



Landfill Gas Electricity Project Interconnection Webinar

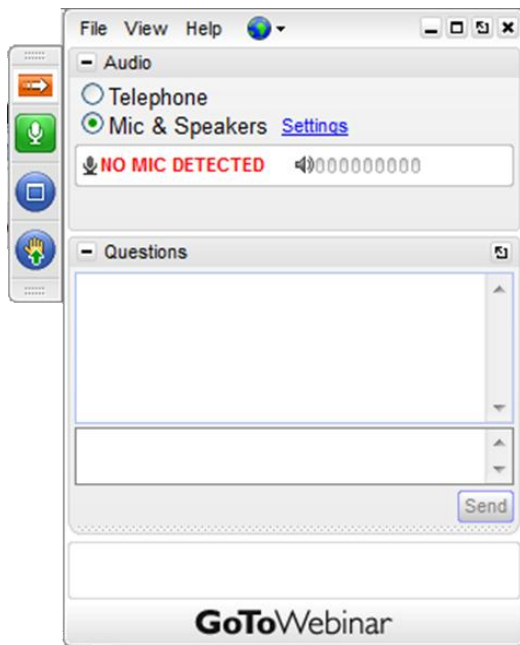
June 6, 2013

Presenters:

Freddi Greenberg, Attorney at Law
Joe Carolan, Carolan Associates, LLC
Keith Johnson, Tetra Tech BAS

Tips

- All participants will be muted at the beginning of the webinar
 - Press *6 to unmute your line
- Please do not put this call on hold
- Questions submitted during the webinar will be reviewed during a general discussion at the end of the webinar



To submit a question or if you are experiencing technical difficulties, let us know using the **Questions pane**

← **Enter your question**

Welcome

- **Introductions**
- **Review of Agenda**

Webinar Agenda

Overview of Interconnection

- General process and requirements from a national perspective

January 2013 Proposed FERC Ruling on Interconnection

- Implications

Case Studies

- Glendale Energy Interconnection with Arizona Public Service
- The Retail vs. Wholesale Choice for BTM LFGE in PJM

Discussion

- Questions and Answers
- Wrap-up & Conclusion

Interconnection

An Overview for LFG to Electricity Projects

Freddi Greenberg
Attorney at Law

Defining Interconnection

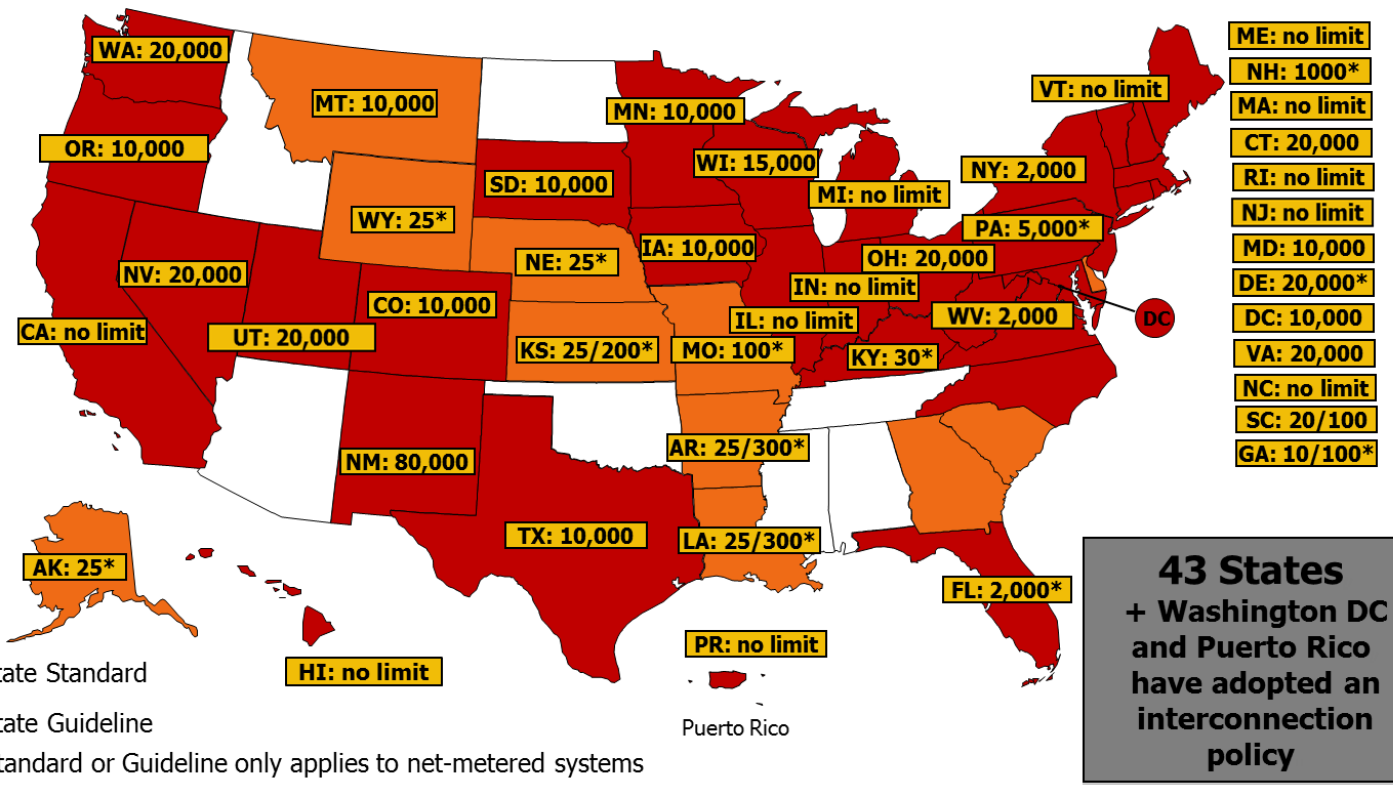
- **Interconnection does not include use of the transmission or distribution system to transmit energy**
- **Focus on what is needed to interconnect with transmission or distribution system where the facility is located**
- **Additional agreements and charges are required for transmission service**
- **Interconnection process and approval may be revisited if there is a change in the generating facility, such as:**
 - Increase in capacity
 - Change from selling energy only to selling capacity



