Course Description

1. This is an overview of MISO’s Generation Interconnection Queue (GIQ) processes. The following slides present an overview of the purpose, objectives, concepts, and planning related to GIQ.

2. This presentation is intended for those individuals seeking an understanding of MISO’s GIQ – including the associated processes.

3. Previous training presentations on MISO Planning are at respectively higher levels. Those presentations focus on the broader concepts and processes.

4. Frequently used terminology, along with reference-links to MISO documentation and contacts, are included in this presentation.

Notice:

The following training materials are intended for use as training materials only and are not intended to convey, support, prescribe or limit any market participant activities. These materials do not act as a governing document over any market rules or business practice manuals. The data used in the examples is hypothetical data and should not be used to support market analyses.
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Introduction
Training:

- It is highly recommended for stakeholders to review the online training available on the MISO Learning Management System. The online training was created to help applicants and TOs navigate the GI Portal. These guides are posted to the MISO Customer Learning Center under Transmission & Generation Planning and Resource Adequacy/Generation Interconnection.

- Refer to Workshop section under Stakeholder Engagement on MISO public website for previous workshop presentations.

Please reference the MISO LMS at https://miso.csod.com/ for more extensive training on the MISO DPP process.
Please reference the MISO LMS at https://miso.csod.com/ for more extensive training on the MISO DPP process.
Queue Admin
Overview of the Pre Queue Phase

MISO Conducts Regular Information Sessions
- Customer Reviews Queue Map and Contour Map
- Customer Requests Ad Hoc Meeting
- MISO/TO/Customer Setup/Hold Meeting to Clarify Pre-Queue Questions

Go to Application Review Phase

Note: Ad-Hoc Meeting Requests received after 5:00 pm ET on August 12, 2022 will be scheduled after the September 15, 2022 deadline.

Please reference the MISO LMS at https://miso.csod.com/ for more extensive training on the MISO DPP process.
**Purpose:** Introduce and provide a demonstration of a new POI self-check tool

**Key Takeaways:**

- POI self-check tool is designed to help Interconnection Customers pre-screen for potential POIs
- The results are for information only and do not include voltage or stability constraints

POI - Point of Interconnection

POI Tool Workshop (Demonstration)

Please reference the MISO LMS at [https://miso.csod.com/](https://miso.csod.com/) for more extensive training on the MISO DPP process
Select an Area on the Map

Please reference the MISO LMS at https://miso.csod.com/ for more extensive training on the MISO DPP process
Technical Requirement

- Definitive gross and net generator output (MW) as measured at the POI
- Definitive POI - Only 1 POI may enter into the DPP unless required by State regulations to take 2 POIs
- Definitive one-line diagram for the POI – Information shall include:
  - Breaker layout, bus configuration (if available) and number of generators
  - The zero sequence impedance (if applicable)
  - The distance from the collector substation to the POI referenced in miles and the line impedance
  - If the POI is a line tap, distance from the tap to the endpoints of the existing line referenced in miles
  - Generator step up (GSU) transformer data and collector substation transformer date (if applicable)
  - For inverter based generators, FERC Order 827 requires
    - Location and size of any dynamic and/or static VAR compensation devises
    - Equivalent collector system impedance

- Power flow models required
  - FERC Order 842 requires newly interconnecting units to install, maintain and operate equipment capable of providing primary frequency response as a condition of interconnection, the order requires ICs to provide a plant controller for inverter based generation or governor model for thermal units in the provided dynamics model
  - For inverter based/non-synchronous generators, FERC Order 827 requires
    - Demonstration that the plant can meet a PF of 0.95 lead/lag at the high side on the main GSUs (The TOs planning criteria will supersede if they require a more stringent PF)
    - Base turbine or inverter reactive capability (inherent power factor)
  - For inverter based (wind or solar) generators, the IC shall provide the short circuit modeling instruction manual and associated model data

- All Generator Types: **All applicable information requested in Attachment A or Appendix 1**
MISO requires PSS/E Standard Library Model per NERC MOD-032-1 standard

- Recommended renewable models are below

<table>
<thead>
<tr>
<th>Generation Type</th>
<th>Generator Model</th>
<th>Electrical Model</th>
<th>Mechanical Model</th>
<th>Pitch Model</th>
<th>Aerodynamic Model</th>
<th>Auxiliary control</th>
</tr>
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<tr>
<td>Type 3 (Doubly-Fed induction generator) wind machine</td>
<td>REGCAU1</td>
<td>REECAU1</td>
<td>WTDTAU1</td>
<td>WTPTAU1</td>
<td>WTARU1</td>
<td>REPCAU1</td>
</tr>
<tr>
<td>Type 4 wind machine</td>
<td>REGCAU1</td>
<td>REECAU1</td>
<td>WTDTAU1 (optional)</td>
<td>Don't use</td>
<td>Don't use</td>
<td>REPCAU1</td>
</tr>
<tr>
<td>Solar</td>
<td>REGCAU1</td>
<td>REECBU1</td>
<td>Don't use</td>
<td>Don't use</td>
<td>Don't use</td>
<td>REPCAU1</td>
</tr>
<tr>
<td>Storage device</td>
<td>REGCAU1</td>
<td>REECCU1</td>
<td>Don't use</td>
<td>Don't use</td>
<td>Don't use</td>
<td>REPCAU1</td>
</tr>
</tbody>
</table>

Please reference the MISO LMS at [https://miso.csod.com/](https://miso.csod.com/) for more extensive training on the MISO DPP process
• Models submitted to the Generator Interconnection process are required to comply with MISO’s MOD-032-1 modeling requirements
• New submittals that do not comply will be considered by MISO to be invalid
Interconnection Customer may submit an Interconnection Request that proposes to share Interconnection Customer Interconnection Facilities (ICIF) with one or more existing projects or pending Interconnection Requests. Interconnection Requests proposing such an arrangement shall so indicate in their Interconnection Request and attach a consent agreement executed by the applicable Interconnection Customers with projects that propose to connect, or are connected, to the shared Interconnection Customer Interconnection Facilities (ICIF).

