Queue Process Workshop

Generator Interconnection Queue

August 8, 2022

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.

Introduction

Queue Admin Overview

Application Review

Site Control

Special Studies

Definitive Planning Phase Provisional

Studies

Generator Interconnection Agreement

Generator Online Application Tool Overview

Helpful Resources

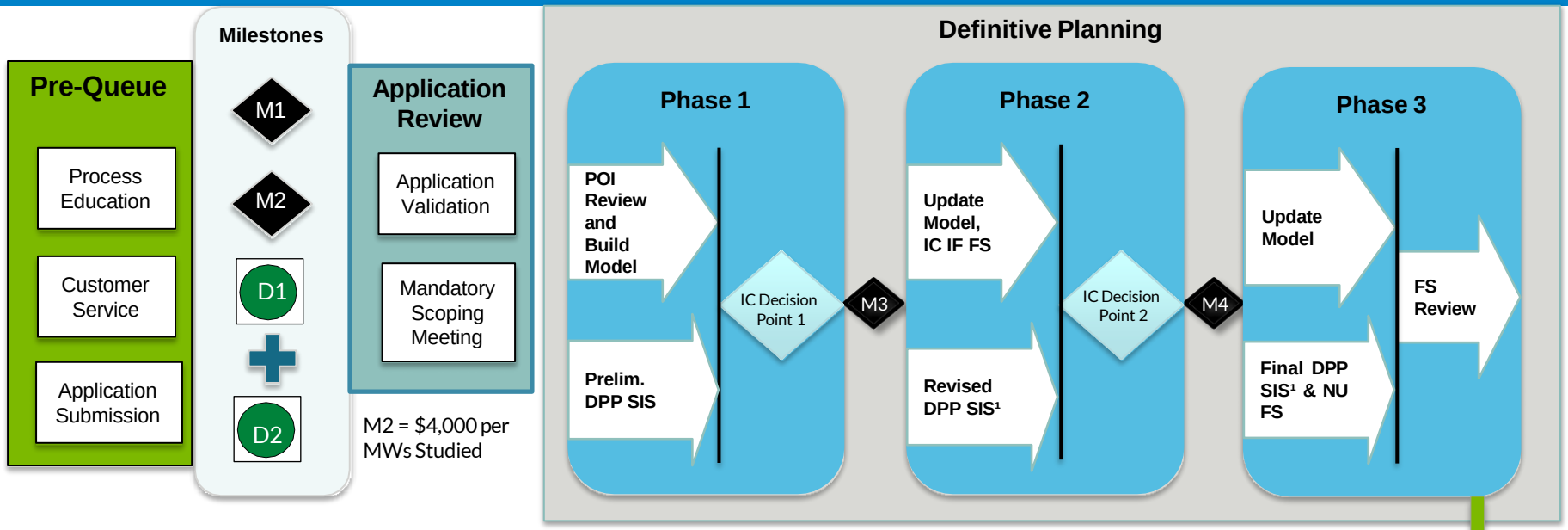
Introduction

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

Generation Interconnection Process



Decision Point 1
- Withdraw : 50% M2 refund
- Move to Phase 2:
  - Pay M3 = (10% of NU) – M2
  - M2 100% at risk

Decision Point 2
- Withdraw : 100% M3 refund
- Move to Phase 3:
  - Pay M4 = (20% of NU) – M2 –M3
  - M2, M3 and M4 at risk

Withdraw in Phase 3
- M2, M3 and M4 at risk

GIA / FCA / MPFCA Negotiations

Interconnection Agreement

Note 1: An Affected System analysis, including estimated upgrades and costs, are part of this study.

Ref	Description	Refund	<6 MW	≥ 6 but ≤ 20 MW	> 20 but ≤ 50 MW	> 50 but ≤ 100 MW	> 100 but ≤ 200 MW	> 200 but ≤ 500 MW	> 500 but < 1000 MW	≥ 1000 MW
D1	Application Fee	No	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000
D2	Fund DPP and Restudies	Yes	$50,000	$120,000	$180,000	$270,000	$320,000	$420,000	$530,000	$640,000

