How MISO Studies Power Plant Retirements

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Outline

• MISO Overview
• Power Plant Retirement Process
  – Process History
  – Process Example
• Other Studies
• Issues
MISO Overview

• Who We Are
  – Independent, non-profit organization

• Our Roles
  – A service company that provides electric system reliability
  – Administer an energy market on a wholesale level
  – MISO does not generate or buy electricity
MISO Overview

• What We Do
  – Monitor energy transfers on the high voltage transmission system
  – Schedule transmission service
  – Manage power congestion through security-constrained economic dispatch
  – Operate day-ahead and real-time energy and operating reserves markets
  – Regional transmission planning
    • The annual MISO Transmission Expansion Plan typically contains over $1 billion in new transmission investment
    • Power Plant retirement studies

• The annual MISO Transmission Expansion Plan typically contains over $1 billion in new transmission investment
• Power Plant retirement studies
Tariff History

• Section 38.2.7 of MISO Tariff describes the power plant retirement and suspension process

• Original purpose was to preserve electric reliability for changes in unit economics
  – Cost uplift until transmission reinforcements are built
  – Decisions today are still economic, but there are other factors
MISO Generation Retirement Process

1. **MP submits Attachment Y Notice >26 weeks**
   - MISO convenes study with Transmission Owners
     - MISO informs MP of findings within 75 days

2. **Reliability Violations**
   - Approval of Retirement or Suspension
     - Yes: Timely Alternatives
     - No: MISO posts on OASIS describing SSR need
       - Yes: SSR Agreement
       - No: MISO convenes Stakeholder review of issues/alternatives (CEII & UNDA)
MISO Generation Retirement Process

Day 1
MISO Receives Attachment Y Notice

Day 75
Steady-State Reliability Assessment Complete

Day 80
Post to OASIS, Evaluate Alternatives

Parallel Process

Day 80
Start SSR Agreement Development

Day 182
File SSR Agreement

Day 182
Approve Request
For Example…

- Perpetual Power Machines, a hypothetical Market Participant, would like to retire unit #1
  - Submit Attachment Y to MISO on 11/5/2014
  - Received > 26 weeks from desired retirement date of May 6, 2015
  - Request remains confidential, unless reliability issues are found and alternatives are necessary

- Ineligible units for 38.2.7
  - Units in forced outage, units in planned outage, behind the meter generators, black start units
Attachment Y Overview

- **MISO Reliability Study**
  - Steady State
    - NERC Reliability Standards
    - Participation with affected Transmission Owners
      - Application of TO Planning Criteria

- **Perpetual Power Machines is notified if reliability issues will delay unit retirement**
  - Post notice on MISO OASIS
  - Use stakeholder process to develop alternatives
Attachment Y Overview

- MISO may require a generator to remain available to mitigate reliability concerns
  - A last resort and temporary measure, until a permanent solution can be implemented
  - MISO and Market Participant would enter into System Support Resource (SSR) Agreement
    - SSR agreements are reviewed for need on an annual basis
MISO Generation Retirement Process

MP submits Attachment Y Notice >26 weeks

MISO convenes study with Transmission Owners

MISO convenes Stakeholder review of issues/alternatives (CEII & UNDA)

MISO posts on OASIS describing SSR need

Approval of Retirement or Suspension

Reliability Violations

Now

+80 Days

+75 Days

+182 Days

SSR Agreement

Timely Alternatives

No

Yes

No

Yes
Perpetual Power Machines wants to retire unit #1

MISO scopes the retirement study with the Transmission Owner

- Power Flow model selection is tied to change of status date
  - Near term models: (Summer Peak and Shoulder)
  - Mid term model: (Summer Peak)

- Before and After scenarios are studied
  - Before retirement models have PPM unit #1 on
  - After retirement model have PPM unit #1 off and balancing area generation dispatched to cover

- Contingencies are run on the cases
Reliability Study

• Evaluating the impact to system reliability
  – Planning standards and criteria used
    • NERC Transmission Planning Standards TPL-001, TPL-002 and TPL-003
    • Regional, State, and MISO transmission owner planning criteria
  – Inclusion Criteria for Thermal Violations
    • 5% Power Transfer Distribution Factor (PTDF) for base violation compared with before retirement case
      – Category A – System Intact
    • 3% Outage Transfer Distribution Factor (OTDF) for contingency violation compared with before retirement case
      – Category B & Category C contingencies
Reliability Study

– Inclusion Criteria for Voltage Violations

• Pre-contingency limitation is between 1.0 and 1.07 per unit for 500 kV and above buses and 0.95 to 1.05 per unit for buses below 500 kV

• Post-contingency limitation is between 0.9 to 1.1 per unit kV if not specified

• 1% voltage change for Category A, B and C contingencies compared to before retirement voltage
MISO Generation Retirement Process