- How to determine the need for consent agreement prior to submitting Interconnection Request
  - Multiple requests with Interconnection Customer Interconnection Facilities (ICIF) will need consent agreement
    - Expansion, Co-location, Hybrid Interconnection Requests – MISO will be reviewing these closely for consent agreements

Please reference the MISO LMS at [https://miso.csod.com/](https://miso.csod.com/) for more extensive training on the MISO DPP process
Application Review
Application Review

1. MISO reviews the application for completeness
2. Verifies information and clarifies any ambiguity
3. Customer contacted for clarification, etc.
4. MISO notifies customer of any deficiencies
5. Customer submits a complete & valid application
6. Likely affected Transmission Owners (TOs) are sent a copy of the Interconnection Request application
7. Scoping Meeting

Please reference the MISO LMS at https://miso.csod.com/ for more extensive training on the MISO DPP process
Refunds of Study Deposits

If the IC withdraws prior to entry into DPP Phase I, then the remaining (D2) DPP Study Funding Deposit and the (M2) DPP Entry Deposit will be refunded one hundred percent (100%).

If the IC withdraws by the end of Decision Point 1, then the remaining (D2) DPP Study Funding Deposit and the (M2) DPP Entry Deposit will be refunded fifty percent (50%).

Once the IC pays the (M3) deposit and enters DPP Phase II, the (M2) deposit becomes one hundred percent (100%) at risk.

If the IC withdraws by the end of IC Decision Point II, then the (M3) Milestone will be refunded one hundred percent (100%).

Once the IC pays the (M4) deposit and enters DPP Phase III, the (M2), (M3), and (M4) Milestone deposits become at risk.

If the IC withdraws any time during DPP Phase III, and MISO determines that an Interconnection Study restudy is required, then the withdrawing IC will be responsible to fund all such restudies in DPP Phase III, up to amount of any remaining study deposit.

Please reference the MISO LMS at [https://miso.csod.com/](https://miso.csod.com/) for more extensive training on the MISO DPP process.
Site Control
Site Control Submission

Documents must be legally binding and give rights to develop specific fuel source(s)

1. Entity relationship documents
   • Leases, deeds, and/or binding options for 100% of acreage requirements
   • **Ensure each agreement’s term is effective (or can be extended) at least through your project’s COD.**
   • If the lessee, optionee, or deed holder does not match the Applicant Company, then the IC must provide documentation of the relationship between entities

2. GIS-enabled Site Maps
   • Google Earth KMZ map preferred
   • PDF Site Plan Map
   • Must show project boundary, IC IF, and POI

3. Executed Appendix 1 Attachment E
   • Must be MISO’s tariff version of this affidavit
**Documentation**

- Lease Agreement
- Option to Lease
- Purchase Agreement
- Option to Purchase
- Title, Deed, or Tax Bill
- Memorandum of Lease*

- Letter of Intent
- Memorandum of Understanding
- Officer Certification
- Other non-binding or non-exclusive agreements

*Must be fully executed & indicate that lease was fully executed, must indicate same parties & terms as lease, must include land description & parcel numbers, and must convey exclusivity and term.*
## Acresage Requirements

<table>
<thead>
<tr>
<th>Fuel Type</th>
<th>Land Required</th>
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<tr>
<td>Wind</td>
<td>Fifty (50) acres per MW</td>
</tr>
<tr>
<td>Solar</td>
<td>Five (5) acres per MW</td>
</tr>
<tr>
<td>Battery</td>
<td>One-tenth (0.1) acres per MW</td>
</tr>
<tr>
<td>Conventional</td>
<td>Ten (10) acres</td>
</tr>
<tr>
<td>Hybrid</td>
<td>Sum of individual Fuel Type requirements</td>
</tr>
</tbody>
</table>

See BPM-015 Section 5.1.2
Insufficient Land Option

- If land does not meet the acreage requirement, the IC may provide additional evidence to demonstrate adequate site control
  - Due at time of application

- Additional Requirements: Detailed Site Plan & Justification Document
  - Include design considerations such as: complete site design, local spacing and setback requirements, location of feeder routes and Collector substation, and land utilization calculations

- See Attachment X Section 7.2.1.1 (ii) and BPM-015 Section 5.1.2 “Insufficient land to meet the acreage requirements”
Coming soon to the MISO public website will be a Site Control Submission Checklist. This checklist will cover all the requirements for Site Control. It will include:

- Lease Agreements
- KMZ Map Requirements
- PDF Site Plan Map Requirements
- Acreage Requirements
- Reduced Footprint Requirements
Where to Submit Site Control Documents

Zip File with KMZ map, and all other SC documents

Entity Relationship Documents

PDF Site Plan Map
Deadline

- Site Control is due at Application Deadline
  - September 15, 2022 @ 5pm ET
  - Will not be delayed

- Please direct project-specific questions to ginterconnection@misoenergy.org
Special Studies
Modification of Existing Generating Facilities

Material Modification

Generator Replacement

Surplus

Please reference the MISO LMS at https://miso.csod.com/ for more extensive training on the MISO DPP process
Customers have three options to modify its Existing Generating Facility

**Generator Modification Process**
- Replacement of only a *portion of the equipment* at the Existing Generating Facility

**Generator Replacement Process**
- Replacement of one or more *generating units* and/or storage devices at an Existing Generating Facility

**Surplus Interconnection Process**
- Adding a separate *Generating Facility* at the same POI with the intention of utilizing existing interconnection service

*Please reference the MISO LMS at [https://miso.csod.com/](https://miso.csod.com/) for more extensive training on the MISO DPP process*
A deposit is not required if the IC submits engineering studies supporting a determination that the planned changes is not substantive modification (i.e. the change will not adversely impact the Transmission System).

If an IC submits an application to MISO for a substantive modification screening without any documentation of the impacts of the planned change on the Transmission System relative to the criteria defined above, the required deposit for this evaluation is $10,000.

Requests submitted to MISO will be evaluated for any change in operating characteristics of the Existing Generating Facility that is different than what was studied in the interconnection process or reflected in its interconnection agreement.

