PARTICIPATION MODELS & MITIGATION

SPP MARKETS

6/28/2022

PARTICIPATION MODEL

WHO CAN PARTICIPATE IN MARKETS+?

An entity that:

- Generates

- Transmits

- Distributes

- Purchases or Sells

Electricity within, into, out of or through the Markets+ Footprint.

Participation includes:

- Wholesale Energy Settlement with SPP

- Asset Registration and Participation

- Market Participant Obligations necessary for effective and efficient market
  - Metering, credit, data requirements, etc.

RESOURCE PARTICIPATION MODEL

RESOURCE ASSET REGISTRATION TYPES

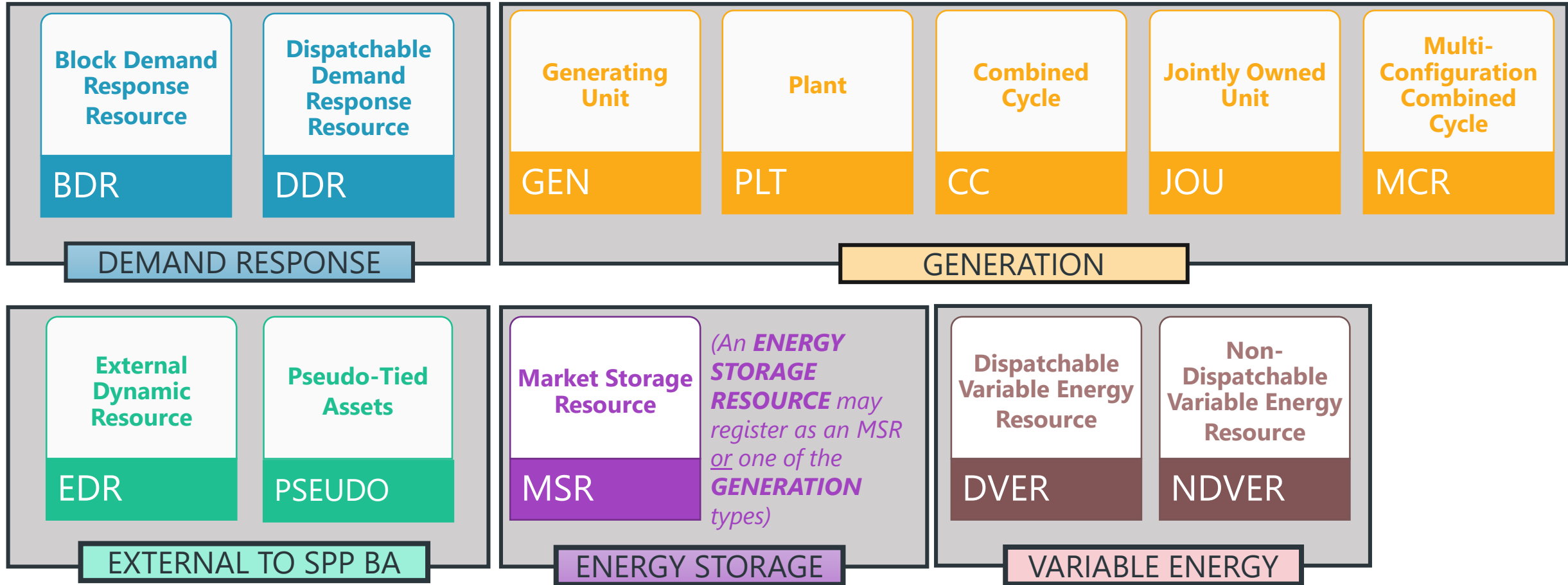|	
DEMAND RESPONSE	Demand response Resources that can physically reduce or shift their electricity usage.
EXTERNAL TO SPP BA	External Resources to the SPP Balancing Authority (BA) that participate in the Integrated Marketplace.
GENERATION	Individual (single) generation unit consisting of physically connected generator(s), reactor(s), boiler(s), combustion turbine(s) or other prime mover(s) operated together to produce electric power.
ENERGY STORAGE	A Resource capable of producing Energy by charging and discharging on demand.
VARIABLE ENERGY	Variable Energy Resources produce Energy intermittently instead of on demand.

