



DER Interconnection Study Cost Analysis

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System Planning

Distributed Energy Resources Subcommittee
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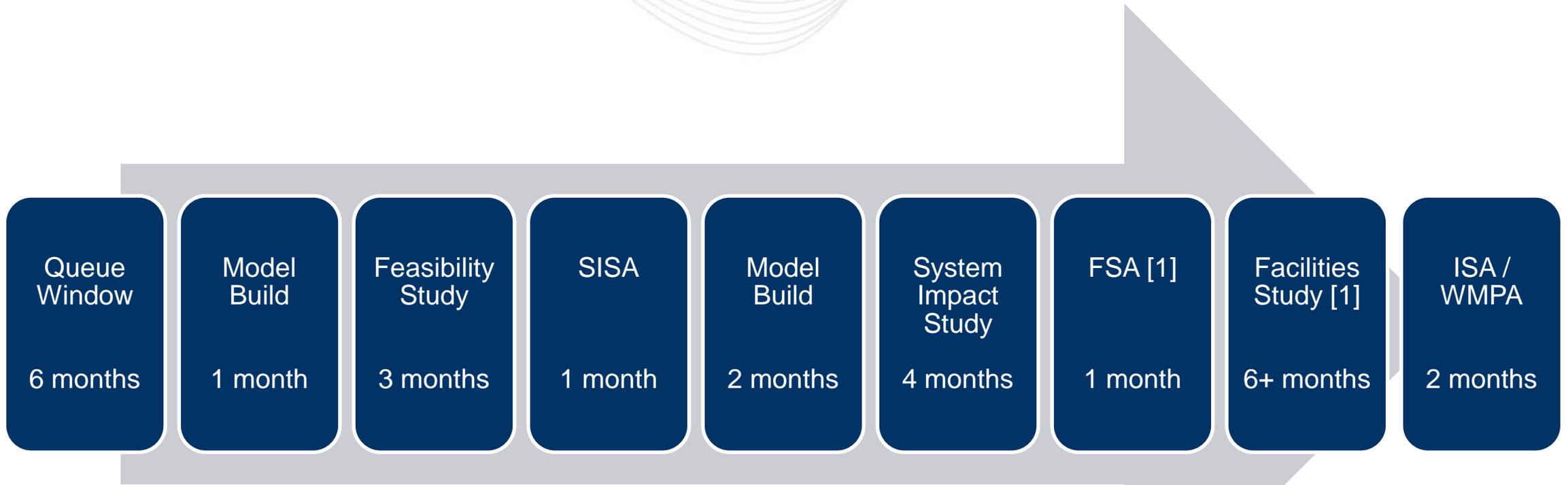
- Cost and Duration
 - By Project Size
 - By if Impact Identified (Transmission and Distribution) and therefore if Upgrade Required
 - By if Attachment Facility Required (meaning New Service Line, Recloser or Direct Transfer Trip)
 - By if using Certified Inverter Package
 - Between FERC vs Non-FERC jurisdictional projects
 - Transmission Study vs Distribution Study (as known by PJM)

Request	Availability
Study costs	Available in internal finance system. Queue AB1-AD2 costs captured for any project that completed at least a Feasibility Study. Cost data captured on 9/17/2018. Any TO invoices received after this date are not reflected.
Study duration	All studies and agreements captured in database. Rule <\$5 million allocation for all projects that load and overload a facility in effect up to the AD1 queue.
Project Size	All project sizes captured in database. Costs and durations captured for all new facilities ≤20 MW.
Impact Identified	Data not captured in database.
Attachment Facility Required	Data not captured in database.
Certified Inverter Package	All projects that qualify for an Attachment Y or BB request (meets size and jurisdiction requirements) use a certified inverter package. This is not collected within PJM's database for any other requested.
FERC vs Non-FERC jurisdictional	Captured in the PJM database for all projects that receive a final agreement (ISA or WMPA). All other projects are captured in scoping meeting minutes.
Transmission Study vs Distribution Study Costs	PJM only processes distribution invoices from PHI companies for non-jurisdictional (AEC, DPL, PEPCO).

- Complexity of the interconnection
- Voltage level and project size (facility output vs. minimum circuit load)
- Variation of equipment standards between zones
- Variation of transmission vs. distribution between zones (some zones recognize 34kV as transmission)
- Changes requested by the customer (data, equipment, reductions, POI changes, financial close and agreements, etc)
- Meetings requested by customers
- Cost allocation responsibility (allocation for <\$5 million upgrades)
- Not all Transmission Owners submit invoices
- Agreement development – ISAs contain more information and require more time to draft and review versus a WMPA.