MISO will respond to the IC within 30 days and provide the path for the IC to amend their GIA, as necessary, or to submit a new IR for Material Modification evaluation.

Once the IC submits an IR for Material Modification evaluation, MISO will perform necessary studies (one or more of Steady State analysis, Short Circuit analysis and Stability analysis as described in Section 6.1) within 90 days to determine if the planned modification is a Material Modification and provide a publicly posted report.

If the planned change is a Material Modification, the IC will have an opportunity to enter its planned change in the subsequent DPP cycle. If the planned change is non-material, MISO will work with the IC to issue an amended GIA.

Please reference the MISO LMS at https://miso.csod.com/ for more extensive training on the MISO DPP process.
Modification Process

Submit a request for review of modification of existing generating facility, deposit and any study that is available

Substantive Modification Screening

Process Request
Amend GIA, as necessary

Submit a new IR for MM evaluation

MM Determination

Enter subsequent DPP cycle
Amend GIA or Issue Pro forma GIA

Non-substantive

Substantive

Not MM

MM

Please reference the MISO LMS at https://miso.csod.com/ for more extensive training on the MISO DPP process
Generator Replacement Requirements
(Att. X 3.7, BPM-015 6.7.2)

- Same POI and voltage level as Existing Generating Facility
- Can be requested any time with a $60,000 study deposit. Will receive a queue number and will be posted publicly on the GI queue page
- Request should be made at least 1 year before cessation of operation of Existing Generating Facility unless it is a suspended unit or in forced outage
- Can request ERIS for existing ERIS and ERIS or NRIS for existing NRIS. Cannot upgrade ERIS to NRIS
- If additional Interconnection Service required, a separate request need to submitted that will go through DPP cycle

Please reference the MISO LMS at [https://miso.csod.com/](https://miso.csod.com/) for more extensive training on the MISO DPP process
If lower Interconnection Service required than existing, Att. Y notice need to be submitted for the difference

Replacement request allowed only after 12 months of Date of sale or assignment of GIA for Existing Facility

Once replacement request is submitted, the IC cannot sell or transfer the facility until the evaluation of request is complete. If request is approved, limitation is extended till COD of Replacement Facility

All requests for Replacement Generating Facility that are submitted to the Transmission Provider within 365 Calendar Days after May 16, 2019 shall have a date of cessation of operation for the Existing Generating Facility that is not earlier than May 16, 2021

The expected Commercial Operation Date of a Replacement Generating Facility shall be no more than three (3) years from the date of cessation of operation of the Existing Generating Facility

Please reference the MISO LMS at https://miso.csod.com/ for more extensive training on the MISO DPP process
Generator Replacement Evaluation Process & Timeline

- **IC submits Replacement Request to MISO**
  
  *Study Deposit = $60,000*

- **Replacement Impact Study & Reliability Assessment Study**
  
  *(180 Calendar Days)*

- **If there are no adverse impacts or reliability concerns, IC can decide to proceed or withdraw**
  
  *(30 Calendar Days)*

- **Interconnection Facility Study (if needed)**
  
  *(90 Calendar Days)*

- **MISO will tender a draft/amend GIA after Final Facility Study Report is provided to the IC**
  
  *(30 Calendar Days)*

*Request will be evaluated in the order they are received

**If there are material adverse impacts or reliability concerns, then the IC will need to go through the 3-phase DPP process for the replacement unit and Attachment Y process for the existing unit, or the IC can withdraw the replacement request.

Please reference the MISO LMS at [https://miso.csod.com/](https://miso.csod.com/) for more extensive training on the MISO DPP process
**Surplus Interconnection Request**
(Att. X 3.3.1.1 - 3.3.1.3, BPM-015 6.7.3)

Adding a separate Generating Facility at the same POI as Existing Generating Facility with the intention of utilizing existing interconnection service

Can be requested any time with a Surplus Interconnection Service Interconnection Request and a $60,000 study deposit. Will receive a queue number and will be posted publicly on the GI queue page

Interconnection Customer shall submit an executed Energy Displacement Agreement and Monitoring and Consent Assignment to the Transmission Provider concurrently with its Surplus Interconnection Service Interconnection Request

The combined generating output at the POI for both the original and surplus ICs is limited to and shall not exceed the total amount of the Interconnection Service of the existing Generating Facility

Please reference the MISO LMS at [https://miso.csod.com/](https://miso.csod.com/) for more extensive training on the MISO DPP process
Can request ERIS for existing ERIS and ERIS or NRIS for existing NRIS. Cannot upgrade ERIS to NRIS

In the event that the Interconnection Customer seeks to continue Surplus Interconnection Service following the retirement and permanent cessation of commercial operation of the Existing Generating Facility associated with that Surplus Interconnection Service, the IC must notify MISO whether the sole operation of the Surplus Interconnection Service Generating Facility at the Point of Interconnection should also be included as a part of interconnection study.

Service after retirement or cessation of commercial operation of an Existing Generating Facility for a limited period not to exceed one (1) year.
Surplus Interconnection Request Evaluation Process

IC submits Surplus Interconnection Request to MISO* (Study Deposit = $60,000)

Within 30 Calendar Days, MISO will commence Interconnection Study for Surplus Interconnection Service (90 Calendar Days)

If there are no material adverse impacts, IC can decide to proceed or withdraw** (30 Calendar Days)

Interconnection Facility Study (if needed) (90 Calendar Days)

MISO will tender a draft GIA after Final Facility Study Report is provided to the IC (30 Calendar Days)

*Request will be evaluated in the order they are received

**If the Interconnection Study for Surplus Interconnection Service identifies material adverse impacts on the Transmission System and/or Affected System, the IC shall proceed through Definitive Planning Phase cycle similar to a request for interconnection of a new Generating Facility. Alternatively, the IC can withdraw the Surplus Interconnection Request.

Please reference the MISO LMS at https://miso.csod.com/ for more extensive training on the MISO DPP process
Please reference the MISO LMS at https://miso.csod.com/ for more extensive training on the MISO DPP process
Optional Studies are for requesting additional information to aid project business decisions.