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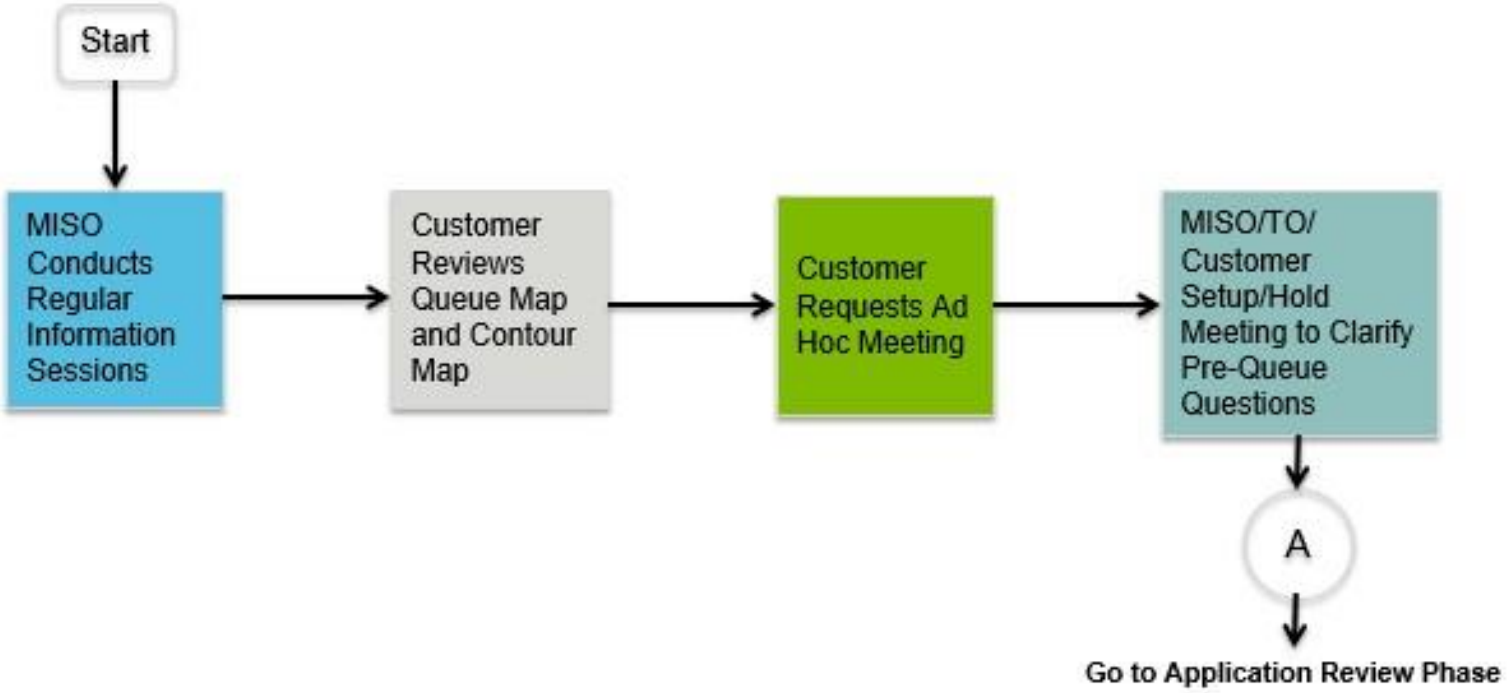
Queue Admin

Overview of the Pre Queue 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.

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Purpose: Introduce and provide a demonstration of a new POI self-check tool

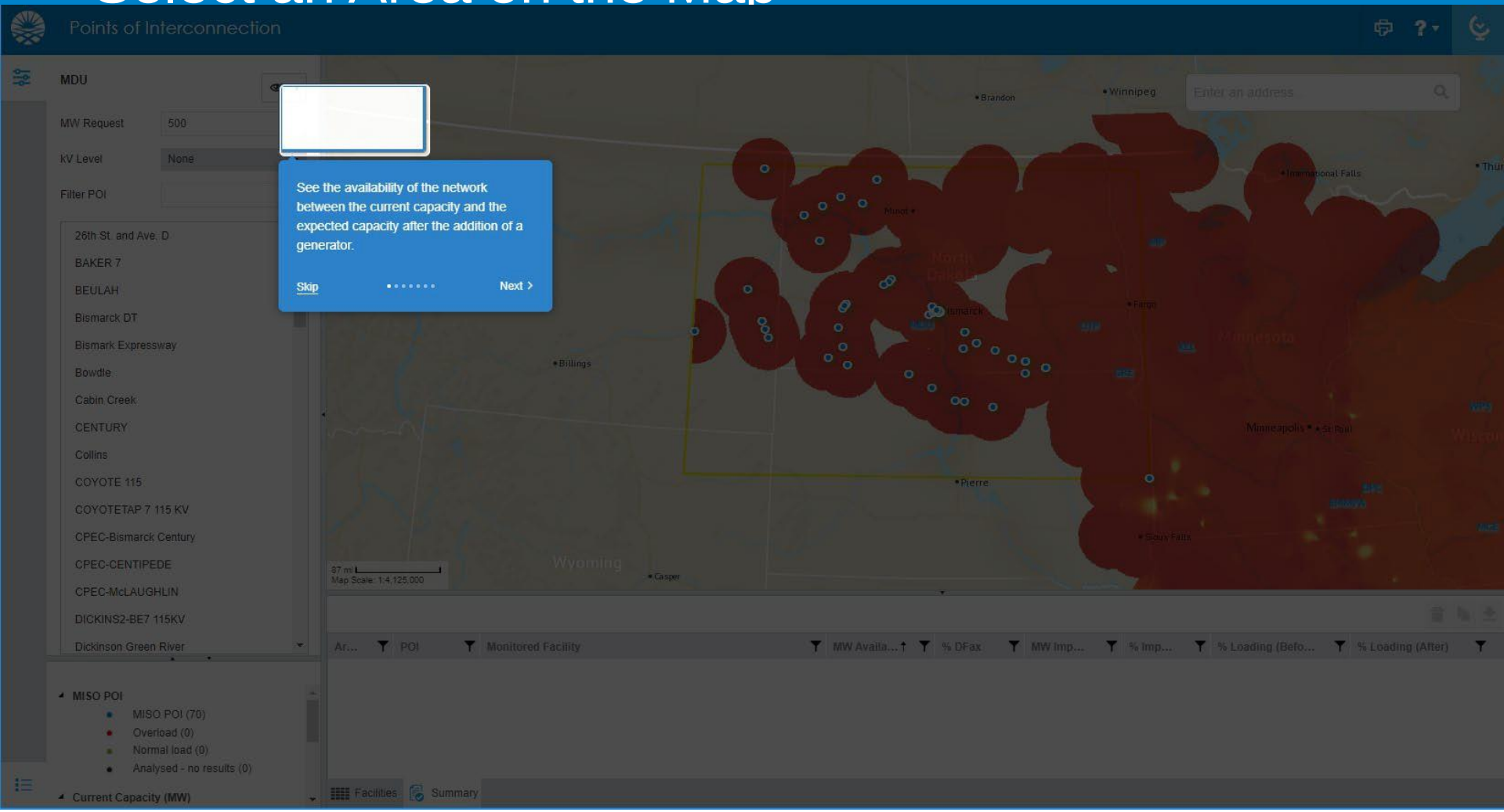
Key Takeaways:

- 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)

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
- All generator Types: Generic Standard Library Stability Model representing the dynamics of the Generating Facility in .dyr format, models submitted must be acceptable and recommended in the NREC Acceptable Model List posted at https://www.nerc.com/comm/PC/Pages.System-Analysis-and-Modeling-Subcommittee-(SAMS)2013.aspx and also comply with MISO's Model Data requirements and Reporting Procedures posted at https://www.misoenergy.org/planning-models/mod-032-1/
  - 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**

During the Application Process, any changes require a submission of the corrected documents.

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

Shared Interconnection Facilities (Tariff Att. X 3.3.1.3)

Interconnection Customer may submit an Interconnection Request that proposes to share Interconnection Facilities 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 Transmission Owner and all Interconnection Customers with projects that propose to connect, or are connected, to the shared Interconnection Facilities.

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

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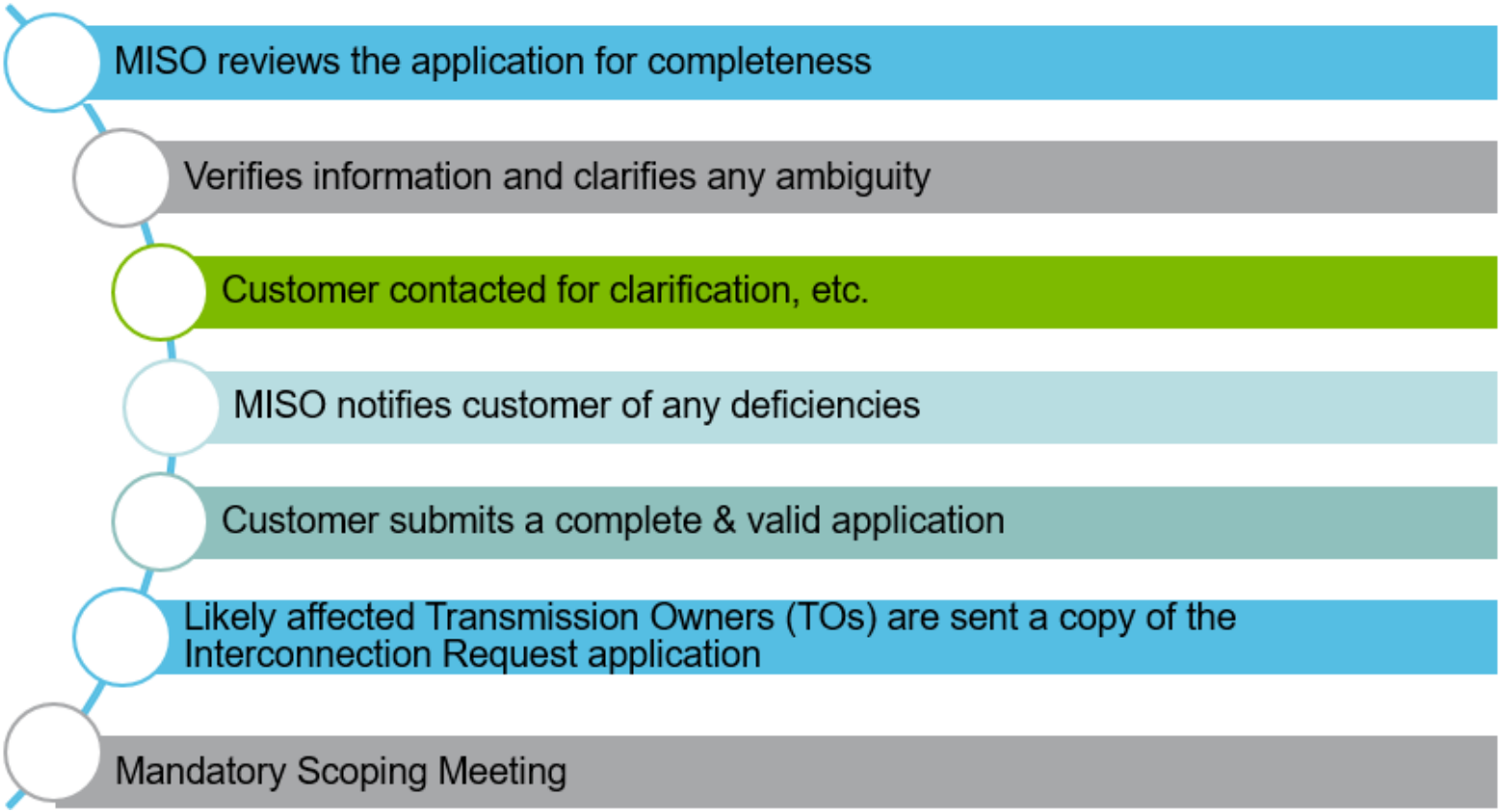
Application Review

Application Review



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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

Accepted

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

Not Accepted

- 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.