Who Regulates Interconnection of Generators?

- States regulate interconnection with distribution system
 - 43 states have adopted interconnection policies, rules
 - California Rule 21 often seen as a model

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February 2013



Notes: Numbers indicate system capacity limit in kW. Some state limits vary by customer type (e.g., residential versus non-residential). "No limit" means that there is no stated maximum size for individual systems. Other limits may apply. Generally, state interconnection standards apply only to investor-owned utilities.

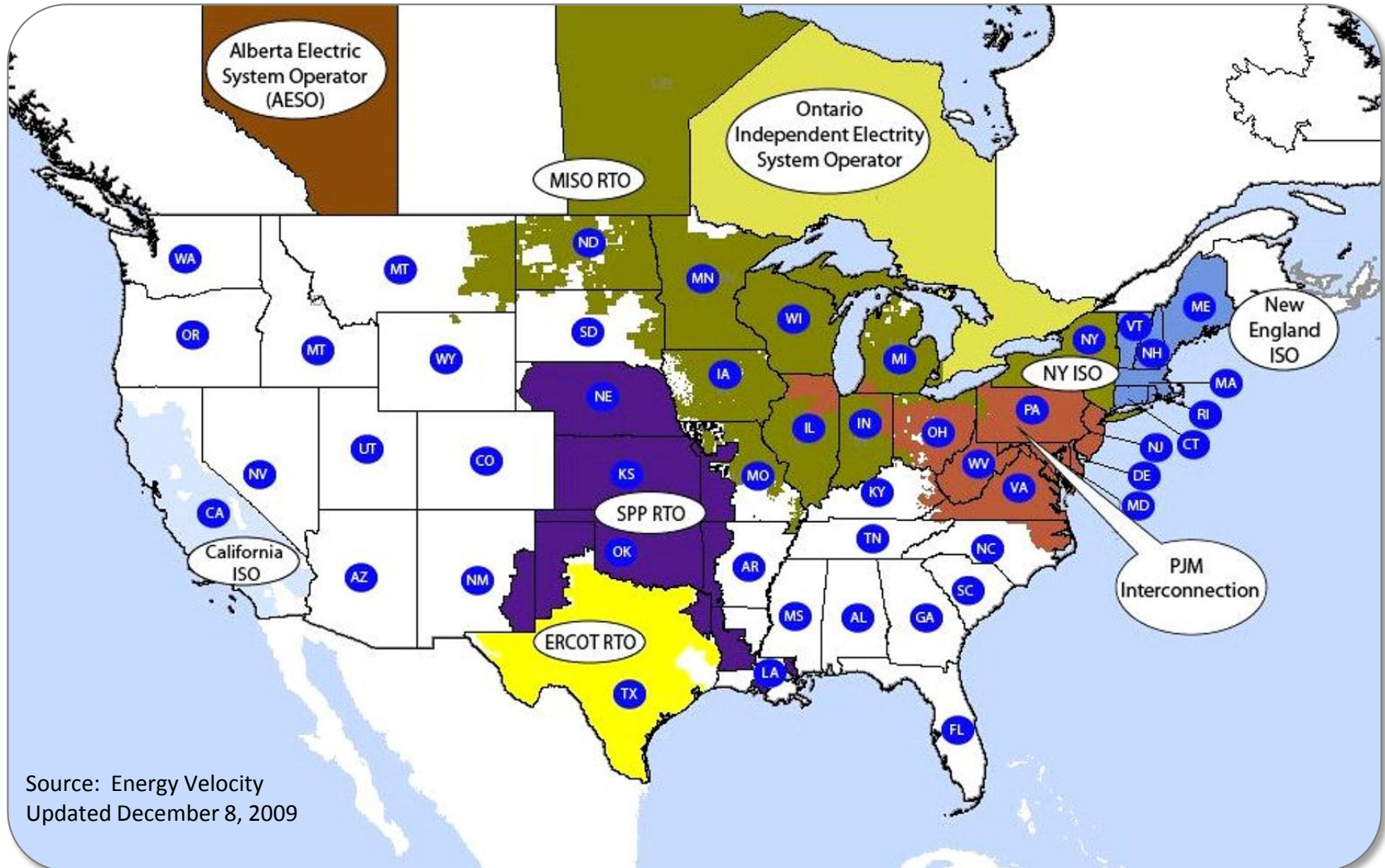
Who Regulates Interconnection of Generators? (continued)