Optional Study will have no impact on the processing time of other projects in the Queue.

Request an Optional Study by submitting Appendix 5 along with a $60,000 study funding deposit.

Studies will be performed based on assumptions outlined by the Interconnection Customer.

Results of such informational studies will be non-binding.

Please reference the MISO LMS at https://miso.csod.com/ for more extensive training on the MISO DPP process.
Procedure for evaluating Interconnection Request for a **New Small Generating facility no greater than 5MW** (ERIS only)

Includes screens set forth in Tariff Attachment X Section 14

Options meeting and optional supplemental review if request fails initial screening

If request pass initial screenings, a GIA will be provided by MISO within (5) Business Days after determination of passing screens

*Please reference the MISO LMS at [https://miso.csod.com/](https://miso.csod.com/) for more extensive training on the MISO DPP process*
Fast Track Interconnection Process

$55,000 for Fast Track application ($5,000 D1, $50,000 D2)

Appendix 1 (Select “Fast Track Process for Small Generating Facility”) along with Attachments A-E, One Line, Site Control, Models and W-9

A request to interconnect a certified inverter-based Small Generating Facility no larger than 10 kW shall be evaluated under the Appendix 4 – 10 kW Inverter Process.

Please reference the MISO LMS at https://miso.csod.com/ for more extensive training on the MISO DPP process
Fast Track Timeline

Per timelines specified in Att. X 3.3.2 and 3.3.3

Official Request Submission

Perform/Report Results of Fast Track Initial Screens
15 Business Days

GIA

Pass
5 Business Days

Fail

Inform IC of Determination and offer Customer Options Meeting

Customer Options Meeting

10 Business Days

Perform Facility/Minor Modifications, and provide non-binding good faith cost estimate.

Perform Supplemental Review (30 Business days) Within 15 days of Offer IC must submit an agreement in writing and a deposit for the review cost.

Continue evaluating under Attachment X Generator Interconnection Procedures

Pass without requiring construction of facilities
10 Business Days

Pass requiring construction/minor modification of facilities
15 Business Days (including delivery of good faith estimates)

Non-binding good faith estimates of IF/modifications

Please reference the MISO LMS at https://miso.csod.com/ for more extensive training on the MISO DPP process
Definitive Planning Phase
Access Requests for Generation Interconnection Facility Studies (GIFS)

- Once your GI Application has been validated and you have received your project number (JXXXX), it is highly recommended to go to your MISO profile, www.misoenergy.org and submit an access request form for Extranet/GIFS so that you can receive access to the DPP basecases, perform model reviews and access your Study Reports.

Please reference the MISO LMS at https://miso.csod.com/ for more extensive training on the MISO DPP process.
Access Request for Generation Interconnection Facility Studies (GIFS)

• How to get access to DPP base cases, models for review and DPP Study reports?
  1. Ensure that you have the required documentation on file with MISO and an active project in the MISO Queue.
     • Required Documentation:
       • Have your name listed on the Appendix A of the Attachment C of your GI Application.
       • Have an Attachment D or a CEII NDA on file with MISO.
  3. Click on your name, profile and scroll down to Access Request form link.

Access Request Form
The MISO Access Request Form provides stakeholders

1. Complete the form for Extranet, GIFS access and include your project number when requested.

   What type of access are you requesting?
   □ Extranet (now includes Maps)

   To what areas are you requesting access?
   □ Closed Committees
   □ Flowgate Information
   □ Generation Interconnection (GI) Facilities Studies

• Note: As an Interconnection Customer or a consultant to an Interconnection Customer, you are eligible for only GIFS for only the life of your project.

Please reference the MISO LMS at https://miso.csod.com/ for more extensive training on the MISO DPP process
Process for updating Attachment C...

- If an *active* project is in any cycle prior to the DPP-2020-Cycle 1 cycle, then an e-mail notification with the updated Attachment C for each project is required. The person requesting the updates must be on the existing Attachment C NDA.

- If the *active* project is in the DPP-2020-Cycle 1 cycle and beyond, then any user who is listed on the attachment C may add personnel to the Attachment C can perform the following:
  - Log in to the GI Online Application Tool and find your desired project.
  - On the far right, click the User Actions button (···) and select “Non Disclosure.”
  - Add or remove personnel as needed.
  - When complete, click “Save and Continue.”
  - Repeat for each individual project.
  - New signatures are not required.

Please reference the MISO LMS at [https://miso.csod.com/](https://miso.csod.com/) for more extensive training on the MISO DPP process.
DPP Kick-off Call

• DPP Kick-off Call is where the project transitions from Queue-Admin to DPP
• Confirm the parameters of the project
• MISO will provide the contact information of the following personnel:
  • DPP Engineer
  • DPP Project Manager
  • DPP Manager

Please reference the MISO LMS at https://miso.csod.com/ for more extensive training on the MISO DPP process
MISO Screening Analysis
(Att. X 7.1.1, BPM-015 5.5.1)

- MISO will perform an indicative non-binding screening analysis to identify potential thermal and voltage constraints and publish the results of that analysis for Interconnection Customers and MHVDC Connection Customers entering the Definitive Planning Phase at least fifteen (15) Calendar Days prior to the kick-off of the DPP Phase I*

- Screening analysis criteria
  - ERIS Criteria with P1 contingencies

*Screening analysis will be implemented with 2020 Cycle

Please reference the MISO LMS at https://miso.csod.com/ for more extensive training on the MISO DPP process
DPP Phase 1 Study

Model Build and POI Review
- 30 calendar days timeline (10 BDs for Ad hoc group to review and remaining days for MISO to make model updates)

Preliminary System Impact Study
- 90 calendar day timeline
- Planning level estimate for network upgrades (includes TO NUs at POI)

Decision Point 1
- Move forward to DPP Phase 2 and pay M3 (10% of NU) – M2
- Withdraw with 50% M2 refund
- MW can be reduced up to 100% at Decision Point 1

Please reference the MISO LMS at https://miso.csod.com/ for more extensive training on the MISO DPP process
DPP Phase 2 Study