MP submits Attachment Y Notice >26 weeks

MISO convenes study with Transmission Owners

-75 Days

Approval of Retirement or Suspension

+5 Days

Reliability Violations

MISO posts on OASIS describing SSR need

SSR Agreement

MISO convened study with Transmission Owners

Timely Alternatives

No

Yes

Now

-75 Days

+107 Days

MISO convenes Stakeholder review of issues/alternatives (CEII & UNDA)
Communicate Reliability Results

- A Market Participant (MP) has the right to cancel their request at this point in process
  - MISO communicates a right to rescind
- If Perpetual Power Machines wants the process to continue, MISO will provide the results
  - If no reliability issues, then the retirement request is approved.
    - Retirement request remains confidential
  - If there are reliability issues, MISO will proceed along parallel paths of alternatives analysis and SSR agreement negotiations
    - Retirement request will now be public
MISO Generation Retirement Process

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Approval of Retirement or Suspension

Reliability Violations

MISO informs MP of findings within 75 days

SSR Agreement

Yes

No

Timely Alternatives

-80 Days
-5 Days
+102 Days

Now
Alternatives Analysis

• Perpetual Power Machines has indicated they will proceed and there were reliability issues

• Alternatives evaluated to avoid SSR contract:
  – Generation Redispach
  – Reconfiguration or Special Protection Scheme
  – Demand Response
  – Generator alternatives
  – Transmission expansion
    • In our example, a transmission line can be rebuilt to allow Perpetual Power Machines to retire unit #1. Upgrade can be completed by May 1, 2016
MISO Generation Retirement Process

- MP submits Attachment Y Notice >26 weeks
- MISO convenes study with Transmission Owners
- MISO informs MP of findings within 75 days

- Approval of Retirement or Suspension
  - Yes: Timely Alternatives
  - No: Reliability Violations
    - Yes: MISO posts on OASIS describing SSR need
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- SSR Agreement
  - Yes: Now
  - No: -107 Days

- -182 Days
- -102 Days

Now
Approval of Retirement Request

• If no reliability issues are found, it is approved
• If reliability issues are found and alternatives are expected to be in place before retirement
  – Conditional approval
• The plant owner may defer retirement until a alternative is implemented
• In our example, Perpetual Power Machines request is not approved and must go to SSR agreement
  • Request to retire in May, 2015
  • Upgrade to address reliability issue done May, 2016
MP submits Attachment Y Notice >26 weeks

MISO convenes study with Transmission Owners

MISO convenes Stakeholder review of issues/alternatives (CEII & UNDA)

MISO convenes

Reliability Violations

Approval of Retirement or Suspension

SSR Agreement

Timely Alternatives

-102 Days

MISO posts on OASIS describing SSR need

Now

MISO informs MP of findings within 75 days

Yes

No

Yes

No
Attachment Y-1: SSR Agreement

• No alternatives are available in time
• The terms of the pro-forma System Support Resource (SSR) agreement are negotiated with Perpetual Power Machines
  – Compensation can be determined through negotiation or Market Participant may file separately with FERC
• MISO files the SSR Agreement with FERC for approval
  – Generally for a term of 1 year or less
Attachment Y-1: SSR Agreement

• SSR agreement need is reviewed annually
• If the agreement is expected to renew, MISO would notify Perpetual Power Machines 90 days prior to the existing contract end date
• Restated agreements are filed at FERC to continue SSR service

• In this example, the required upgraded is completed on time and renewal of SSR agreement is not required
Cost Allocation of SSR unit(s)

- The operating costs of SSR units are allocated to load serving entities “which require the operation of the SSR unit for reliability purposes”
  - An optimal load shed methodology is used to determine MISO Local Balancing Areas (LBA) that benefit from the SSR unit(s)
    - Optimal power flow identifies the load shed amounts for each contingency which results in a reliability issue
    - Relative load shed amounts for each impacted LBA are determined to apportion costs amongst impacted LBAs
    - Load Serving Entities within impacted LBA areas are assessed charges based on Actual Energy Peak withdrawal
Retirement Process Key Points

- MISO has a process to maintain system reliability when power plants want to retire
- SSR Agreements are a measure of last resort to address an underlying reliability issue
- Before entering into SSR agreement MISO shall assess feasible alternatives in an open and transparent planning process
Other Studies

- **MISO Resource Adequacy Construct**
  - Planning Reserve Requirement: 1 day in 10 LOLE
  - Local Clearing Requirement for minimum reserves in Local Resource Zones

- **MISO has been assessing environmental polices since 2008 in interest of ensuring an informed stakeholder body**
  - EPA Impact Analysis in 2011
    - Transmission reliability cost impact for 2900 MW and 12650 MW of generation retirement scenarios
  - **Carbon Analysis in 2014 for Clean Power Plan 111(d) draft**
Generator Retirement Planning Issues

• Market Participants don’t request early because
  – Public policy is fluid
  – Employee communications on plant closure
• Reliability plans assume generation is there until retirement is officially approved
  – Can’t build in anticipation of potential retirement. Market Participant could choose to retrofit
  – We need generators’ plans to plan transmission
• Time to implement public policy
Questions?