- **The Federal Energy Regulatory Commission (FERC) regulates interconnection with transmission system**
 - FERC has defined transmission based on voltage level and other factors
 - RTO/ISO
 - Transmission facilities that are not part of RTO/ISO
- **Current FERC Rule adopted in Order 2006**
 - Small Generator Interconnection Procedures [SGIP]
 - Small Generator Interconnection Agreement [SGIA]

Interconnection With....

- **Investor-owned utilities**
 - Regulated by State Public Utility Commission
- **Cooperative Electric Systems**
 - Generally unregulated and develop own policies, tariffs
- **Municipally owned Systems**
 - Generally unregulated and develop own policies, tariffs
- **Regional Transmission Organizations/System Operators**
 - Regulated by Federal Energy Regulatory Commission or FERC
- **Texas**
 - ERCOT; no FERC regulation
- **Other**
 - TVA, Bonneville, etc.

Regional Transmission Organizations (RTO/ISO)



Interconnection with RTO

- **Regional Transmission Organizations or RTOs are composed of multiple transmission systems**
- **Interconnection with RTO offers access to broader markets for energy, capacity and RECs**
- **Interconnection with RTO requires additional costs and obligations**
- **Physical interconnection with distribution owner does not necessarily preclude participating in RTO markets**
 - Additional agreements, i.e., PJM Wholesale Market Participation Agreement or (WMPA) - 3 parties, PJM, transmission owner and project
 - Distribution or uplift charge for use of distribution system
 - Case study from Illinois will illustrate this

Volume of Interconnection Requests

- **Increase in development of renewables (per FERC)**
 - 37 states and DC have RPS or renewable goals
 - Increases in size of RPS or goal
 - State goals and policies to promote distributed generation
- **Example: PJM Historic Data**
 - Smaller projects comprise 66% of recent queue
 - 94% of <20 MW projects sought voltages <69 KV



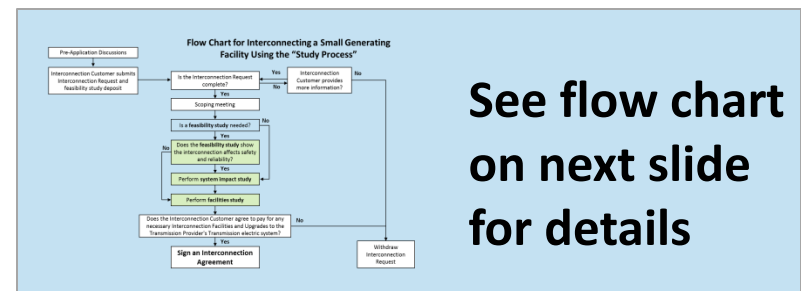
Typical Interconnection Process

- **Interconnection request**
- **Wait in a queue**
- **Studies conducted as to capacity availability**
- **Studies as to cost of any additional facilities**
- **Project pays for the studies**
- **Project receives interconnection agreement**
- **Agreement addresses cost, timing, including milestones for project**
- **Executes agreement or decides not to proceed**