Model Update
• 10 business day timeline for Model Update (5 BDs for Ad hoc group to review and remaining days for MISO to make model updates)

Revised System Impact Study & Interconnection Facilities Study
• 45 calendar days for SIS
• 90 calendar days IC IF FS start
• Planning level estimates for network upgrade

Decision Point 2
• Move forward to DPP Phase 3 and pay M4(20% of NU)-M2-M3
• Withdraw with 100% M3 refund. M2 at risk
• MW can be reduced up to 10% at Decision Point 2
• Site Control Review

Please reference the MISO LMS at https://miso.csod.com/ for more extensive training on the MISO DPP process
DPP Phase 3 Study

Model Update

- 10 business day timeline for Model Update (7 calendar days for Ad hoc group to review and remaining days for MISO to make model updates)

Final System Impact Study & Network Facilities Study

- 30 calendar days for SIS
- 90 calendar days for Network Upgrades Facility Study (NU FS)
- Withdraw and risk M2, M3, and M4

Please reference the MISO LMS at https://miso.csod.com/ for more extensive training on the MISO DPP process
Once the last GIA from a given study cycle is issued, MISO will perform checks to identify harm caused by withdrawn projects ("harm test")

Examples:
- Projects A & B split the cost of a network upgrade 50/50. Project A withdraws and the network upgrade is still required
- Project C withdrawal results in a new network upgrade for Project D

The total allocation to any remaining Interconnection Requests will not exceed the total Definitive Planning Phase milestones collected from the Interconnection Customers that withdrew their Interconnection Requests from the same Definitive Planning Phase cycle.
True-down of Milestone Payments  
(Tariff Att. 7.3.2.4.2)

Within ten (10) Business Days from the start of Definitive Planning Phase III, Transmission Provider shall notify the Interconnection Customer if the total posted milestone payments (i.e., the sum of the M2, M3 and M4 payments) for the Interconnection Request exceed twenty percent (20%) of the total Network Upgrade cost assigned to such Interconnection Request in the revised System Impact Study. Transmission Provider shall refund such excess amounts to the Interconnection Customer as soon as practicable.
Model Assumptions

**Model Dispatch**
- Existing Generator and New Generator with signed IA
- MTEP LBA dispatch
- DPP Higher Queued Generator and Study Generator
- Wind at 15.6% Peak, 100% Shoulder
- Solar at 100% Peak, 0% Shoulder
- Peaking Plants on in Peak, Off in Shoulder
- CCGTs at 100% Peak, 50% in Shoulder
- Storage, no charging scenario in Peak
- Hybrid Facility- Based on dispatch assumptions of each fuel type with any adjustment based on requested interconnection Service(Example in Appendix E of BPM 015)

**Study Generation Sink**
- Per GI BPM section 6.1.1.1.1, higher queued and study generation will be dispatched as per fuel type such that generators in MISO North(Classic) are sunk into MISO North(Classic) and generators in MISO South are sunk into MISO South

**Higher Queued Project**
- Have met cash Milestones
- Have signed GIA
- Have signed GIA or SIS Agreement as applicable in neighboring queues

*Please reference the MISO LMS at [https://miso.csod.com/](https://miso.csod.com/) for more extensive training on the MISO DPP process*
Model Assumptions (Cont.)

Topology
- MTEP Appendix A projects
- Other Appendix A projects approved since previous cycle
- Upgrades from higher queued projects

Scenarios
- SUPK - Load at 100% of summer peak
- SHPK - Load has been scaled down to 70 - 80% scenarios
- Load and generation levels adjusted based on load and generation information provided by TOs

Please reference the MISO LMS at [https://miso.csod.com/](https://miso.csod.com/) for more extensive training on the MISO DPP process
System Impact Study Scope

In Accordance with FAC-002-2:

- Steady State Thermal Energy Resource Interconnection Service (ERIS) Analysis
- Steady State Voltage Analysis
- Deliverability or Network Resource Interconnection Service (NRIS) Analysis
- PF & LVRT Analysis
- Stability Analysis
- Short Circuit Analysis

*Afs, Stability, and SC results are required only for DPP phase 2 and DPP phase 3

Please reference the MISO LMS at https://miso.csod.com/ for more extensive training on the MISO DPP process
In accordance with the procedures between MISO and neighboring systems:

- MISO provides Generator Interconnection Requests (GIRs) to and coordinates with the neighboring systems regarding any studies required to determine the impact of a GIR on non-MISO systems.

- Results of such coordinated studies will be included in MISO’s System Impact Study report appropriately.

- MISO System Impact Study reports will not be considered final unless the AfS reports are included*

- The Affected System’s study and reinforcement criteria will apply to studies performed to determine impacts on their transmission system when evaluating the impact of MISO generation on non-MISO transmission facilities

*AfS results are required only for DPP phase 2 and DPP phase 3

Please reference the MISO LMS at [https://miso.csod.com/](https://miso.csod.com/) for more extensive training on the MISO DPP process
Steady State Thermal Analysis

ERIS Analyses performed for study generators

Contingencies Evaluated

- TPL 001-4 Standards in effect January 1, 2015
- NERC Standard FAC-002-2
- P1, P2, P3*, P4, P5**, P6*, P7

Violations and Mitigations

- Obtain limiting elements from impacted TOs on all constraints
- Constraints verified by Ad Hoc Group
- Available transmission plans considered for potential mitigation
- AC verification performed when constraints mitigated in DC analysis
- Additional study may be required to identify & evaluate transmission solutions to sub-transmission issues

*Select P3, P5 & P6 Contingencies will be run based on Ad Hoc Group Input
**Only select EHV (300kV & Above) contingencies will be run based on Ad Hoc group input

Please reference the MISO LMS at https://miso.csod.com/ for more extensive training on the MISO DPP process
ERIS Constraint Criteria*

1. Study Project Distribution factor (Dfax)
   - Dfax ≥ 5% for system intact
   - Dfax ≥ 20% for contingency events

2. Study Project MW Impact
   - MW Impact of Study Project ≥ 20% of facility rating

3. Study Project Outlet
   - If outlet is overloaded or constraint is caused by contingency of outlet facility

4. Cumulative MW Impact
   - If 1, 2 or 3 are not met and total MW impact of entire study group ≥ 20% of facility rating and Study Project has MW impact > 5% of facility rating and Study Project has Dfax > 5%

Local TO Planning Criteria and Affected System Study Criteria

Steady State Voltage:
Bus voltage is outside of applicable normal or emergency limits, AND Voltage degradation is greater than 1%

*Reference: BPM 015 - Section 6.1.1.6

Please reference the MISO LMS at https://miso.csod.com/ for more extensive training on the MISO DPP process
ERIS Constraint Criteria (Cont.)