Acreage Requirements

Fuel Type	Land Required
Wind	Fifty (50) acres per MW
Solar	Five (5) acres per MW
Battery	One-tenth (0.1) acres per MW
Conventional	Ten (10) acres
Hybrid	Sum of individual Fuel Type requirements

See BPM-015 Section 5.1.2

Insufficient Land Option

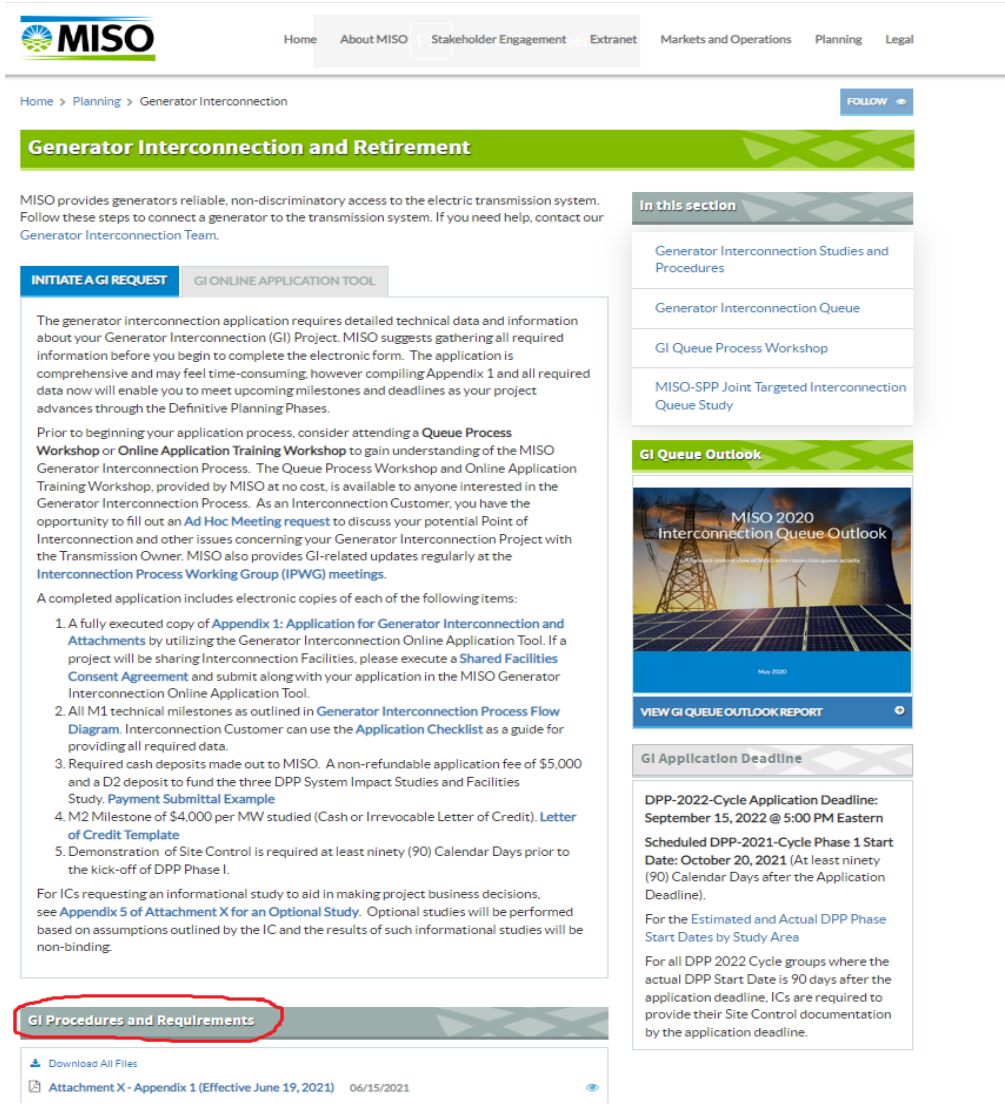
- If land does not meet the acreage requirement, the IC may provide additional evidence to demonstrate adequate site control
  - Due at time of application

