminate the time-consuming process by administratively determining an *AEP*-derived rate for each generation type using actual generator cost data as a proxy. CEC has presented example data to show how the stated rate would be derived.
- Very few questions have been raised about the CEC package. CEC is willing to discuss revisions to various aspects of an *AEP*-derived rate as it applies to wind or solar generation. That has not yet occurred in these stakeholder meetings.
- Once adopted, all market participants will be apprised of the rate; lengthy processes at FERC will be eliminated entirely.

Benefits of the CEC Package

- **Streamlined administrative process** – One flat rate per technology; no more filings at FERC by every generator.
- **Limits costs** – Payments are “capped” at the agreed-upon cost of the proxy unit; no more costs spent at FERC proceedings for every generator.
- **Reliability** – Promotes long-term investment in reactive capability, especially fast-acting IBRs.
- **Comparability** – Ensures new and existing resources are compensated on a comparable basis, i.e., *AEP* rates.
- **Easy Implementation** – There is no need for a transition period or any additional PJM personnel, monitoring or tools.
- **Pathway for FERC approval** – Proposes a solution based on historical FERC *AEP* method
- **Predictability** – Allows generation developers to forecast economic value and support new generation development

AEP and “Black Box” Rates

- Nearly all the rates for every generator in PJM over the past 20+ years have been adopted through “black box” settlement negotiations at FERC after an *AEP*-based rate has been filed.
- “Black box” means the rate was agreed to by customers and the generator, with FERC approval, without listing of the principles leading to the settlement rate.
- Settlement rates are achieved all the time at FERC on a “black box” basis. Transmission rate cases can be resolved on a “black box” basis.
- The fact that the current PJM generator rates are “black box” is not an indictment of the *AEP* rate process. It simply means customers and the generator/utility agreed to a rate rather than litigate and achieve a result through a hearing. However, all those “black box” rate have stemmed from an *AEP*-derived rate.
- The CEC proposal to use an administratively-derived *AEP* rate, which might be based on settlement compromises in this stakeholder process, is no different.

AEP and Performance

- *AEP* is based on a resources' capability. That capability should be available when PJM needs it.
- Generators provide reactive support on a daily basis per the voltage schedules or power factor requirements that PJM and interconnecting utility direct.
- PJM has stated there have been instances where a generator has not provided reactive support when requested. PJM has not provided any data to support this claim despite being asked many times.
- Regardless, CEC agrees that performance is important. This is because reactive support is necessary for reliability.
- CEC agrees there should be some penalty if a resource does not perform when requested by PJM.
- CEC supports adopting the "Three Strike Rule" that FERC approved for MISO.

AEP and Testing

- For reliability management, currently reactive testing is undertaken and uploaded to eDART per PJM Manual requirements. Leading and lagging reactive capability is tested at least once within the first year of operations and at least every 66 months thereafter.
- PJM also allows new generation to utilize the facility design values for initial MVAr capability curves in eDART, with subsequent testing to replace the manufacturer's or design rating.
- PJM has not identified any reason to change this process.
- PJM has not used the eDART testing to validate a generator's power factor rating for *AEP* rate purposes.
- If the PJM stakeholder process wants some form of online testing, PJM will need to make arrangements to accommodate an ability to demonstrate the full reactive capability of a resource.
  - PJM establishes telemetry to the low side or per feeder for wind and solar resource;
  - PJM allow units to absorb VARs while other units provide VARs so the full range of VAR capability is validated;
  - PJM directs redispatch of local generation, cap banks and reactors to allow meaningful testing.

AEP and Scalable Rates

- CEC proposes an *AEP*-derived rate based on proxy cost data for each generation type.
- Generation types have different nameplate power factor capability. In *AEP*, for example, some generation had a .80 power factor capability and other generation had a .85 power factor capability.
- Power factor variability can easily be accommodated in the CEC proposal. It is simply a matter of swapping out the power factor used to determine the “reactive allocator.” This occurs all the time in *AEP* filed rates.
- This would apply for gas-fired generation, as well as wind or solar generation.
- The proxy cost data that is adopted would continue to be used; the only difference is the power factor used in the *AEP* formula.
- For solar generation, there are typical power ratings of the inverters: .80 or .85
- For wind generation, there are typical power ratings: .87, .90. .95.
- Stated rates would simply be listed for typical power factor ratings; alternatively, the stakeholder membership could decide to use some medium power factor rating so only one rate is listed per generation type.

AEP and "Comparability"

- In Order No. 2003, FERC stated if the interconnecting transmission owner/utility collects a rate for the reactive capability of its generation, independently-owned generation is afforded the same "comparable" opportunity to receive a rate for the reactive capability of its generation.

