Market Participation Options for Mixed Technology Facilities (MTF)

Maria Belenky, Patricio Rocha Garrido

Market Implementation Committee

November 4, 2026

Disclaimer: While materials are current at the time of publishing, applicable requirements may change. PJM Governing Documents control.

PJM © 2026

Mixed Technology Facilities



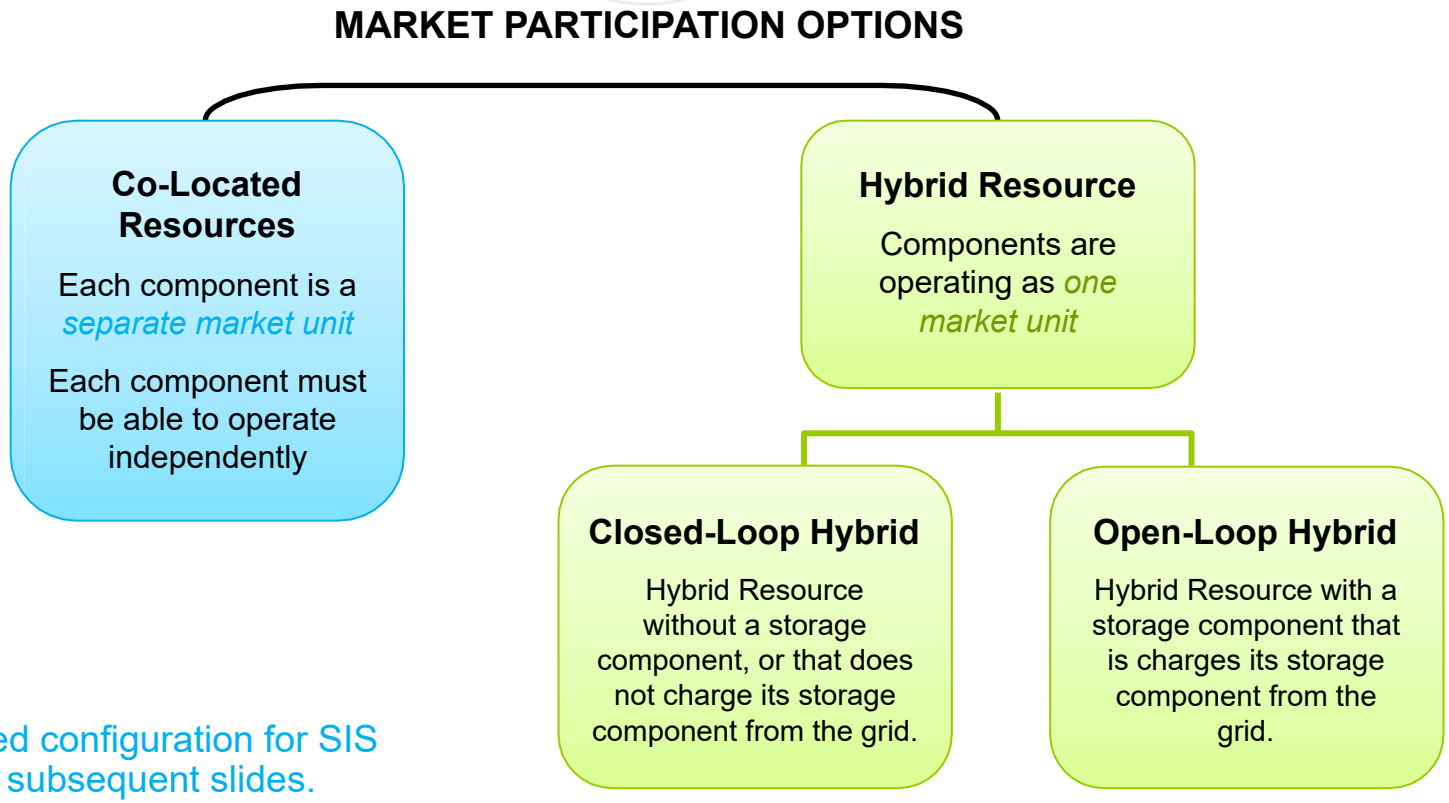
Mixed Technology Facility (MTF):

- A facility that features multiple technology types behind the same Point of Interconnection.
- A MTF can be formed via any interconnection process (regular queue, surplus interconnection service, etc.).