- 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

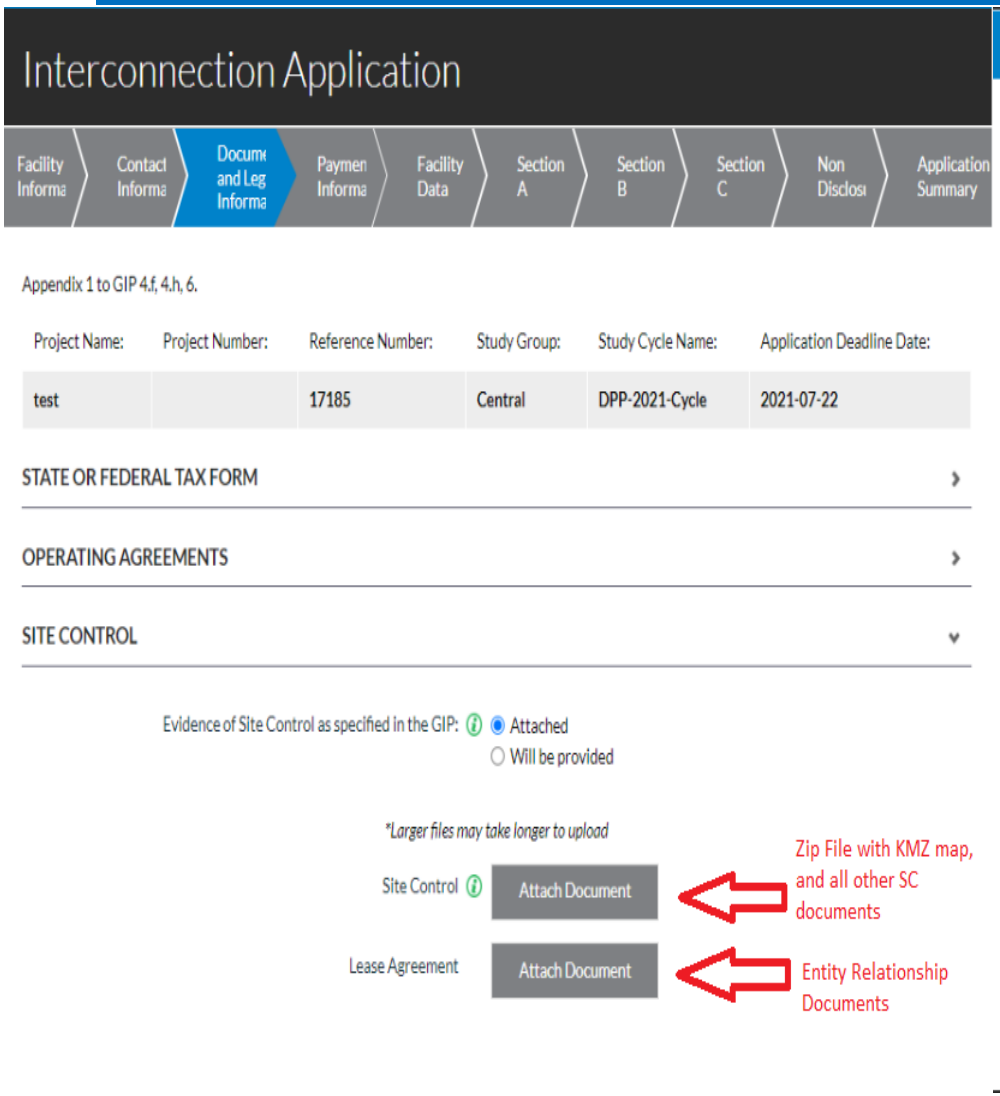
- See Attachment X Section 7.2.1.1 (ii) and BPM-015 Section 5.1.2 "Insufficient land to meet the acreage requirements"