VALID RESOURCE TYPES

DEMAND RESPONSE

Block Demand Response Resource
BDR

Dispatchable Demand Response Resource
DDR

GENERATION

Generating Unit
GEN

Plant
PLT

Combined Cycle
CC

Jointly Owned Unit
JOU

Multi-Configuration Combined Cycle
MCR

EXTERNAL TO SPP BA

External Dynamic Resource
EDR

Pseudo-Tied Assets
PSEUDO

ENERGY STORAGE

Market Storage Resource
MSR

*(An **ENERGY STORAGE RESOURCE** may register as an MSR or one of the **GENERATION** types)*

VARIABLE ENERGY

Dispatchable Variable Energy Resource
DVER

Non-Dispatchable Variable Energy Resource
NDVER

DEMAND RESPONSE RESOURCES

BDR — BLOCK DEMAND RESPONSE

- ❏ Created to model demand reduction
- ❏ **Hourly blocks** for commitment and dispatch
- ❏ Must have a corresponding Demand Response Load (DRL)
- ❏ Eligible for **Energy** and **Operating Reserve** products
- ❏ Not eligible for **Ramp Capability** products

DDR — DISPATCHABLE DEMAND RESPONSE

- ❏ Created to model demand reduction
- ❏ **5-Minute increments** for commitment and dispatch
- ❏ Must have a corresponding Demand Response Load (DRL)
- ❏ Eligible for **Energy**, **Operating Reserve**, including **Ramp Capability** products

EXTERNAL TO SPP BA

EDR — EXTERNAL DYNAMIC

- Any external Resource, not pseudo-tied, or external fleet for importing from external source
- Eligible for **Operating Reserve** only within Eastern Interconnect
- Not subject to **Energy** dispatch
- Only clearing and deployment of qualified **Operating Reserve** products

- Two types of **EDRs – AC** and **DC connected**

AC connected EDRs	**DC connected EDRs**
- Not Eligible for **Energy** - Eligible for **Operating Reserve** products	- Eligible for **Energy** and **Operating Reserve** products

EXTERNAL TO SPP BA

PSEUDO TIED | **PSEUDO-TIED ASSETS**

- ❑ **No tagging** required
- ❑ Pseudo-tied **IN** assets physically located outside the SPP BA and **eligible** to submit bids/offers
- ❑ Pseudo-tied **OUT** assets are physically located inside the SPP BA and **not eligible** to submit bids/offers
- ❑ Both **IN** and **OUT** assets require Meter Data submittal

GENERATION

GEN — GENERATING UNIT

- Individual (single) generation unit consisting of physically connected generator(s), reactor(s), boiler(s), combustion turbine(s) or other prime mover(s) operated together to produce electric power
- **Capable** of following dispatch

PLT — PLANT

- Aggregated Resource consisting of multiple generating units at the same plant
- **Capable** of following dispatch

GENERATION

CC — COMBINED CYCLE

One of four modeling options must be selected at registration:

1. Each combustion and steam turbine registered as a separate Resource
2. An aggregate unit configuration - registered as a single Resource
3. Several "pseudo" unit assets with each unit representing a combo of one combustion turbine and a portion of steam turbine
4. Register as **MCR** (see details on the right)

MCR — MULTI-CONFIGURATION COMBINED CYCLE

- ☐ Aggregated Resource consisting of multiple configurations at the same plant (**PLT**)
- ☐ Resources type will **not be CC** when **MCR** option is selected

GENERATION

JOU — **JOINTLY OWNED UNIT**

- ❑ **GENs** with more than one owner may be registered as **JOU** or **CIR**
- ❑ May model **JOU** shares using the **Individual Resource Option**; and each individual **JOU** share must register as **PLT**

CIR — **COMBINED INTEREST RESOURCE***

- ❑ **CIR** modeling option for **JOUs** indicates it is not electing to model each share as an individual Resource

*NOTE: CIR is not a Resource type. Resources associated with a CIR configuration will be registered as a "GEN" and have a flag of "Y" under the "CIR Reference" column in the Appendix B "Resources" tab.