Existing Study Process – Up to 20 MW, FERC Order 2006

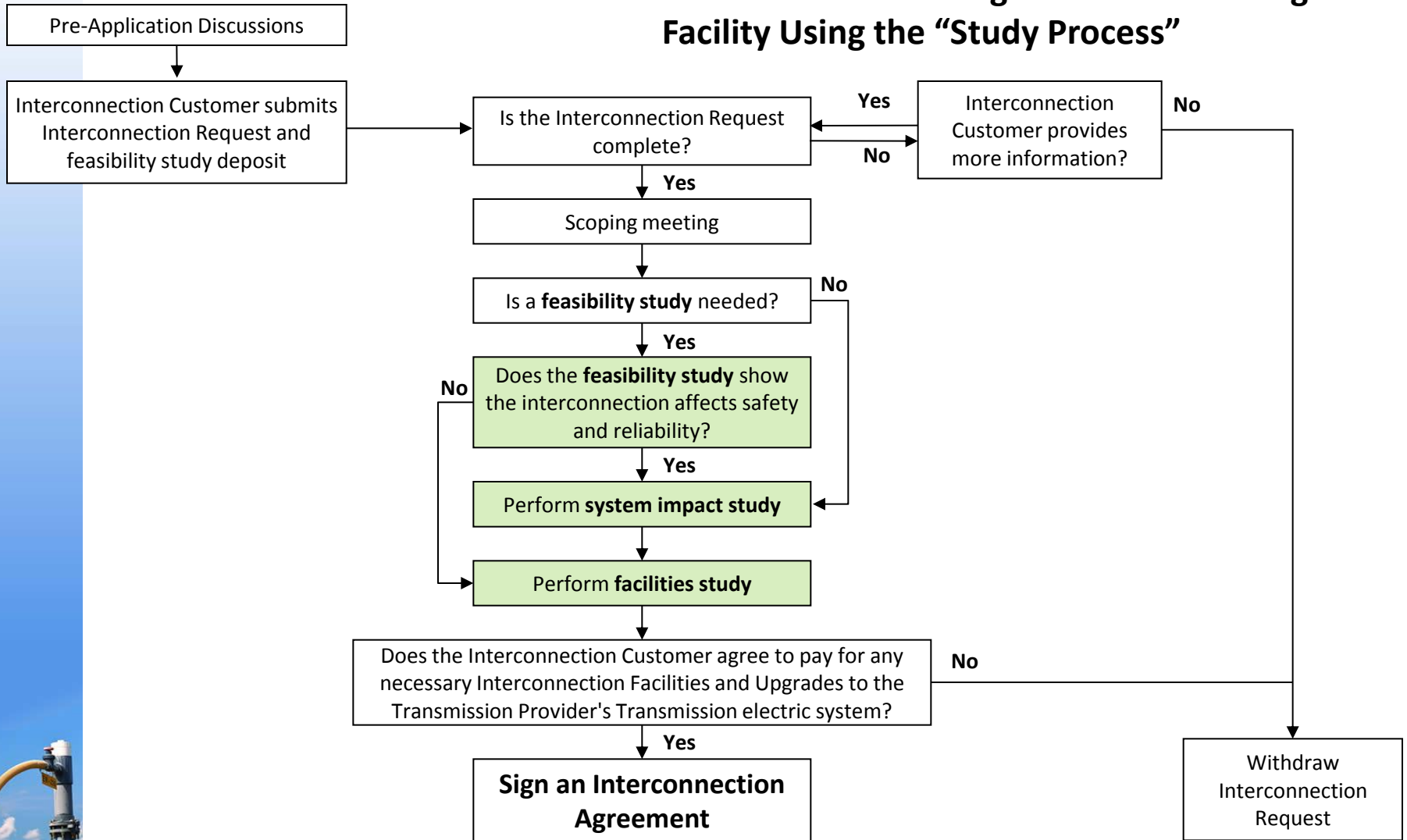
- Scoping Meeting
- Three studies identify technical limits or needed equipment modifications
 - Feasibility study
 - System Impact Study
 - Facilities study
 - If customer agrees to pay the cost of needed work, SGIA is signed



See flow chart
on next slide
for details

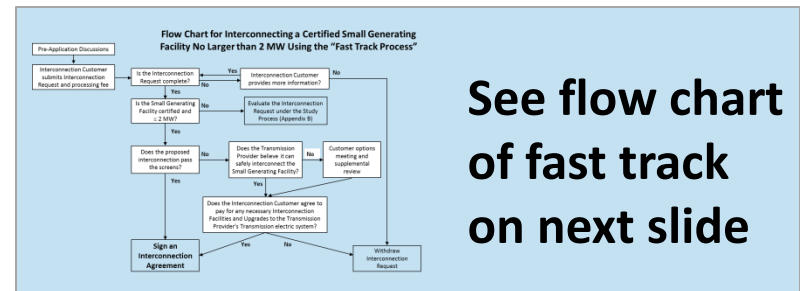
Study Process

Flow Chart for Interconnecting a Small Generating Facility Using the "Study Process"