Reactive Power Requirements

- In June 2016 FERC issued Order 827 with applicability to all inverter based generation, including wind and solar projects, that did not have a study completed that resulted in a GIA by September 21, 2016.
- All inverter based generation is required to uphold a 0.95 lead/lag dynamic Power Factor ("PF") at the high side of their main Generation Step Up Transformer(s) ("GSU").
  - Static switched devices may be used to make up for losses in collector systems, GSUs, or other equipment.
  - The full 0.95 PF range available at the high side of the main GSU must be dynamic.
- Other TO reactive power requirements as applicable.
- MISO will test that this requirement is met prior to commencing studies.

Please reference the MISO LMS at https://miso.csod.com/ for more extensive training on the MISO DPP process.
ERIS Constraint Criteria (Cont.)

Frequency Response Requirements

• **FERC Order 842** requires newly interconnecting units to install, maintain and operate equipment capable of providing frequency response as a condition of interconnection.

• Interconnection Customer to provide a plant controller for inverter based generation or a governor model for thermal units in the dynamics model submitted to MISO.

Please reference the MISO LMS at [https://miso.csod.com/](https://miso.csod.com/) for more extensive training on the MISO DPP process.
NRIS Constraint Criteria

All generators studied at 100% nameplate under Summer Peak Conditions

Required to mitigate constraints via the deliverability algorithm under

- P0 (No Contingency): 5% DF Cutoff
- P1 (Single contingency or N-1): 5% DF Cutoff
- Generators can opt for a reduced level of NRIS at Kick-off, Decision Points 1 and 2
- Deliverability methodology in MISO BPM # 15 - Appendix C

Deliverability Only

- NRIS Only requests will be studied for deliverability only

Please reference the MISO LMS at https://miso.csod.com/ for more extensive training on the MISO DPP process
Stability and Short Circuit Analysis

**Stability**

- Performed on MISO models for:
  - Shoulder peak case
  - Study Generators dispatched at requested values
  - Analysis performed with and without Thermal mitigation
  - Local and regional disturbances studied including:
    - Mitigation identified for observed criteria violations
    - Per FERC Orders 661/661A LVRT and FERC Order 827 will be tested
    - Performed per TO Local Planning Criteria as applicable

**Short Circuit Analysis**

- Faults evaluated and Breaker duty violations attributed to generator requiring mitigation
- Performed per TO Planning Criteria as applicable

Please reference the MISO LMS at https://miso.csod.com/ for more extensive training on the MISO DPP process
Facilities Study Scope

- Interconnection Substation Facility Study (DPP Phase 2)
  - Determine facilities for POI substation
  - Final report

- Network Upgrade Facility Study (DPP Phase 3)
  - Incorporate Network Upgrades identified in Final SIS
  - Final Facilities Study report issued

Please reference the MISO LMS at https://miso.csod.com/ for more extensive training on the MISO DPP process
Material Modifications

- Modifications that have a material impact on the cost or timing of an Interconnection Request with a later queued priority date.
- IC is to submit to MISO in writing, modifications to any information provided in the Interconnection Request.
- For any permitted modification proposed by IC, the IC must supply a detailed analysis demonstrating why they believe the change is not a Material Modification.

Please reference the MISO LMS at https://miso.csod.com/ for more extensive training on the MISO DPP process
Ad Hoc Group Input

- Review models and provide contingencies
- Validate constraints; provide limiting elements
- Suggest conceptual plan options
- Identify need for analysis & suggest mitigation options
- Provide fault scenarios
- Review/provide fault currents
- Identify scenarios for P3, P5 & P6 contingencies and develop solutions to potential cascading issues
- Provide input in developing planning level estimates for cost and construction time for NU

Please reference the MISO LMS at https://miso.csod.com/ for more extensive training on the MISO DPP process
Provisional Study
An IC may request a Provisional Study by providing written notice from the IR submission and through IC Decision Point II.

Or if scheduled IC Decision Point I, Decision Point II, or the Interconnection NU FS becomes delayed by more than sixty (60) Calendar Days.

IC must submit DPP II and DPP III Milestones (M3 and M4). If M3 and M4 have not been calculated, then $4,000 per MW will be used for each.

The IC can revert back to the standard DPP process only before/at Decision Point I.

Study will consist of stability, short circuit, voltage analysis and IC Interconnection Facilities.

Maximum output of the Generating Facility under a PIA will be updated by the Transmission Provider on a quarterly or annual basis.

Please reference the MISO LMS at https://miso.csod.com/ for more extensive training on the MISO DPP process
For all Provisional and Conditional GIA’s, the maximum permissible output of the Generating Facility will be updated on a quarterly basis.

Projects subject to QOL studies shall be responsible for the cost of performing the required quarterly studies.

Customers shall submit a QOL study deposit of $10,000 sixty (60) Calendar Days prior to the start of the applicable binding quarter.

For all Conditional GIAs and PIAs, an Annual ERIS evaluation will be performed which will identify the maximum level of injection available for the next Resource Adequacy Planning Year.

The customer may decline to participate in the QOL studies if they wish to be limited by the AERIS evaluation results for all four quarters of that year.

For Conditional GIAs, an Annual Interim Deliverability analysis will be performed to identify the maximum level of Conditional NRIS available for next Resource Adequacy Planning Year, up to the level of a project’s GIA approved NRIS.