- Projects starting with the AB1 queue
- Limited to small generation (≤ 20 MW)
- Only collected when a study was issued
- Cost Data - 272 projects, 109 received an ISA or WMPA
 - 100+ projects were not assess costs from the TO

Interconnection Process Summary Schedules and Tasks



[1] May be waived depending on complexity of interconnection or required network upgrades.

Interconnection Process

Small generation expedited process (when applicable)



[1] May be waived depending on complexity of interconnection or required network upgrades.

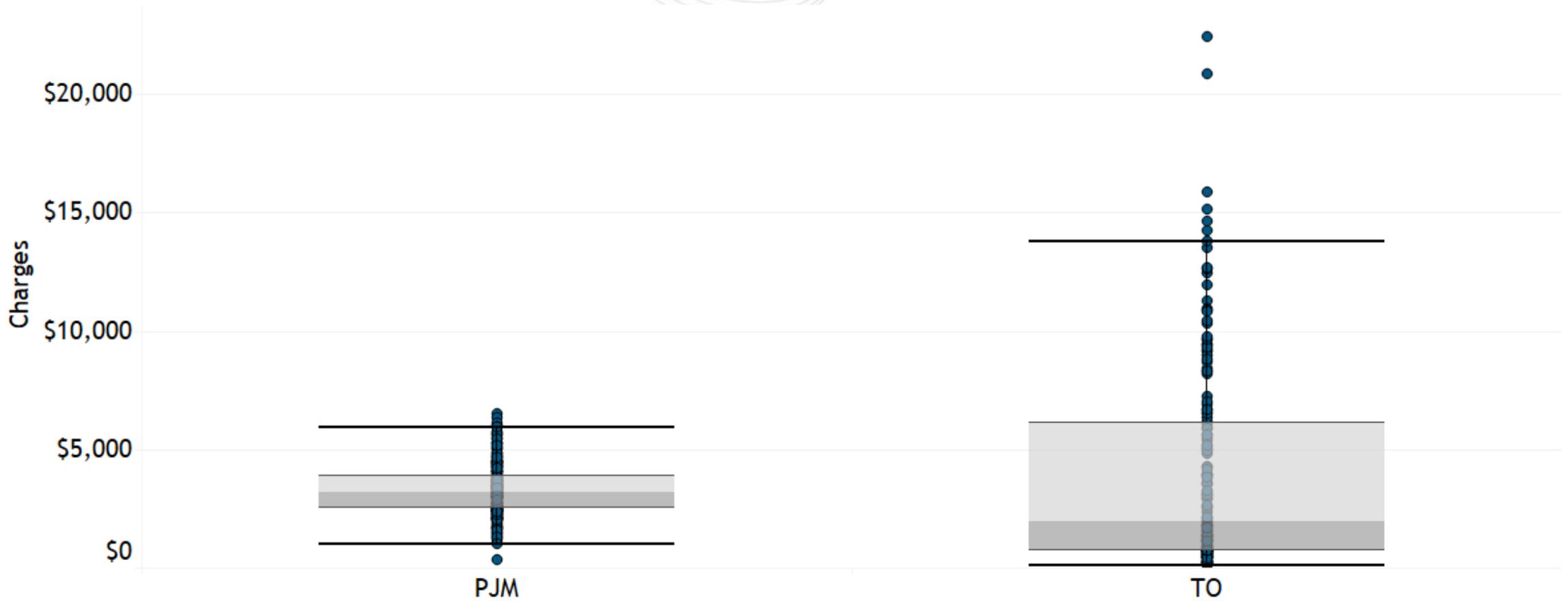
Duration	Task Owner	Activity
5 business days from receipt of request	PJM Project Manager	Perform deficiency review
10 business days from notice by PJM	Interconnection Customer	Review and correct all identified deficiencies
5 business days from response	PJM Project Manager	Review responses and validate if deficiencies are resolved
45/30/20 calendar days from confirmation of no deficiencies	PJM Project Manager Transmission Owner Interconnection Customer	Hold scoping call

Days from Window Close	Activity
0-15	Model all queued generation within window
15-40	Perform summer peak load flow and short circuit analysis
40-100	Transmission Owners review analysis and develop mitigations for violations
100-110	PJM Interconnection Analysis engineers reviews mitigations and prepare analysis reports
110-120	PJM Interconnection Projects compiles final study report and next agreement

