Issues with Intelligent Reserve Deployment

OC

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IMM

Monitoring Analytics

Issues with IRD Proposal

- **The IRD SCED solution is a significant departure from PJM practice for market dispatch.**
  - **PJM has relied on the state estimator to indicate online and offline unit status before dispatching.**
  - **Constraint limit changes are on a case by case basis, not changed across the system all at once.**
- **IRD will trigger shortage pricing and dispatch units based on events that are assumed and not actual.**
- **IRD should be reviewed through the stakeholder process, including the MIC, as a change to the OA and manuals.**

Background

- PJM deploys synchronized reserves (synchronized reserve event) via the PJM All Call.
- PJM deploys 100 percent of all synchronized reserves although it has the ability to load a different percentage (25, 50 or 75 percent) (Manual 12, Section 4.1.2)
- This deployment is done outside of RT SCED.
- RT SCED reflects the cause of the spin event only after it is incorporated in the state estimator results.

IRD Proposal

- RT SCED currently solves three scenarios with high, medium and low load bias. Load bias is the only difference among the scenarios.
- IRD would be a fourth scenario that increases the load forecast in the zone with the largest contingency in PJM by the MW output of the largest contingency.
- Approval of the IRD case would become the only way that PJM declares a synchronized reserve event, converting reserves to energy.
- The All Call would still occur, but only when IRD solution is approved.

Locational Issues

- Increasing the load in the zone where the largest contingency is located is not reasonable or based on facts.
  - For example, increasing load in Dominion for a unit trip in ComEd or PSEG.
- In Jan-Jul 2020, eight spin events were caused by the loss of a unit. Seven out of eight were not in the zone with largest contingency.
- Generators are not located where load is located, even within the zone with the largest contingency.
- Inaccurate assumptions will lead to inaccurate dispatch and pricing.

Locational Issues

- **Incorrect locational modelling will cause incorrect congestion.**
  - **Pricing impacts may include violations with $2,000 per MWh shadow prices.**
  - **IRD proposal will increase line ratings to 100 percent, creating additional volatility.**
  - **Source of short term line ratings to be used in IRD is not clear.**

Cause of Spin Event Matters

- **Not all spin events are caused by the loss of a unit.**
- **In Jan-Jul 2020, three spin events were caused by low ACE.**
- **Low ACE events are not sudden events like unit trips.**
- **The IRD case will not accurately simulate a low ACE.**
- **PJM already tends to positively bias load during low ACE events.**

Load Bias

- **The IRD case load bias will be set to zero.**
- **Depending on the load bias of the previously approved RTSCED case, setting the IRD case load bias to zero could result in:**
  - **No impact at all when previous bias is positive and equal to the largest contingency MW.**
  - **Net load reduction when previous bias is positive and higher than the largest contingency MW.**
  - **Net load increase beyond the largest contingency MW when previous bias is negative.**

IRD and SCED Issues

- **RTSCED cases are currently executed every five minutes. RTSCED cases take 2 to 4 minutes from execution to approval.**
- **When the state estimator captures the lost MW, a normal RT SCED case should be used.**
- **No need for an IRD case.**
- **Under PJM's short term SCED/LPC solution, prices will not reflect spin event for first five minutes.**

Sep 9, 2020, Spin Event

- **At 20:19 on Sep 9, 2020, PJM declared an RTO spin event for the loss of roughly 1,000 MW in PSEG.**
- **The MW were lost between 20:13 and 20:15.**
- **At the time the spin event was declared, PJM had solved RT SCED cases that reflected the lost MW. Those cases were solved around 20:17:30.**
- **None of the available RT SCED solutions showing the unit trips were approved.**

Sep 9, 2020, Spin Event

- The example IRD case that solved at 20:17 reflected:
  - The loss of the roughly 1,000 MW.
  - Increased demand in Dominion by 1,600 MW
  - A decrease of the load bias from 500 MW in the previously approved case to zero MW in the IRD case.
- The net supply called by the IRD case to meet power balance was 2,100 MW.
  - 1,600 – 500 + 1,000
  - IRD called for more than twice the amount of MW lost.
- The demand increase in Dominion was on the wrong side of the prevailing north to south constraint.

Sep 9, 2020, Spin Event – RT SCED Cases

Case Type	SE Data Timestamp	RTSCED Execution Time	RTSCED Solution Time	RTSCED Approved Time	Load Bias	Simple Average Generation LMP
Mid	20:13:00	20:13:49	20:15:27	20:16:23	500	119
Low	20:13:00	20:13:49	20:15:20		0	27
High	20:13:00	20:13:49	20:15:23		1,000	1,794
IRD	20:13:00	20:13:49	20:15:24		1,610 (DOM Only)	1,799
Mid	20:15:00	20:16:00	20:17:35		500	643
Low	20:15:00	20:16:00	20:17:41		0	45
High	20:15:00	20:16:00	20:17:36		1,000	1,857
IRD	20:15:00	20:16:00	20:17:39		1,611 (DOM Only)	1,823
Mid	20:21:00	20:22:18	20:23:44	20:25:56	300	62
Low	20:21:00	20:22:18	20:23:38		(200)	25
High	20:21:00	20:22:18	20:23:41		800	644
IRD	20:21:00	20:22:18	20:23:38		1,609 (DOM Only)	1,826

The IRD Is Not Appropriate.

- An RT SCED deployment of reserves is a desirable goal.
- The intelligent deployment of reserves should be based on facts.
- Intelligent deployment of reserves means providing dispatch instructions according to economic dispatch to cover MW lost in the location where they were lost.
- The IRD proposal does not achieve that.
- Inaccurate dispatch signals, and prices based on these signals are not an improvement over status quo.
- The risk of undesirable consequences from inaccurate dispatch and pricing is high.

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