Please reference the MISO LMS at [https://miso.csod.com/](https://miso.csod.com/) for more extensive training on the MISO DPP process
Generation Interconnection Agreement
Types of Agreements

- Generator Interconnection Agreement (GIA)
  - Agreement between the native Transmission Owner and Interconnection Customer.
- Facility Construction Agreement (FCA)
  - Agreement between an Interconnection Customer and Affected Transmission Owner.
- Multi-Party Facilities Construction Agreement (MPFCA)
  - Agreement between multiple Interconnection Customers-who will share in the cost of a Network Upgrade-and Transmission Owner.

Please reference the MISO LMS at [https://miso.csod.com/](https://miso.csod.com/) for more extensive training on the MISO DPP process
Process – DPP3 started after March 15, 2022

Negotiation of 40 Business Days
- Completion of SIS Phase 3 study starts negotiation process
- Projects can elect to delay negotiation until all NUFS complete
- One conference call, additional calls if necessary

IC and TO Signature
- Concurrent forty-five (45) calendar days to execute agreement for IC and TO
- From day of circulation of negotiated draft

MISO Sign & File with FERC
- Execute and submit to FERC within ten (10) business days
- Transmittal letter / Electronic Quarterly Report (EQR)
- Individual filing as required

Please reference the MISO LMS at https://miso.csod.com/ for more extensive training on the MISO DPP process
<table>
<thead>
<tr>
<th><strong>Interconnection Timelines and Deadlines</strong></th>
<th><strong>Estimated Processing Time</strong>*</th>
</tr>
</thead>
<tbody>
<tr>
<td>GIA Negotiation Date (parties can choose to start or end negotiation early)</td>
<td>Starts 60 Calendar Day timeline before Legal Analysts receive agreement</td>
</tr>
<tr>
<td>Agreements sent to Legal Analysts by Resource Utilization</td>
<td>15 business day timeline to finalize and circulate agreement</td>
</tr>
<tr>
<td>Agreement finalized by Legal Analysts</td>
<td>2-6 hours/each agreement depending on type of agreement</td>
</tr>
<tr>
<td>Agreement sent for Legal and Technical Review</td>
<td>Can take 1-5 days to receive and process edits and final approval prior to circulating for execution</td>
</tr>
<tr>
<td>IC deadline for signature (parties can choose to sign at any point)</td>
<td>60 calendar days from date of circulation</td>
</tr>
<tr>
<td>TO deadline for signature (parties can choose to sign at any point)</td>
<td>30 Calendar days from IC signature received date</td>
</tr>
<tr>
<td>MISO to execute agreement once IC and TO Signatures received</td>
<td>Generally within 1-3 days of receiving all signatures; Includes execution of agreement and sending to parties (1-2 hours)</td>
</tr>
</tbody>
</table>
| Fully Executed Agreement triggers a 10 Business day deadline to file the agreement with FERC | • Preparation of transmittal letter (1-2 hours)  
• Forward for internal/external approval (3-5 days for approval)  
• Preparing documents for filing (1-6 hours)  
• Creating/Building filing in eTariff Software (1-4 hours) |

* Standard expected processing time, requirements dependent upon individual agreements and parties

Please reference the MISO LMS at [https://miso.csod.com/](https://miso.csod.com/) for more extensive training on the MISO DPP process
### Key items

<table>
<thead>
<tr>
<th>Facility Study Reports</th>
<th>GIA/FCA/MPFCA drafts</th>
<th>Negotiation</th>
<th>Execution</th>
<th>Post Execution</th>
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</thead>
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<tr>
<td>- Includes Exhibits A1-A14</td>
<td>- Pro forma section</td>
<td>- Provide inputs timely</td>
<td>- Sign or file unexecuted</td>
<td>- Site control</td>
</tr>
<tr>
<td>- Review during DPP phase</td>
<td>- Appendices</td>
<td>- Provide questions in advance of calls</td>
<td>- Specify reason for filing unexecuted</td>
<td>- Initial payment</td>
</tr>
<tr>
<td></td>
<td>- Construction and Payment milestones</td>
<td>- Diagrams legible and accurate</td>
<td>- Comply to all agreed milestones</td>
<td>- Quarterly/Annual limit calculations</td>
</tr>
<tr>
<td></td>
<td>- IC name in the document</td>
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<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- A10</td>
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</tbody>
</table>

Please reference the MISO LMS at [https://miso.csod.com/](https://miso.csod.com/) for more extensive training on the MISO DPP process.
GI Online Application Tool Overview
Getting Started

MISO provides generators reliable, non-discriminatory access to the electric transmission system. Follow these steps to connect a generator to the transmission system. If you need help, contact our Generator Interconnection Team.

**GI Online Application Tool**

- Need access to submit the Generator Interconnection Application online? Complete this [GI Access Request form](#) and start your Generator Interconnection Online Application.

(Please be advised that GridUnity will cease supporting IE11 and Legacy Edge starting May 1st, 2021.)
Getting Started

Welcome to the MISO Generation Interconnection Portal

- **Start a new Application**
  - The MISO Generation Interconnection Portal will guide you through the entire application process. Take the next step and start an interconnection application today!

- **View existing Applications**
  - The Queue View provides you with simple, flexible access to your applications.
Copy from an Existing Application

- Data can be copied from an existing application to a new one
  - Existing application must be a DPP-2022-Cycle project
  - Existing application must be in “Initiated” or “Submitted” status

- This feature can be used to duplicate repetitive information
  - Contact Info, Banking Info, Generator Specs, and Att C NDA
Navigating the Application

- Navigate between Application pages using the Navigation bar
  - Be sure to click “Save and Continue” or values will be lost
- “Facility Information” page must be fully complete before proceeding
- Remaining pages may be left blank and returned to later
Questions on how to use the Online Application Tool?

Please refer to the Generation Interconnection Online Application Guide
Helpful Resources
List of Helpful Links...