Existing Fast Track Process – Up to 2MW, FERC Order 2006

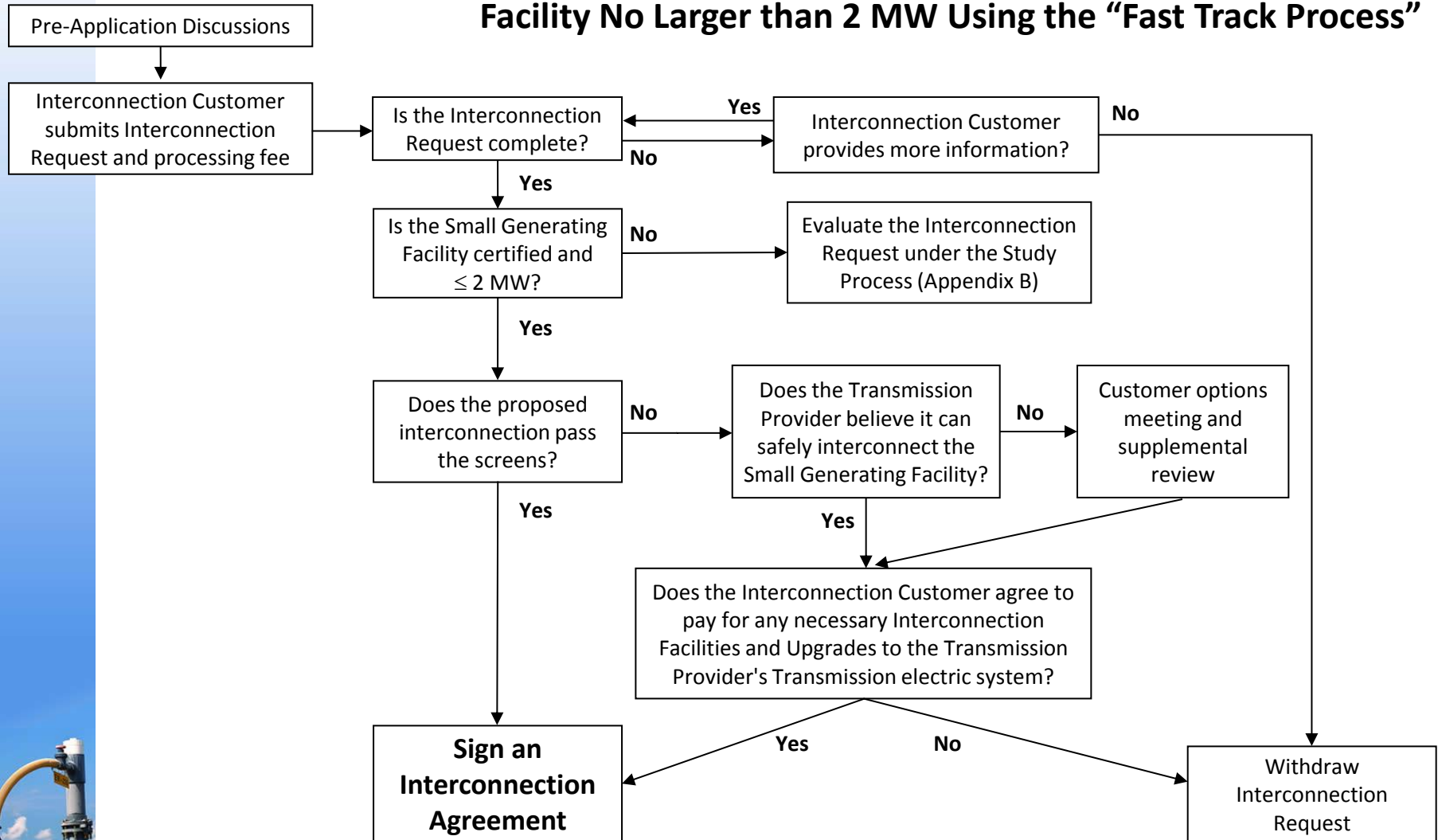
- Technical screens are used to evaluate proposed interconnection; if screens are passed, then SGIA is executed
- If project fails screens, transmission owner can determine that interconnection will not affect safety and reliability, SGIA is executed
- If project fails screens, alternatives would require generator to pay for facility modifications to transmission system or pay for supplemental review or move to study process
- If project fails supplemental review, project moves to study process



See flow chart
of fast track
on next slide

Fast Track Process

Flow Chart for Interconnecting a Certified Small Generating Facility No Larger than 2 MW Using the “Fast Track Process”



FERC Rulemaking

RM 13-02-000

- **FERC Proposes Four Primary Reforms to Small Generator Rule**

1. Pre Application Report

- Would be available to project for \$300
- Information specific to interconnection location
- Would contain information already available to transmission provider

2. Increase Fast Track Threshold to 5MW if eligible

- Eligibility considers generator capacity, interconnection voltage and distance from substation
- Example: project 4-5 MW would have to interconnect to line >30 kv