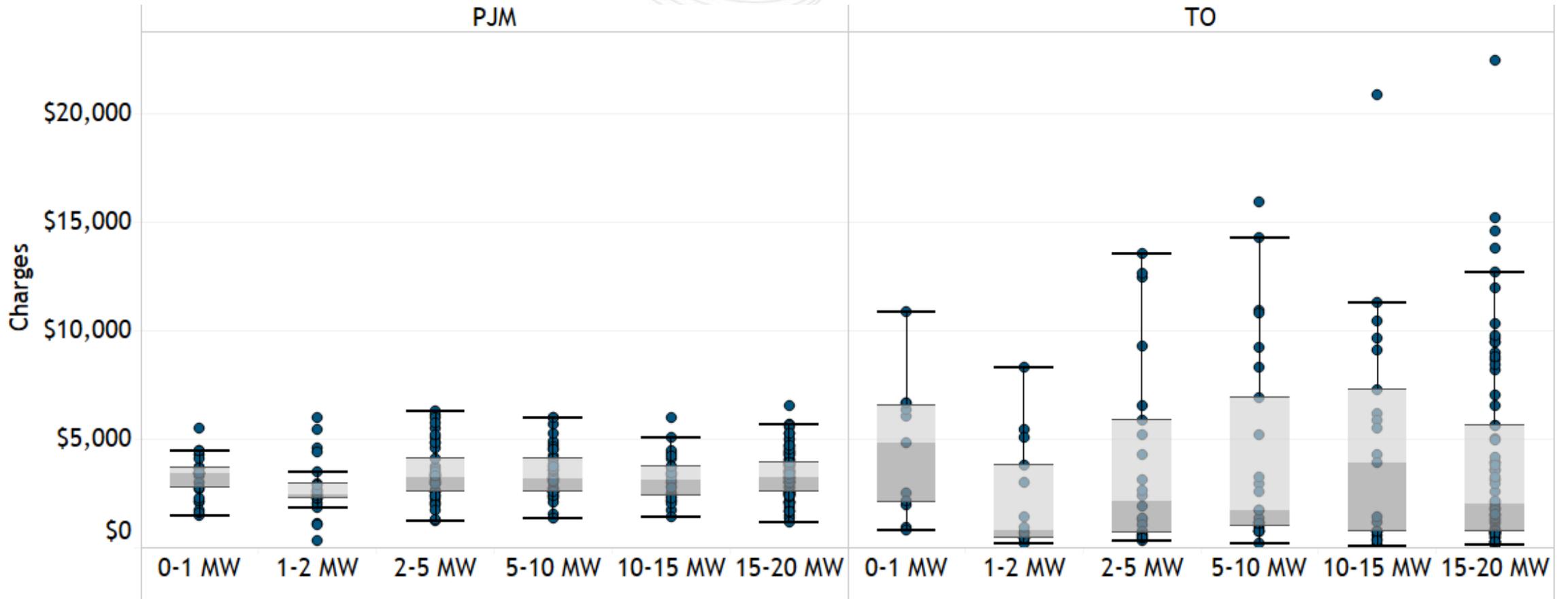
Days from SISA Execution	Activity
0-60	Update model to remove withdrawn projects and update models for queue generators
61-100	Perform load flow (summer peak, winter peak, light load), short circuit and stability analysis
101-150	Transmission Owners review analysis and develop mitigations for violations
151-160	PJM Interconnection Analysis engineers reviews mitigations and prepare analysis reports
161-180	PJM Interconnection Projects compiles final study report and next agreement