Documents

Generator Interconnection and Retirement Website
https://www.misoenergy.org/planning/generator-interconnection/

Generator Interconnection Queue Website
https://www.misoenergy.org/planning/generator-interconnection/GI_Queue/

Generator Interconnection Studies and Procedures
https://www.misoenergy.org/planning/generator-interconnection/GI_Studies/#t=10&p=0&s=&sd=

Please reference the MISO LMS at https://miso.csod.com/ for more extensive training on the MISO DPP process
List of Reference Materials and Contacts...

Documents

Business Practice Manual: Generator Interconnection BPM - 015
Committees, Work Groups, and Task Forces
https://www.misoenergy.org/stakeholder-engagement/
Generator Interconnection Ad-Hoc Requests
https://cdn.misoenergy.org/GL_Ad_Hoc_Info_Session_Request108144.pdf
Generator Interconnection GI Process flowchart, GI Application Checklist and DPP Schedule Updates
https://cdn.misoenergy.org/GL_Ad_Hoc_Info_Session_Request108144.pdf
Generator Interconnection Contour and Queue Maps
https://www.misoenergy.org/planning/generator-interconnection/GI_Queue/
Generator Interconnection Appendix 1
https://cdn.misoenergy.org/Attachment%20X_%20Appendix%201_Interconnection%20Request%20for%20a%20Generating%20Facility108376.pdf
MISO Instructions for Resources Connecting to Distribution System or Non-MISO Transmission System
https://cdn.misoenergy.org/Distribution_System_Interconnection_Request_Instructions108140.pdf

Contacts

MISO Client Relations
866-296-6476
MISO Help Center

Resource Utilization
General Contact
ginterconnection@misoenergy.org

Resource Integration
General Contact
ResourceIntegration@misoenergy.org

GIA Negotiations
General Contact
GIANegotiation@misoenergy.org

MISO Affected System Team
General Contact
GI-AFS@misoenergy.org

Please reference the MISO LMS at https://miso.csod.com/ for more extensive training on the MISO DPP process
Additional Resources

**Current Queue Info**
- [Interactive Queue & Queue Map](#)
- [GIQ Web Overview](#)
- [Replacement Requests](#)
- [Surplus Requests](#)
- [MHVDC Requests](#)
- [Definitive Planning Phase Schedule](#)

**Stakeholder Entities**
- [Interconnection Process Working Group (IPWG)](#)
- [Planning Advisory Committee (PAC)](#)
- [MISO-SPP Joint Targeted Interconnection Queue Study (JTIQ)](#)

**Getting Started**
- [Attachment X](#)
- [BPM-015](#)
- [MISO Learning Center](#)
- [Queue Process Diagram](#)
- [Queue Process Workshops](#)
- [POI Analysis Tool](#)
- [Transferred Transmission Facilities](#)
- [Ad Hoc Info Session Request Form](#)
- [GI Online Application Tool](#)

Contact the Generator Interconnection team at [ginterconnection@misonergy.org](mailto:ginterconnection@misonergy.org)
### List of Acronyms

#### Acronyms

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<tr>
<th>Acronym</th>
<th>Description</th>
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<tbody>
<tr>
<td>COD</td>
<td>Commercial Operation Date</td>
</tr>
<tr>
<td>D1</td>
<td>Deposit 1</td>
</tr>
<tr>
<td>D2</td>
<td>Deposit 2</td>
</tr>
<tr>
<td>DF</td>
<td>Distribution Factor</td>
</tr>
<tr>
<td>ERIS</td>
<td>Energy Resource Interconnection Service</td>
</tr>
<tr>
<td>DPP</td>
<td>Definitive Planning Phase</td>
</tr>
<tr>
<td>FCA</td>
<td>Facility Construction Agreement</td>
</tr>
<tr>
<td>FERC</td>
<td>Federal Energy Regulatory Commission</td>
</tr>
<tr>
<td>FS</td>
<td>Facility Study</td>
</tr>
<tr>
<td>GIA</td>
<td>Generation Interconnection Agreement</td>
</tr>
<tr>
<td>GIQ</td>
<td>Generation Interconnection Queue</td>
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<tr>
<td>GIP</td>
<td>Generator Interconnection Process</td>
</tr>
<tr>
<td>GSU</td>
<td>Generator Step Up Transformer</td>
</tr>
<tr>
<td>IA</td>
<td>Interconnection Agreement</td>
</tr>
<tr>
<td>IC</td>
<td>Interconnection Customer</td>
</tr>
</tbody>
</table>

*Please reference the MISO LMS at [https://miso.csod.com/](https://miso.csod.com/) for more extensive training on the MISO DPP process.*
<table>
<thead>
<tr>
<th>Acronym</th>
<th>Definition</th>
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</thead>
<tbody>
<tr>
<td>ICT</td>
<td>Independent Coordinator of Transmission</td>
</tr>
<tr>
<td>IF</td>
<td>Interconnection Facilities</td>
</tr>
<tr>
<td>IR</td>
<td>Interconnection Request</td>
</tr>
<tr>
<td>M1</td>
<td>Milestone 1</td>
</tr>
<tr>
<td>M2</td>
<td>Milestone 2</td>
</tr>
<tr>
<td>M3</td>
<td>Milestone 3</td>
</tr>
<tr>
<td>M4</td>
<td>Milestone 4</td>
</tr>
<tr>
<td>MTEP</td>
<td>MISO Transmission Expansion Plan</td>
</tr>
<tr>
<td>MPFCA</td>
<td>Multi Party Facility Construction Agreement</td>
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<tr>
<td>MVP</td>
<td>Multi Value Project</td>
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<tr>
<td>NRIS</td>
<td>Network Resource Interconnection Service</td>
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<td>NU</td>
<td>Network Upgrade</td>
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<tr>
<td>PIA</td>
<td>Provisional Interconnection Agreement</td>
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<tr>
<td>POI</td>
<td>Point of Interconnection</td>
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<tr>
<td>QOL</td>
<td>Quarterly Operating Limit</td>
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<tr>
<td>SIS</td>
<td>System Impact Study</td>
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<tr>
<td>TO</td>
<td>Transmission Owner</td>
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</tbody>
</table>

Please reference the MISO LMS at [https://miso.csod.com/](https://miso.csod.com/) for more extensive training on the MISO DPP process