3. Revise project developer options meeting and supplemental review for projects that fail Fast Track screens

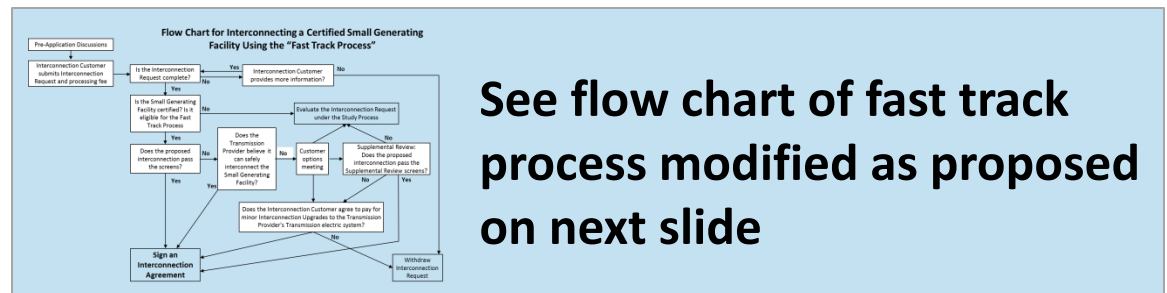
- Transmission Provider must offer to perform minor system work and provide cost and if project agrees to pay, provide contract in 5 business days or
- Transmission Provider must offer to conduct supplemental review of request for \$2500 at customer discretion (using screens specified in the rule)
- Transmission Provider must obtain consent to continue processing request under Study Process

FERC Rulemaking

RM 13-02-000 (cont'd)

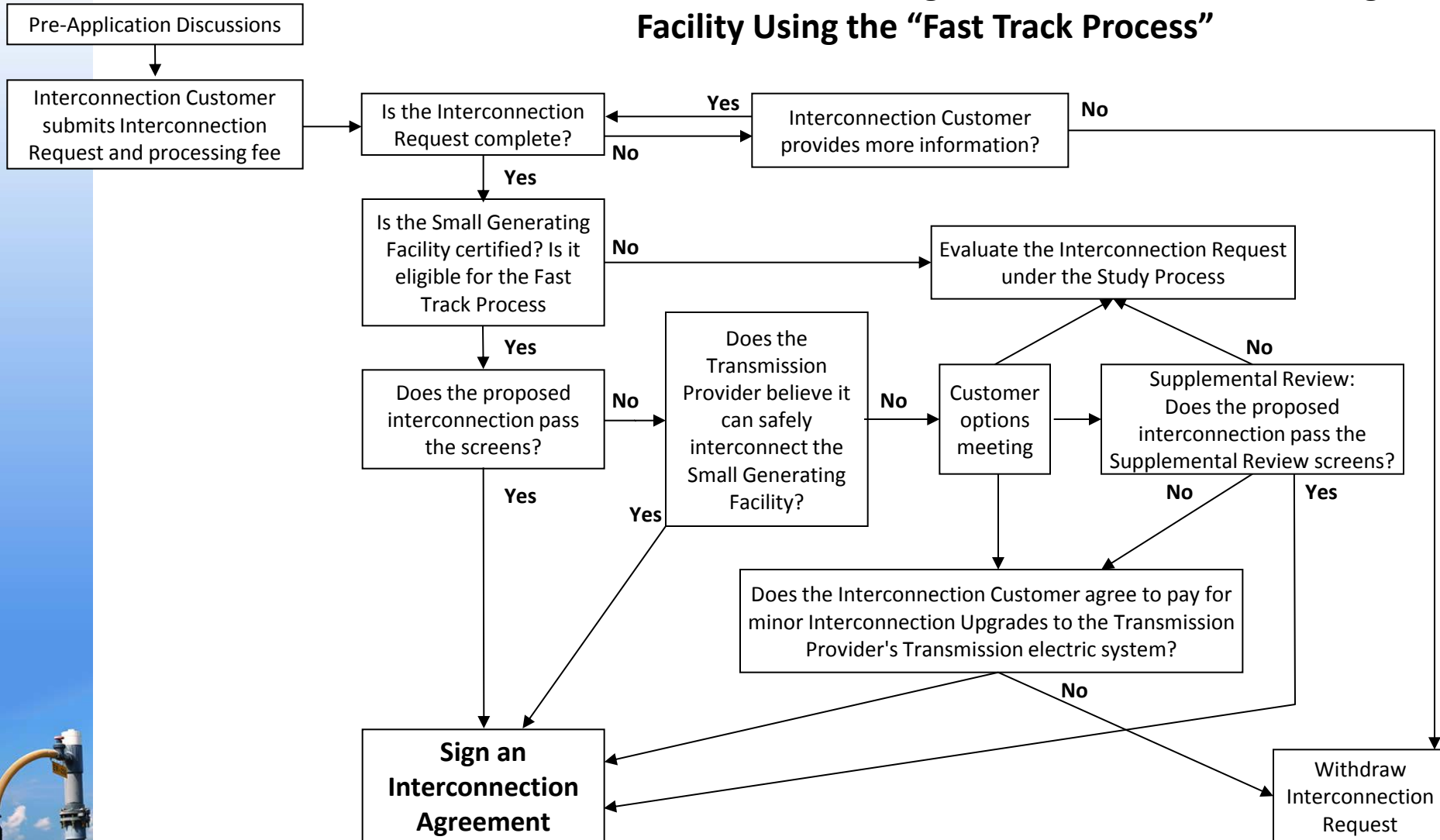
4. Project developer to have opportunity to review and comment on upgrades proposed by Transmission Provider
 - Developer may provide written comments that Transmission Provider must include in its final report on the interconnection request
 - Transmission Provider must provide developer with supporting documentation used in preparing the facilities study
 - Meeting between Transmission Provider and developer within 10 days after draft study is provided