- To date, "comparability" has meant that the utility and independent generation are compensated via the same rate method. In PJM, that has been via the *AEP* methodology.

- The CEC proposal would continue this "comparability," with existing and new generation obtaining a rate based on the *AEP* methodology.

Concerns With PJM Package – Unproven Path

- PJM proposes to treat existing and new generation differently.
- Existing generation would preserve *AEP*-based rates.
- New generation would be based on deliverability measures, measured at the GSU or POI, and use current reactive revenues in PJM as a basis.
- PJM's proposal would ask FERC to approve a rate means that violates its "comparability" requirement. This is unproven territory.
- If FERC rejects the proposal on comparability grounds, it will send the PJM stakeholder process "back to the drawing board," with time and effort wasted.
- It is in everyone's best interest for PJM to file a proposal that is a workable solution to the streamlined issue. The CEC proposal is a workable solution. The CEC proposal comports with FERC's "comparability" policy.

Concerns with PJM Proposal - Implementation

- PJM does not have the resources to implement its proposal
- Telemetry and other tool changes will be needed.
- PJM states it will take a few years to develop its tool. Tools can be delayed.
- PJM's proposal will require more PJM staff time.
- CEC proposal has none of these implementation issues.

Concerns with PJM Proposal – Transition Phase Out

- PJM recently also proposed to eliminate all compensation for generation (Package G) and only compensate for reactive capability outside of the leading/lagging required range.
- Presumably, this would apply to existing and new generation. If not, it raises the same comparability problem.
- PJM has yet to provide justification for this “phase out” of compensation.
- The justification and details must be known so generation developers can make economic assessments for generation that is in the PJM study queue and will achieve operation 5 or so years from now.

Concerns with PJM Proposal – Improper Ratio

- PJM proposes to calculate the per MVAR rate by dividing total compensation of $377,522,624.82 by the system MVAR capability, which is estimated based on the nominal plant MW ratings of all units in eDART and a .95 power factor.

- This denominator must be adjusted:
    - Units that are directed to operate per a power factor schedule do not provide dynamic reactive response, so under PJM's logic should be removed from the denominator,

    - Units that have no eDART reactive capability curve, eDART reactive curves with 0 MVARs at max or min p, or that do not have a voltage schedule on file in eDART should be removed from the denominator, and/or

    - Alternatively, the rate could be calculated using actual eDART data for all units collecting under Schedule 2 and the corresponding total revenue requirement

- Unless corrected, the ratio suffers defects that will be unacceptable at FERC and send stakeholders "back to the drawing board."

Concerns with PJM Proposal – Testing

- PJM proposes to establish a generator's MVAR capability based on tested, delivered value at the GSU or POI.
- CEC explained that, when testing occurs, system limitations prevent accurate testing of capabilities.
    - This needs to be addressed or it will create new administrative burdens and persistent disputes about capability and therefore compensation – which is not consistent with moving to a streamlined process.
- Possible Solutions:

    1) PJM to establish telemetry to the low side or per feeder for wind and solar resources to allow for more granular testing and demonstration of unit VAR capability;

    2) PJM to continue to allow new resources to dedicate certain units to absorb VARs while others provide VARs so the full range of capability is captured without impacting system voltage constraints; and

    3) PJM to direct redispatch of local generation, caps, reactors, etc., for VARs during testing.

- PJM has not responded. Unless this is remedied, PJM proposes means that fail to allow for robust testing that demonstrates the full MVAR capability of a generator, which is not "just and reasonable" and will be "unduly discriminatory" in violation of the Federal Power Act standard.

Concerns With PJM Proposal – Lack of Proposal to Address Opportunity Costs

- The issue statement noted the need to establish means to compensate inverter-based resources as exists now for synchronous generation
- No proposal has been discussed yet
- Is a key piece to understand the full proposal
- The full package needs to be understood as vetted before stakeholders move forward

Next Steps

- CEC encourages PJM to schedule meetings that address:
  - CEC Proposal - Proxy Rate Questions
  - PJM Proposal – Fixes/Commitments to the Concerns

Sponsor Companies

- Pine Gate Renewables, LLC
- Solar Energy Industries Association
- GlidePath Power Operations LLC
- NextEra Energy Resources, LLC
- Clearway Energy
- Open Road Renewables
- Lightsource BP
- Leeward Renewable Energy, LLC
- Savion, LLC, a Shell portfolio company
- Invenergy
- Jupiter Power
- TransAlta
- Geenex Solar
- Cypress Creek Renewables

Thank You

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