PJM © 2026

MTF Market Participation Options

Each component in a **Mixed Technology Facility** can participate in PJM markets as either an independent **Co-Located Resource*** or as part of a **Hybrid Resource**.



* Limitations to the co-located configuration for SIS resources are discussed on subsequent slides.

PJM © 2026

MTF Market Participation Options

- A MTF with components that can operate independently may select to participate as ***either*** a Hybrid Resource or as multiple independent Co-Located Resources.
  - In order to participate separately in the capacity market, each component of a MTF must have its own CIRs.
- A MTF with significant interaction between components—a MTF with a storage component that cannot physically charge from the grid—may participate as a Hybrid Resource ***only***.
- The classification elected (one Hybrid Resource or multiple co-located resources) must be the same across all of PJM's markets.

PJM © 2026

Selecting and Updating Classification

Capacity resources

- The Capacity Resource Provider of a MTF eligible to participate as either a single Hybrid Resource or as multiple standalone resources will elect whether PJM is to model it as a single resource or as multiple standalone resources.
- The classification election must be made by August 1 ahead of the calendar year in which an auction is held (RAA, Schedule 9.2) by submitting the requests and supporting documentation to ELCC@pjm.com.
- The election will be for a term of five consecutive Delivery Years.

Energy & Ancillary Services Markets

- The Market Participant of a Mixed Technology Facility must inform PJM of its desired participation model at least 6 months ahead of their planned in-service date by contacting Member Relations at custsvc@pjm.com.
- Once elected, classification can be changed 1x per calendar year with notice to PJM by May 30 for the upcoming Jan 1 to Dec 31 participation months.

PJM © 2026

Mixed Technology Facility: Capacity Market

Co-Located Resources

These resources participate in the PJM's markets individually and follow the relevant business rules for the underlying technology type.

Hybrid Resources

- Hybrid Resource receive unit-specific ELCC accreditation.
- Hybrid Resources committed for capacity have an energy must offer requirement as described in M11.
- Today, one Hybrid Resource committed for capacity is supported by one Hybrid Resource energy market unit.
- Compliance is assessed based on the performance of the single hybrid energy market unit.

PJM © 2026

Mixed Technology Facility: Energy Market

Co-Located Resources

These resources participate in the PJM's markets individually and follow the relevant business rules for the underlying technology type.

Hybrid Resources

- Hybrids meet the must offer requirement by self-scheduling (i.e., self-committing) in the energy market at fixed MW quantities or with a dispatchable range.
- Hybrids may offer values that vary hour to hour from the capacity commitment.
- The Market Seller of a Hybrid with a storage component must specify the hourly mode of operation.
- As cost guidelines are not defined in Manual 15, the cost offer defaults to $0.

PJM © 2026

MTF Market Participation Options - SIS

- Surplus Interconnection Service (SIS) was established via FO 845. SIS allows a technology to be added to an existing POI via an expedited process such that it can make use of unused interconnection service (e.g., a battery injecting when it isn't sunny).
- While a SIS resource can obtain permission to inject at the POI, it cannot obtain Capacity Interconnection Rights (CIRs), or initiate the transfer of CIRs, via the surplus process.
- Because CIRs are required to participate in PJM's capacity market, the SIS resource must rely on the CIRs granted to the existing resource to provide capacity value. This is done by changing the ELCC class of the existing resource (e.g., Solar → Solar+Storage Hybrid).
- PJM does not permit CIR sharing/re-allocation between the existing and SIS resources because, while there may be physically "unused" interconnection service at a POI, **CIRs are never "unused"**.
  - CIRs become active once an asset reaches commercial operation. Once in-service, the CIRs are subject to the capacity must offer and are **used fully in ELCC modeling**.
- A SIS resource may operate independently if providing energy/AS only.