(the above are already used in large generator process)



Fast Track Process

Flow Chart for Interconnecting a Certified Small Generating Facility Using the “Fast Track Process”





Case Studies: Arizona and Illinois (next on the agenda)

- **Arizona**

- Rule Proposed in a 2007 docket
- Rule not adopted
- Utilities adopted interconnection procedures

- **Illinois**

- Commerce Commission Rules for Interconnection of Distributed Generation
 - 83 Ill. Admin. Code Part 466 – Small Generator – Capacity 10 MW or less
 - 83 Ill. Admin. Code Part 467 – Large Generator – Capacity Over 10 MW
 - PJM ISO interconnection alternative at transmission level



Case Study #1

Glendale Energy Interconnection with Arizona Public Service

Keith A. Johnson, P.E.
Senior Project Manager,
Tetra Tech BAS

Overview of Project

- **Glendale Energy installed 2.8 MW**
- **Fueled by landfill gas**
- **Project delivers power to Arizona Public Service (APS)**
- **Project went online in 2010**



Utility Agreements

- **Power Purchase Agreement (PPA) was negotiated after a competitive bid process**
 - In response to a 2007 APS RFP for Renewable Energy
- **6 months to obtain PPA**
- **Draft PPA needed to be approved by the Arizona Corporation Commission (ACC)**
- **90% Availability for 10 days then 68% capacity averaged over 2 years**
- **Serious penalties for missing production targets**



Utility Agreements (cont.)



- **Separate interconnection agreement was required**
- **APS has two power lines running through the landfill site:**
 - Transmission line at 69,000 (69 kV)
 - Distribution line at 12,500 (12.5 kV)
- **Most projects would connect at the 12.5 kV line**
- **Interconnect Feasibility Study was the first step**
- **Then Facility Study Agreement (\$12,000 more)**

APS Policy



APS requirement:

All power sources must interconnect at a sub-station

- **The project can interconnect at the landfill but must establish communication with all sub-stations in area**
- **Rationale is safety and ease of operations**
- **Project has to run a fiber optic cable to each sub-station**
- **The 12kV line has at least 12 sub-stations (one reason 69kV option was less expensive)**
- **A tone trip has to be set up to notify the sub-station or the plant if there is a shut down**



APS System Feasibility Study Results

- **The 12.5 kV interconnection point was a sub-station 2-miles away**
- **The power had to be delivered underground to the sub-station even though an overhead line existed at the landfill**
- **APS proposed an option to interconnect at the transmission level (69 KV line)**
 - The 12kV substation interconnection was estimated at \$1.5 million
 - The 69kV interconnection was estimated at \$1.3 million
- **The 69kV option was selected**
- **A 69 kVA transformer was located and purchased**
- **APS had never worked with such a small plant but the design process was initiated**



APS Risk Management



**A concern about
Superfund liability
was raised!**

- **APS legal review stopped the project over environmental concerns of the APS facilities located on a landfill**
- **Operations began at the landfill in 1973, 20 years before effective date of Subtitle D**
- **The landfill had never accepted hazardous waste, only municipal solid waste**

APS Risk Management

- Gas rights agreement contained an indemnification from the City against any environmental problems
- Indemnification would be transferred to APS

Not enough!

- APS demanded a separate agreement with the City
- It took 6 months to get the agreement signed between the two entities, and then APS resumed work



Substation Issues

- **Glendale Energy was required to install a real-time meter to record the power delivered to APS**
- **APS required that Glendale Energy install another real-time meter for APS to read the power received – duplicate meters**
- **Glendale Energy was required to send monthly invoices using APS data – other utilities handle this aspect of a project**
- **Transforming up from 4,160 v to 69kV results in a loss of 1%**
- **Glendale Energy has (as is typical) a gang-operated manual isolation switch to cut off power plant from grid**
- **APS demanded their own gang-operated isolation switch**

Double protection!