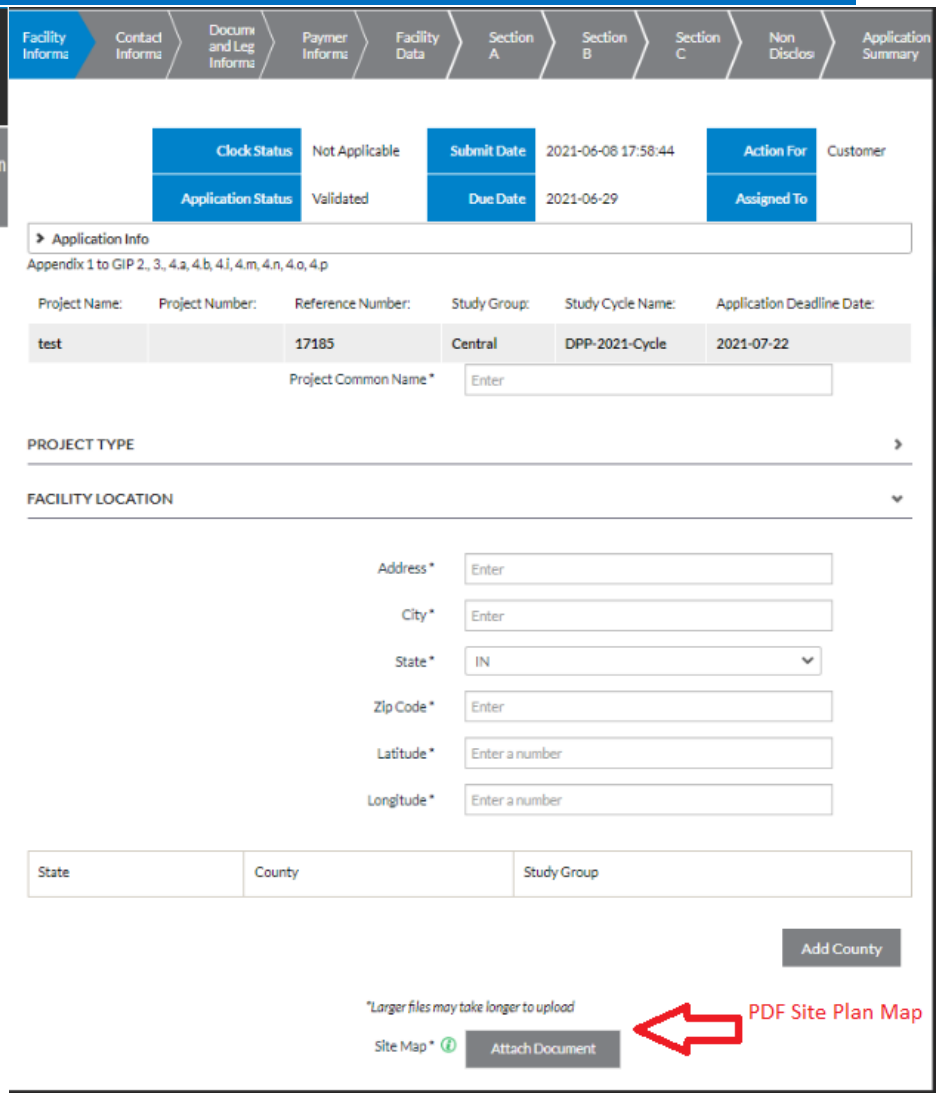
Site Control Checklist Coming Soon

- 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





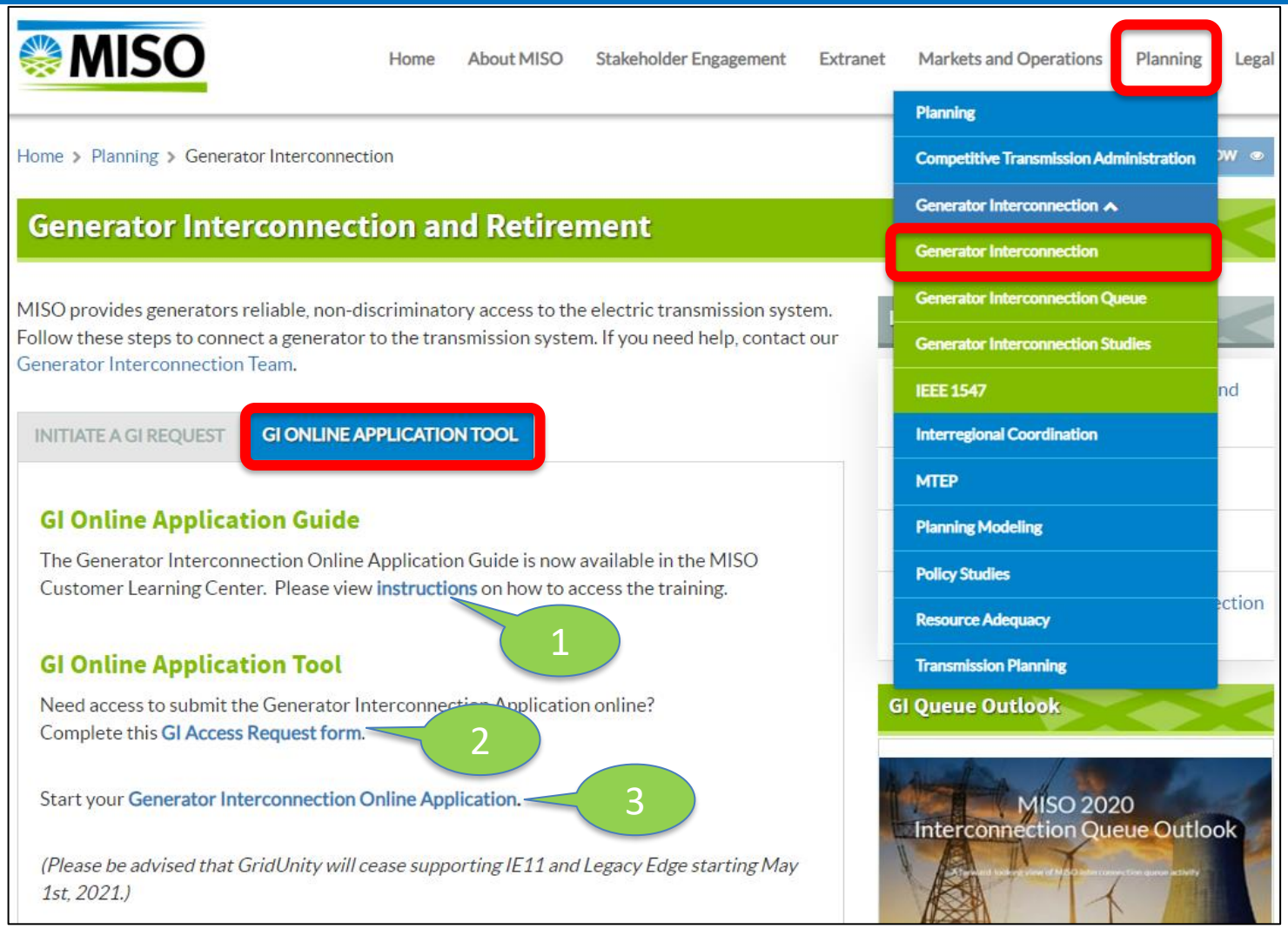