Cost Summary

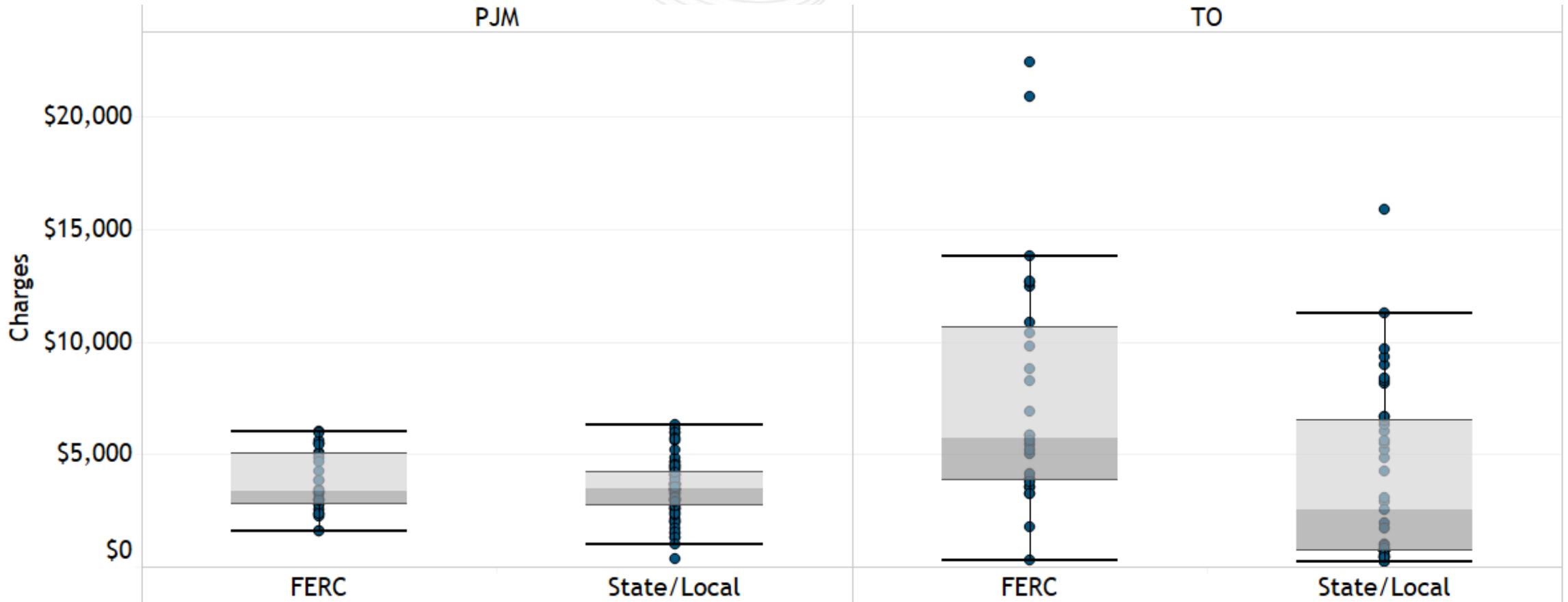
Chart	Represents
Feasibility Study costs	Costs incurred by PJM and invoices received from Transmission Owners to complete a Feasibility Study. Only projects with issued Feasibility Studies were included in the data set. Note: PJM began charging projects for deficiency reviews starting with the AC2 queue.
All Study costs	Costs incurred by PJM and invoices received from Transmission Owners to complete a all required interconnection studies. Only projects that were issued an ISA or WMPA were included in the data set.

