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Interconnection of New Generation Facilities

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Generation and Transmission in the United States

In the United States, most eastern and mid-western states participate in electric Regional Transmission Organizations (RTOs).

RTOs file and maintain tariffs with the Federal Energy Regulatory Commission (FERC).

Many southern and western states do not have RTOs.

RTOs in Missouri

- Missouri is located in the footprint of two Regional Transmission Organizations:
- Midwest Independent System Operator (MISO)
 - Ameren Missouri
- Southwest Power Pool (SPP)
 - Empire District Electric Company
 - Kansas City Power & Light
 - Kansas City Power & Light-Greater Missouri Operations

What is a queue?

- The interconnection queue (queue) refers to the process of getting a new power generator connected to the operating system's grid.
- The queue is a waiting line for these new generators.
- Each Regional Transmission Organization establishes its own process for managing the queue within its territory.
- SPP is currently reviewing its queue management procedures.

Queue Management and Interconnection in MISO

- MISO, with the permission of the Federal Energy Regulatory Commission (FERC), reformed its queue management process in 2008.
- MISO transitioned from a “first-in, first-served” model to a “first-ready, first-served” model.
- The new queue management model has been modified three times since its initial approval in 2008.

Queue Management and Interconnection at MISO, cont.

- MISO most recently filed tariffs to reform its queue management process with the FERC in March of 2012.
- MISO sought reform, in part, to allow companies that are currently in the queue to remain in the queue for longer periods of time.
 - Under the previous process, companies were sometimes forced to withdraw from the queue prematurely or to file unexecuted tariffs with the FERC.

Queue Management and Interconnection at MISO, cont.

- The FERC accepted MISO's queue reform compliance tariffs on June 27, 2012.
- Although many projects in the queue are wind projects, MISO's queue management process applies to all projects regardless of fuel source.

Overview of the steps involved in getting into and through the MISO queue

BASIC MISO QUEUE PROCESS

Basic Queue Process

- 1. Applicant submits a completed application.**
The application must include Deposits D1 and D2 and all M1 Milestones.
- 2. The application is reviewed to make sure it meets filing requirements.**
- 3. Feasibility study.**
The feasibility study examines the applicant's impact on the system and whether the system is capable of accommodating the applicant.

Basic Queue Process, cont.

4. **System Planning and Analysis (SPA).**

The SPA determines the network upgrades that will reliably and efficiently integrate the applicant onto the system. The SPA also provides preliminary estimates of cost and time for upgrades. The SPA uses a tool called a System Impact Study (SIS).

5. **Applicant meets all M2 milestones as submits Deposit 3.**

6. **SPA review.**

The review could include a restudy or a new SIS.

Basic Queue Process, cont.

7. Applicant meets all M3 Milestones.

8. Facility Study.

Estimates the cost and time to construct upgrades necessary to connect with the system.

Includes draft appendices to the Generator Interconnection Agreement (GIA).

Once finalized, the GIA must be filed with the Federal Energy Regulatory Commission.

9. Interconnection Agreement.



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MILESTONES

Description of the milestones required as an applicant moves through the queue

Milestones

- There are three different sets of milestones that must be completed: M1, M2, and M3.
- Each stage has both technical and non-technical milestones that must be achieved.
- There are three deposits (D1, D2, and D3) that are not milestones but usually must be paid in conjunction with a milestone.

M1 Technical Milestones

- Generic Stability Model
 - Simplified stability model that approximately mimics the dynamics behavior of the generating facility.
- Point of Interconnection (POI)
 - Location of the POI
 - The information provided as part of this milestone should be descriptive enough to locate the POI in a power flow model.

M1 Technical Milestones, cont.

- Impedance from collective substation to POI
 - Impedance of the radial line from generator substation (GSU) to POI
 - Impedance is the measure of opposition that a circuit presents
- Technical data to run studies
 - Other technical data (as applicable) required to run studies such as sequence impedances, generating facility reactance, saturation curves, etc.

M1 Technical Milestones, cont.