Positive Note

- **Operating at the 69 kV level has been very smooth**
- **Only 1 unplanned outage from the utility since start up (normally 1 or 2 a month occurs on lower voltage distribution lines)**
- **The successful operations gained APS confidence and established a good working relationship**
- **APS cannot “see” such a small power source**
- **APS has relaxed their criteria for other small generators**



Case Study #2

The Retail vs. Wholesale Choice for BTM LFGE in PJM

Joseph E. Carolan, Phd, MA, MBA
Principal
Carolan Associates, LLC

Behind the Meter in PJM

- **Generation unit that delivers energy to load without using Transmission System**
- **In practice**
 - PURPA
 - Bi-lateral PPA with LDC
 - Often Energy only (i.e., ComEd Rider POG)
- **Upsides**
 - Long history / understood by developers
 - Plug-n-Play
 - No financial settling in PJM
 - No bidding or membership requirements
 - Simpler interconnection
 - No RTU
 - Retail level
 - Avoid PJM Interconnection Process

Grass must be Greener on other side of Meter

- **The Lure of Wholesale Participation**
 - 1) Market Rates vs. Avoided Cost
 - 2) The Bi-lateral Market
 - 3) Capacity Payments
 - 4) More (& more lucrative) REC markets

Must add up to more \$, right?



PJM Interconnection Process

- **PJM Manual 14A**
 - Submit Generator Interconnection Request
 - Feasibility Study, System Impact Study, Interconnection Facilities Study
- **Costs depends on size (expect \$20 – 25k)**
- **Time frame: ‘Expedited’ < 20MW, 3-5 year lag, working on facilities that submitted in 2006**
- **3-party ISA (or WMPA if not QF) (\$5k +/-)**
 - Energy only: QF may automatically qualify, but still need ISA
 - Capacity resource: will have to go through PJM study process and be qualified as capacity resource

Energy Only

- Quantify costs of application & ISA
- Check your P-node pricing vs. LDC PPA / Rider
- DLFs (1 - 2 %)
- May not need RTU
- Minimal financial & operational obligations
- 'Settle' in PJM
- Thin (to non-existent) market for bi-lateral energy only

*In ComEd, with floating rate POG,
likely to lose \$*

Energy & Capacity

- **Capacity Interconnection Rights (CIRs)**
 - LDC claiming?
 - No, must go through studies to get them
- **Quantifiable costs**
 - Application, studies & agreements
 - Membership
 - Real-time telemetry
 - Outsourcing
- **Increased oversight & operational implications**
 - Mandatory RPM Auctions (4 per Delivery Year)
 - Submission of operating data to PJM (eGADs)
 - eRPM, eGADS, eDART, eMKT, eSUITE, etc
 - Twice per year testing
 - Constraints to voluntary downtime for O & M
 - DA Energy Participation req'd / Two-settlement process
 - may impact energy prices **+ ¼ of 1 %**

Capacity Considerations

- **1st auction (“BRA”) is THREE years before DY**
 - Things change in 3 years!
 - LFG availability
 - ICAP (‘steel in ground’) vs. UCAP
 - Must bid in **current** UCAP
- **Unforced outages**
 - eFORd, eFORd-5, eFORP
- **Penalties for non-performance (RPM commitments, Peak availability, testing, peak season maintenance) @ 120% + MCP**
- **Non-quantifiable costs / changes in operations**
- **How much is the interconnection upgrade?**

\$200k per site

Final Thoughts

- **Do detailed cost-benefit**
 - Historical & future outage, Peak & UCAP
 - How many penalties could you absorb? What's likelihood of these kicking in?
Model scenarios
 - Energy Revenues (likely lower)
 - study, application & ISA costs
 - Interconnection upgrades
- **Extreme volatility in Capacity Prices, so forecasting future prices is key**
 - MCP = \$20.00, payback \approx 9 years
 - MCP = \$100.00, payback \approx 2 years
- **Qualitative determination of operational impact may be make or break**

Questions and Answers



Resources

- Database of State Incentives for Renewables & Efficiency (DSIRE):
<http://www.dsireusa.org>
- Federal Energy Regulatory Commission (FERC):
<http://www.ferc.gov/>
- Regional Transmission Organizations (RTO)/Independent System Operators (ISO):
<http://www.ferc.gov/industries/electric/indus-act/rto.asp>
- For further information regarding efforts to reduce methane emission from landfills, visit LMOP's website at:
<http://www.epa.gov/lmop/>

Wrap-up & Conclusion

- **Contact Information:**

Freddi L. Greenberg
Attorney at Law
1603 Orrington Avenue, Suite 1050
Evanston, Illinois 60201
847.864.4010
flgreenberg@flglaw.com

Joseph E. Carolan, PhD, MBA
Carolan Associates, LLC
j.e.carolan@att.net
248.495.8927

Keith Johnson
Tetra Tech BAS
keith.johnson@tetratech.com
602-267-0336

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