Deadline

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

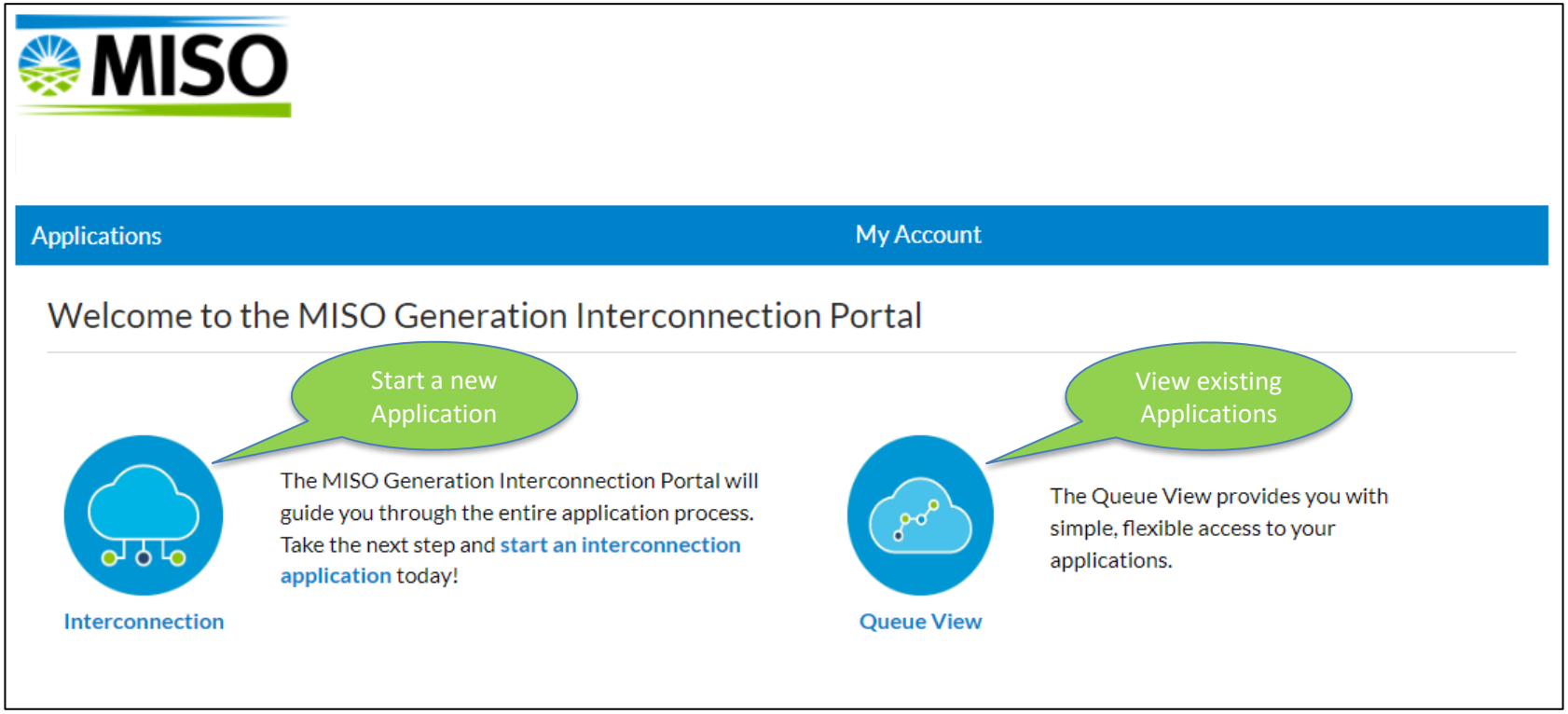
- Please direct project-specific questions to ginterconnection@misoenergy.org