- One-line diagram
 - Diagram of the generating facility clearly showing the interconnection facilities and POI
- Generation output (MW)
 - Gross and net MW output of the generating facility under summer and winter conditions
- Step-up transformer data
 - Specifications of the generating facility step-up transformer

M1 Non-Technical Milestones

- Application
 - Fully complete and correct interconnection request
- Proof of site control
 - Documentation demonstrating ownership, leasehold interest, or a right to develop a generating facility on the specified site
 - Proof that there is sufficient land area equal to at least 50% of that required to support the proposed generating facility
 - \$100,000 deposit can be made in lieu of site control

M1 Deposits

- There are no financial milestones attached to M1
- However, two deposits are due with the application: D1 and D2.
 - D1 is a non-refundable application fee
 - D2 funds the System Planning Analysis (SPA)
 - Any unused funds will be returned to the applicant upon withdrawal.



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M1 Milestones Complete

Once all of the primary milestones are met and deposits are received, the request for queue position is acknowledged

M2 Technical Milestones

- Detailed stability model
 - Actual stability model representing the dynamics of the generating facility
- Definitive Point of Interconnection (POI)
 - POI before entering the Definitive Planning Phase (DPP)
 - Any material changes after this point will result of withdrawal of the request from the queue.

M2 Technical Milestones, cont.

- Definitive one-line diagram
 - Diagram before entering the Definitive Planning Phase (DPP)
 - Any material changes at this point will result in the withdrawal of the request from the queue.
- Definitive generation output (MW)
 - Generation output before entering the DPP. Any material changes after this point will result in withdrawal of the request from the queue.

M2 Non-Technical Milestones

- Proof of site control
 - Re-validation of site control demonstrated at M1 milestone submission.
 - Deposit submitted in lieu of site control at M1 becomes non-refundable if site control is not demonstrated by the tenth business day after the start of the Definitive Planning Process (DPP).

M2 Non-Technical Milestones, cont.

- Any two of the following six milestones must be met
 1. Equipment on order
 - Demonstration that generation turbines have been ordered.
 2. Necessary permits*
 - Submitted application for required federal, state, or local permits
 3. Regulatory approval*
 - Approval of the facility by a state utility regulatory commission

**letter of credit or deposit may be used in lieu of milestone.*

M2 Non-Technical Milestones, cont.

4. Board of Directors approval*

-Approval to proceed from the interconnection customer's board of directors or its highest level of authority.

5. Contract sale of inclusion of resource adequacy plan*

-Execution of the contract for sale of electric energy or capacity from the generating facility, or a statement that the generating facility is included in an applicable state resource adequacy plan.

6. Deposit or letter of credit

** Letter of credit or deposit may be used in lieu of milestone.*



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M2 Milestones Complete

Once all M1 and M2 milestones are received and feasibility study results are within acceptable limits, a project will be placed in the Definitive Planning Phase (DPP)

M3 Non-Technical Milestones

There are no technical M3 milestones

- Deposit or letter of credit
 - For the greater of the estimated network upgrades or interconnection facilities as determined in the system planning and analysis review.
- Contract sale of inclusion or resource adequacy plan
 - Execution for the contract for sale of electric energy or capacity from the generating facility, or statement that the generating facility is included in an applicable state resource adequacy plan.
- Equipment on order
 - Demonstration that generation turbines have been ordered.

M3 Milestones

- There are no M3 financial milestones.
- But there is a third and final required deposit: D3
 - D3 funds the Definitive Planning Phase (DPP).
 - Any unused portion is refunded to the applicant at commercial operation.



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M3 Milestones Complete

If an applicant fails to meet M3 milestones, the project will be withdrawn from the queue.

If all the milestones are met, the queue position is set.

Links to MISO webpage outlining queue process for applicants:

- <https://www.midwestiso.org/PLANNING/GENERATORINTERCONNECTION/Pages/ProceduresRequirements.aspx>
- and
- <https://www.midwestiso.org/Library/Repository/Study/Generator%20Interconnection/Queue%20Process%20Overview.pdf>

Incentives for Renewable Generation

- The MISO queue process does not differentiate between renewable energy projects and non-renewable energy projects.
- Because of the geographic location of MISO states, many of the renewable energy projects in the MISO queue are wind projects.
- But there are other incentives available for renewable energy projects

Incentives for Renewable Generation, cont.

