RCSTF Synchronized Reserve Deployment Solution Package

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Introduction

- The package proposed here is focused on a set of reforms to Synchronized Reserve Deployment that are implementable before Winter 2024/2025.
- This package does not reflect the full set of solution's PJM sees as necessary to full address the immediate term key work activities under the RCSTF issue charge, but provides incremental improvement on the status quo.

Deployment: Challenges to Address

- Dispatchers lack tools to deploy less than 100% of the reserves held
- Communication delays caused by the All-Call
- Inconsistency between how instructions are given during a spin event and during normal dispatch
- Confusion on what PJM is requesting from resources during a spin event

Deployment Proposed Solution

- Dispatcher initiates the reserve event, entering the amount of reserves to be deployed (either in MW or %)
- **Reserve deployment instructions to generators will be transmitted as an update to basepoints.** Deployed reserve MWs are added to the current output of each resource and sent out immediately through telemetry, along with a notification that we are in a spin event.
  - This addition of the deployment MWs will happen outside of the dispatch and pricing optimization, and therefore will not be reflected in LMP
- For demand response resources, deployment instructions continue to go through DR Hub
- While the event persists, dispatch instructions to dispatch-following resources with a reserve deployment assignment would be the greater of a) the original deployment instruction sent at the start of the event or b) the new economic dispatch point calculated by SCED

Less than 100% Reserve Deployment Proposed Solution

- To the extent possible, all resources will be deployed pro rata
  - Example: A resource has a 10 MW SR assignment and PJM deploys 80% of held reserves. The resource would be instructed to deploy 8 MW.
- Inflexible generation resources will be deployed to the greater of a) EcoMin and b) the pro rata reserve deployment instruction*
  - Example: A condenser has an EcoMin of 10 MW, a 30 MW SR assignment, and PJM deploys 50% of held reserves. The resource would be instructed to deploy 15 MW.
  - Example: A condenser has an EcoMin of 20 MW, a 30 MW SR assignment, and PJM deploys 50% of held reserves. The resource would be instructed to deploy 20 MW.
- Resources without a dispatchable range will be deployed to their SR assignment*

**Due to these constraints, actual reserves deployed may be greater than the pro rata calculation*

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RCSTF SR Deployment Solution Package

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Appendix: Deployment Examples

Deployment Example 1

For target time T_2, Resource 1 has a 100 MW target basepoint and a 20 MW reserve assignment. At time T_{start}, the resource is operating at 100 MW and is immediately requested to load all 20 MW of reserve.

*BP_{spin} = *Output at T_{start} + Reserve Deployment*

**BP_n': *MAX(BP_{spin}, T_n)*

SCED DISPATCH CALCULATED FOR NEXT TARGET TIME

BP_2: 100 MW BP_3: 100 MW BP_4: 100 MW

RESERVE DEPLOYMENT CALCULATED

BP_{spin}: 120 MW* BP_3': MAX(100 MW, 120 MW)** BP_4': MAX(100 MW, 120 MW)**

INSTRUCTION SENT TO RESOURCE

100 MW 120 MW 120 MW 120 MW

Deployment Example 2

For target time T_2, Resource 2 has a 100 MW target basepoint and a 20 MW reserve assignment. At time T_{start}, that resource is operating at 100 MW and immediately requested to load all 20 MW of reserve.

*BP_{spin} = *Output at T_{start} + Reserve Deployment*

**BP_n': *MAX(BP_{spin}, T_n)*

SCED DISPATCH CALCULATED FOR NEXT TARGET TIME

BP_2: 100 MW BP_3: 90 MW BP_4: 80 MW

RESERVE DEPLOYMENT CALCULATED

BP_{spin}: 120 MW* BP_3': MAX(120 MW, 90 MW)** BP_4': MAX(120 MW, 80 MW)**

INSTRUCTION SENT TO RESOURCE

100 MW 120 MW 120 MW 120 MW

Deployment Example 3

For target time T_2, Resource 3 has a 100 MW target basepoint and a 20 MW reserve assignment. At time T_{start}, that resource is operating at 100 MW and is immediately requested to load all 20 MW of reserve.

*BP_{spin} = *Output at T_{start} + Reserve Deployment*

**BP_n': *MAX(BP_{spin}, T_n)*

SCED DISPATCH CALCULATED FOR NEXT TARGET TIME

BP_2: 100 MW BP_3: 130 MW BP_4: 160 MW

RESERVE DEPLOYMENT CALCULATED

BP_{spin}: 120 MW* BP_3': MAX(120 MW, 130 MW)** BP_4': MAX(120 MW, 160 MW)**

INSTRUCTION SENT TO RESOURCE

100 MW 120 MW 130 MW 160 MW

Acronyms

Acronym	Term & Definition
LMP	**Locational Marginal Price** is defined as the marginal price for energy at the location where the energy is delivered or received. For accounting purposes, LMP is expressed in dollars per megawatt-hour ($/MWh). LMP is a pricing approach that addresses Transmission System congestion and loss costs, as well as energy costs.
AGC	**Automatic Generation Control** is equipment that automatically adjusts generation.
SCED	**Security Constrained Economic Dispatch** is the optimization engine used to calculate dispatch and reserve assignments and to set prices.
MW	A **Megawatt** is a unit of power equaling one million watts (1 MW = 1,000,000 watts) or one thousand kilowatts (1 MW = 1,000 KW). To put it in perspective, under non-severe weather conditions, one MW could power roughly 800 to 1,000 average-sized American homes.

PJM Glossary

Acronyms

Acronym	Term & Definition
SR	**Synchronized Reserves** is a reserve capability that can be converted fully into energy within 10 minutes following the request of PJM. Equipment providing Synchronized Reserve must be electrically synchronized to the power system.
NSR	**Non-Synchronized Reserves** is a reserve capability that can be converted fully into energy within 10 minutes following the request of PJM. Equipment providing Non-Synchronized Reserve need not be electrically synchronized to the power system.
SECR	**Secondary Reserves** is a reserve capability that can be converted fully into energy within 30 minutes following the request of PJM. Equipment providing Secondary Reserve need not be electrically synchronized to the power system.

PJM Glossary

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THINK BEFORE YOU CLICK!

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