PJM © 2026

Deliverability (CIRs, etc.) and the ELCC Model

- Reforms approved by FERC in docket ER23-1067 established a direct link between resource deliverability for Variable and Combination Resources and how such resources are modeled in resource adequacy (RA) studies (i.e., IRM, CETO and ELCC)
  - The docket also introduced changes to CIRs request policy, verification, testing and retention

- Specifically, two changes were made to the resource adequacy studies:
  - Resource output in the studies is capped at the levels tested for deliverability
  - Resource output in the studies is adjusted for historical curtailments: the RA studies must reflect the output as if a resource was not curtailed.

PJM © 2026

Deliverability (CIRs, etc.) and the ELCC Model

ELCC Class	Summer Deliverability (Cap)	Winter Peak (WP) Deliverability (Cap)	Winter Light Load (WLL) Deliverability (Cap)
Onshore Wind	Max (CIR, Transitional Deliv)	P90 (e.g., 83% of ENC for PJM WEST in 28/29 BRA run)	P90 (e.g., 79% of ENC for PJM WEST in 28/29 BRA run)
Offshore Wind	Max (CIR, Transitional Deliv)	P80 (e.g., 98% of ENC for DOM in 28/29 BRA run)	P80 (e.g., 94% of ENC for DOM in 28/29 BRA run)
Solar Fixed	Max (CIR, Transitional Deliv)	Capacity Factor (e.g., 5% of ENC in 28/29 BRA run)	Capacity Factor (e.g., 51% of ENC for MAAC in 28/29 BRA run)
Solar Tracking	Max (CIR, Transitional Deliv)	Capacity Factor (e.g., 5% of ENC in 28/29 BRA run)	Capacity Factor (e.g., 53% of ENC for MAAC in 28/29 BRA run)
Storage	Min (CIR, ENC)	Min (CIR, ENC)	Min (CIR, ENC)
Hybrid	Max (CIR_Hybrid, Transitional Deliv_Hybrid)	Min (Component1_WP_Deliv + Max_Output_Class_Storage_Component, CIR_Hybrid)	Min (Component1_WLL_Deliv + Max_Output_Class_Storage_Component, MFO_Hybrid)

P90 refers to the 90th percentile of output in applicable set of hours during the last 10 years

PJM © 2026

Deliverability Levels -> ELCC Caps -> UCAP Value

- The Deliverability Levels shown in the previous slide are an input to the ELCC model
- These levels are used as hourly output caps in the ELCC model
  - For example, if a solar resource holds 60 MW of CIRs, the summer hourly output of the solar resource in the ELCC model will be capped at 60 MW (even if the historical output of the resource for that summer hour shows a value greater than 60 MW)
- Therefore, these hourly output caps ***underpin*** the accredited UCAP value that a resource receives
  - To continue with the above example, if the output during one of the critical hours that impact the accreditation in the ELCC model (e.g., 5pm on a summer day) was capped at the deliverability level (i.e. CIR, 60 MW), then any change to the deliverability levels will produce a change to the UCAP value in the same direction of the deliverability level change.

PJM © 2026

Contact

Chair:
Jason Shoemaker,
Jason.Shoemaker@pjm.com

Secretary:
Stefan Starkov,
Stefan.Starkov@pjm.com

SME/Presenters:
Maria Belenky,
Maria.Belenky@pjm.com

Patricio Rocha Garrido,
Patricio.Rocha-Garrido@pjm.com

Hybrid Resources Market Model Selection



Member Hotline

(610) 666 – 8980

(866) 400 – 8980

custsvc@pjm.com

PJM © 2026

PROTECT THE POWER GRID

THINK BEFORE YOU CLICK!

pjm



Be alert to malicious phishing emails.



Report suspicious email activity to PJM.

(610) 666-2244 / it_ops_ctr_shift@pjm.com