- Many states have renewable portfolio standards (RPS).
- Renewable portfolio standards are also sometimes called renewable energy standards (RES).
- RPS or RES programs are designed to increase the amount of electricity that is generated from renewable sources.
- States are free to choose which utilities are subject to RPS or RES requirements.

Incentives for Renewable Generation, cont.

- RPS or RES can be mandatory standards or discretionary targets, depending on the legislation enacting them.
 - 30 states plus the District of Columbia have mandatory RPS or RES statutes
 - 7 states have non-mandatory RPS or RES goals
 - 13 states have neither mandatory or non-mandatory RPS or RES goals

<http://www.eia.gov/todayinenergy/detail.cfm?id=4850>

accessed 01/23/2013

State RPS or RES Targets

- California: 33% of total procurement by 2020
- Missouri: 15% by 2021
- Iowa: 105 MW of renewable generating capacity

Incentives for Renewable Generation, cont.

- Mandatory or non-mandatory state-level RPS or RES standards create incentives for both regulated utilities and independent power producers to invest in renewable energy projects.
- The expansion of renewable energy generation has also created a secondary market in renewable energy credits (green certificates).

Incentives for Renewable Generation, cont.

- A renewable energy credit (REC) or green certificate represents the “green” attributes of a unit of energy produced from a renewable fuel.
- In some cases, generators can sell both the power produced from renewable energy and the renewable energy credit associated with the power.
- Renewable energy credits or green certificates are created by state law and there are REC markets in place in various parts of the United States.

Production Tax Credit

- RPS and RES requirements are enacted at the state level.
- On the federal level, Congress has authorized a Production Tax Credit (PTC).
- The PTC was originally enacted in 1992 and it has been in place off and on since that time.
- The most recent wind PTC expired at the end of 2012, but was reinstated on January 2, 2013.
- http://www.ucsusa.org/clean_energy/smart-energy-solutions/increase-renewables/production-tax-credit-for.html

Production Tax Credit, cont.

- The PTC is a per-Kilowatt hour tax credit for electricity produced and sold to a third party during the taxing year.

Production Tax Credit, cont.

- Energy sources that qualify for the PTC:
 - Landfill gas 1.1¢/kWh
 - Wind 2.2¢/kWh
 - Hydroelectric 1.1¢/kWh
 - Geothermal electric 2.2¢/kWh
 - Municipal solid waste 1.1¢/kWh
 - Hydrokinetic power (flowing water) 1.1¢/kWh
 - Anaerobic digestion 1.1¢/kWh
 - Small Hydroelectric 1.1¢/kWh
 - Tidal energy 1.1¢/kWh

Production Tax Credit, cont.

- Energy sources qualifying for the PTC:
 - Wave energy 1.1¢/kWh
 - Ocean thermal 1.1¢/kWh
 - Biomass 2.2¢/kWh
- http://dsireusa.org/incentives/incentive.cfm?Incentive_Code=US13F

Production Tax Credit, cont.

- Unused credits can be carried forward for up to 20 years following the year of generation.
- The expiration date of the tax credit varies by technology type.
- The PTC for wind expired at the end of 2012, but it was reauthorized on January 2, 2013. The authorization is through the end of 2013.

Production Tax Credit, cont.

- Changes were made to the PTC in 2013:
 - Placed in service deadlines were replaced with deadlines that use the beginning of construction to determine when a facility is eligible to claim the credit.
 - Eligible facilities may claim the credit through 2013.
 - The definition of municipal solid waste was changed to exclude “paper that is commonly recycled and which has been excluded from other waste.”

Production Tax Credit, cont.

- Investment in renewable energy projects increases in years when the PTC is in effect and decreases in years when the PTC is not in effect.
- Many groups advocate for more certainty in the availability of the credit, arguing that the uncertainty created by short-term extensions discourages investment in renewable energy.
- http://www.ucsusa.org/clean_energy/smart-energy-solutions/increase-renewables/production-tax-credit-for.html



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Thank you