GI Online Application Tool Overview

Getting Started

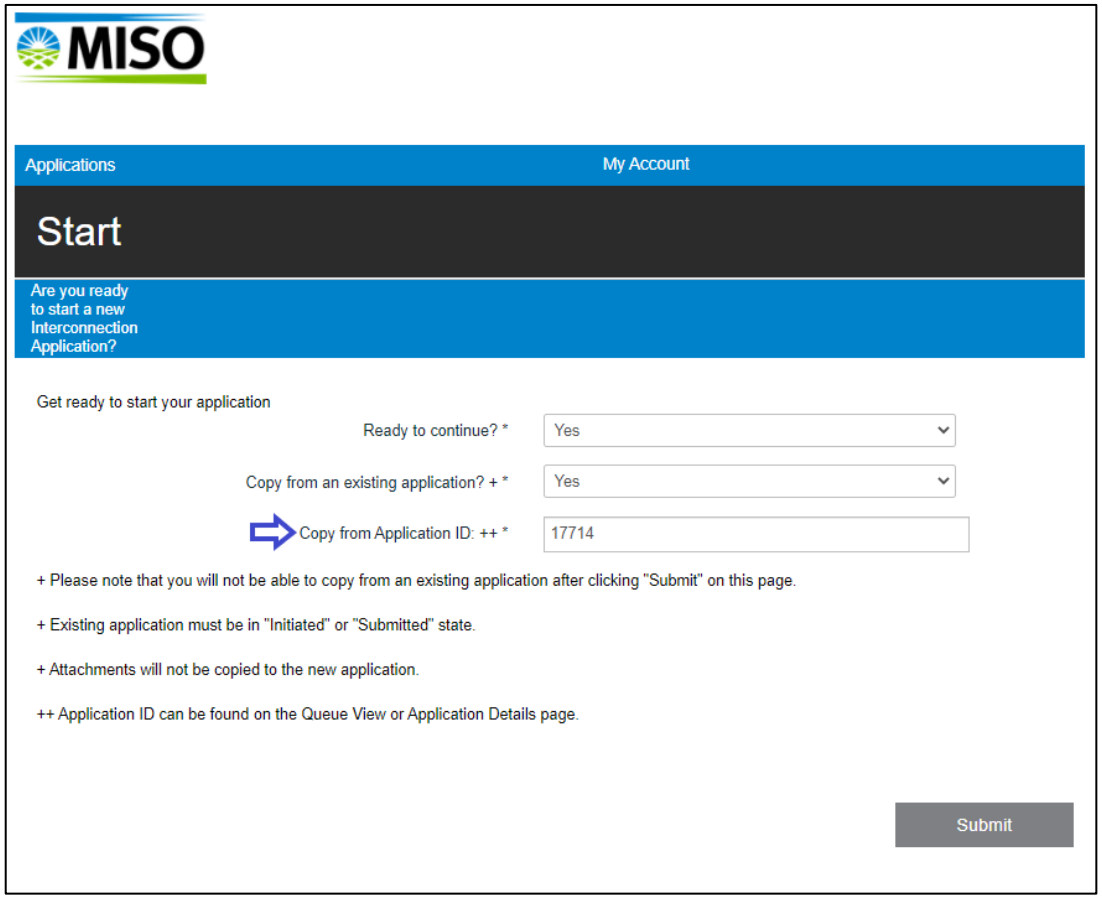


Getting Started



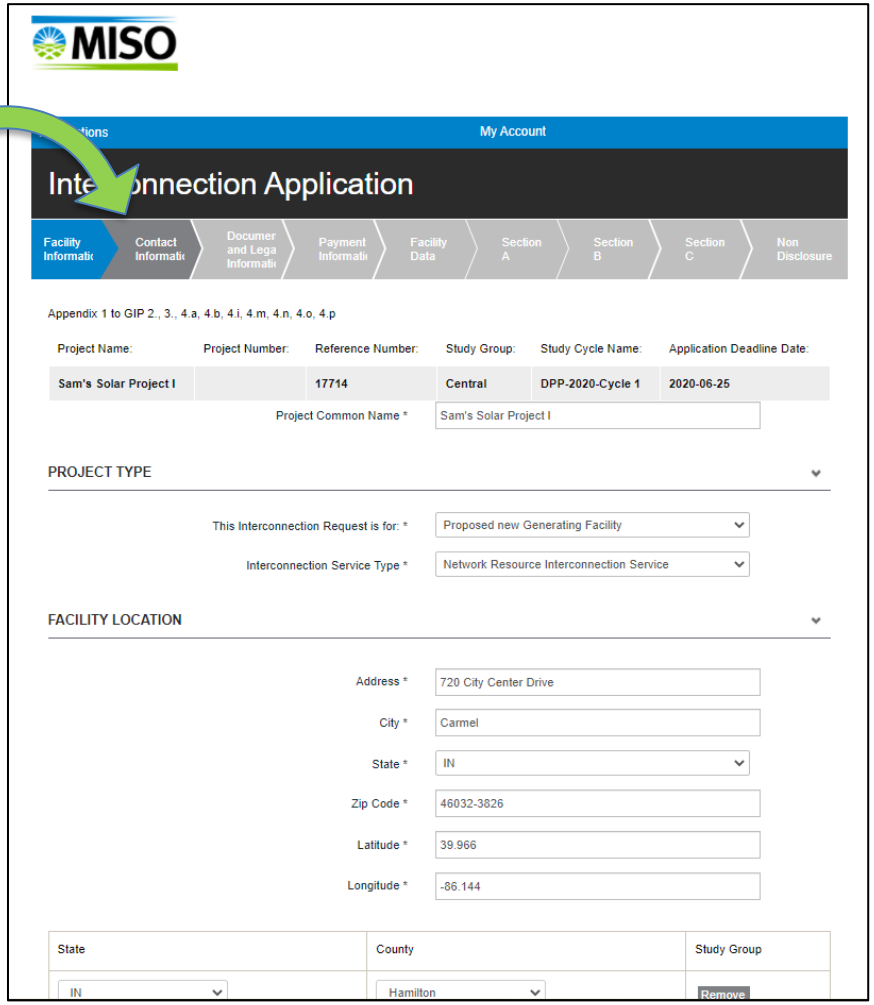
Copy from an Existing Application

- 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=

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List of Reference Materials and Contacts…

Documents

Business Practice Manual: Generator Interconnection BPM - 015
https://www.misoenergy.org/legal/business-practice-manuals/ MISO
Committees, Work Groups, and Task Forces
https://www.misoenergy.org/stakeholder-engagement/
Generator Interconnection Ad-Hoc Requests
https://cdn.misoenergy.org/GI_Ad_Hoc_Info_Session_Request108144.pdf
Generator Interconnection GI Process flowchart, GI Application Checklist and DPP Schedule Updates
https://cdn.misoenergy.org/GI_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
help@misoenergy.org

Resource Utilization
General Contact
ginterconnection@misoenergy.org

Resource Integration
General Contact
ResourceIntegration@misoenergy.org

GIA Negotiations
General Contact
GIANegotiation@misoenergy.org

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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

Acronyms

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

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Acronyms (Cont.)

ICT	Independent Coordinator of Transmission
IF	Interconnection Facilities
IR	Interconnection Request
M1	Milestone 1
M2	Milestone 2
M3	Milestone 3
M4	Milestone 4
MTEP	MISO Transmission Expansion Plan
MPFCA	Multi Party Facility Construction Agreement
MVP	Multi Value Project
NRIS	Network Resource Interconnection Service
NU	Network Upgrade
PIA	Provisional Interconnection Agreement
POI	Point of Interconnection
QOL	Quarterly Operating Limit
SIS	System Impact Study
TO	Transmission Owner

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