MARKET STORAGE RESOURCE

MSR MARKET STORAGE RESOURCE*

- ❑ Used to model **Electric Storage Resources (ESRs)** as defined by FERC
- ❑ Modeled as a **GEN** with negative or positive output
- ❑ Eligible for **Energy**, **Operating Reserves**, including **Ramp Capability** products
- ❑ Must be capable of providing 0.1 MW for at least one (1) hour

*__NOTE__: (An __ENERGY STORAGE RESOURCE__ may also register under one of the __GENERATION__ types)

VARIABLE ENERGY RESOURCES

DVER — DISPATCHABLE VARIABLE ENERGY

- ❑ **Capable** of being incrementally dispatched
- ❑ Eligible for **Energy**, **Reg-Down** and **Ramp Capability** products
- ❑ Not eligible for **Reg-Up**, **Spinning** or **Supplemental** products
- ❑ Special commitment and dispatch rules apply to RUC and RTBM

NDVER — NON-DISPATCHABLE VARIABLE ENERGY

- ❑ Must be a Qualifying Facility exercising their rights under **PURPA**
- ❑ Must have primary fuel source of run of the river hydro-electric that is **incapable** of following dispatch
- ❑ Any Resource previously registered as a DVER shall not subsequently register as a NDVER
- ❑ Special commitment and dispatch rules apply to RUC and RTBM

MARKET MITIGATION

MARKET POWER

- No market participant (MP) should have the ability to unduly influence the market price through its individual actions

  - Only true if high liquidity exists with a large number of participants to where no single entity controls too much of the supply or demand (~perfect competition)

- Market designers want perfect competition in order to:

  - Ensure the marginal price is equivalent to the marginal value of goods for consumers

  - Lead to greater efficiency

MARKET POWER (CONTINUED)

- MPs that can influence the market (Ex: control too much of the market)

  - Are said to have "Market Power"

- With Market Power, an entity can manipulate the price via strategies such as:

  - Physical withholding → withholding MWs from the market

  - Economic withholding → increasing their offers into the market

SPP MITIGATION

- Runs fully "inline" with the clearing engine and conducts 3 tests:
  - Behavior, Structure, and Impact
  - Done in all studies, but RTBM used here as the main example
- Behavior (aka Conduct) Test
  - Offers > 125% of the Mitigated Offer (110% for manual commitments & 117.5% for FCA) are flagged and both the current and mitigated offer are included in the study
  - RTBM runs like normal (i.e. normal solve) with the current offers

SPP MITIGATION (CONTINUED)

- Structure Test
  - Looks at the result of the RTBM solve and checks to see if the resource is pivotal to a binding constraint
  - If the resource is pivotal, a "mitigation solve" occurs where the current offers are replaced with the mitigated offers
    - Pivotal if in a binding FCA or Reserve Zone, or if you have a sensitivity > 5% to a binding constraints (FCA or not)

- Impact Test
  - Compares the "normal" and "mitigated" solves
  - The mitigated solve is used if there is financial impact, else the normal solve is used
  - LMPs/MCPs change about threshold (Ex: $25/MWh) or if MCE's estimated MWP is increased by more than a threshold it fails

PERFORMANCE IMPACTS

- This "inline" process was adopted in order to automate the mitigation process and reduce the manual actions needed to be taken by SPP's independent market monitor
  - It is well liked by the SPP MMU and FERC
- The RTO recognizes both the value and the drawbacks
  - The additional solves are a significant performance burden