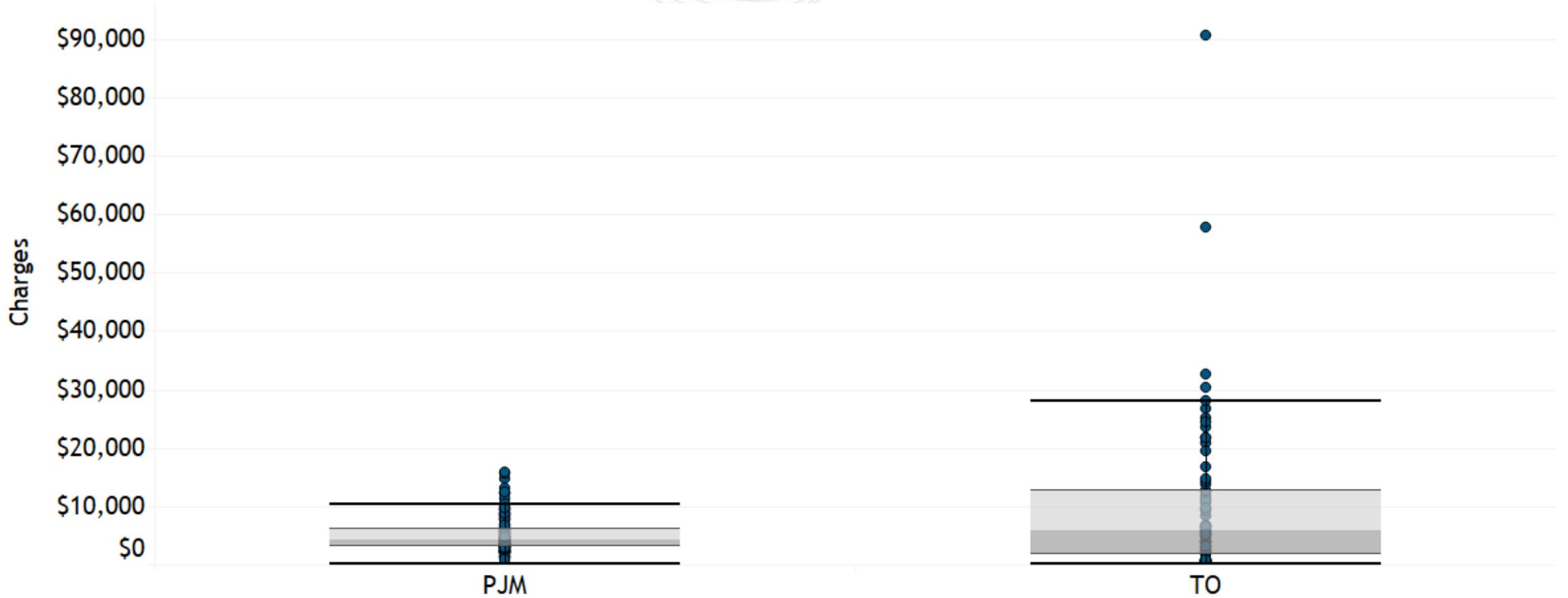


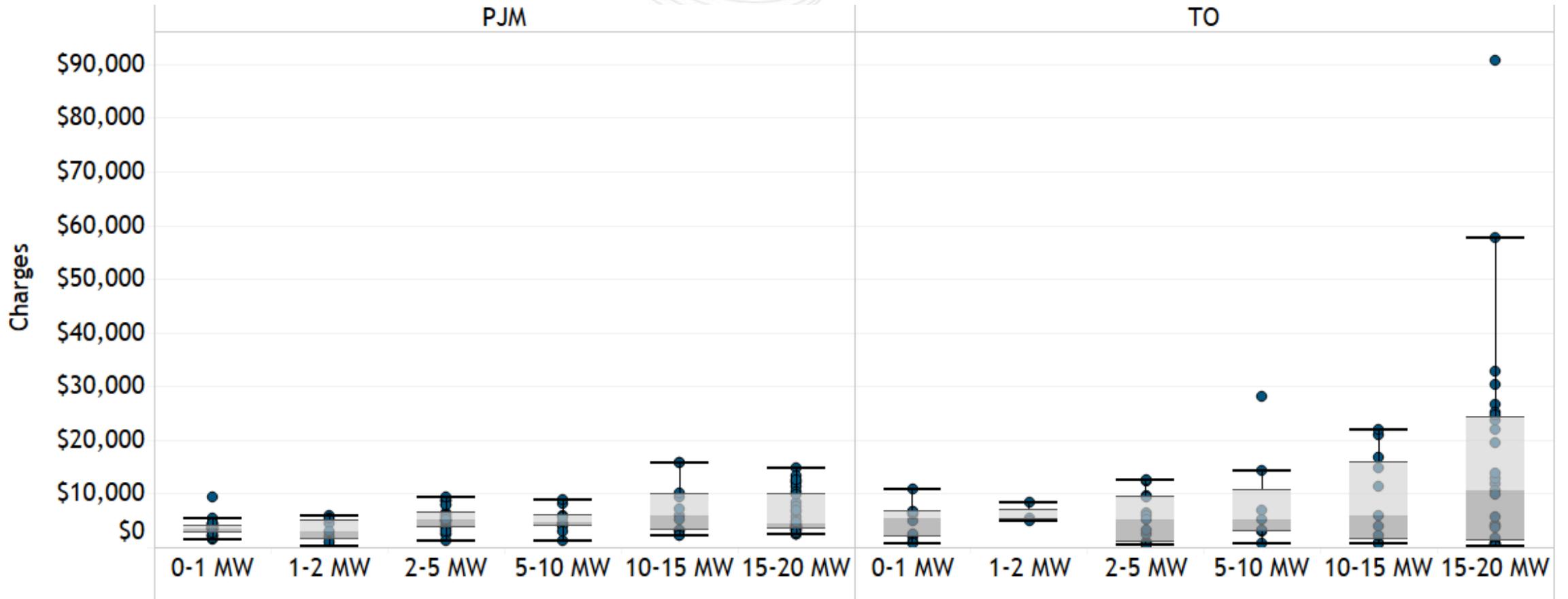
Feasibility Study Costs by Project MFO

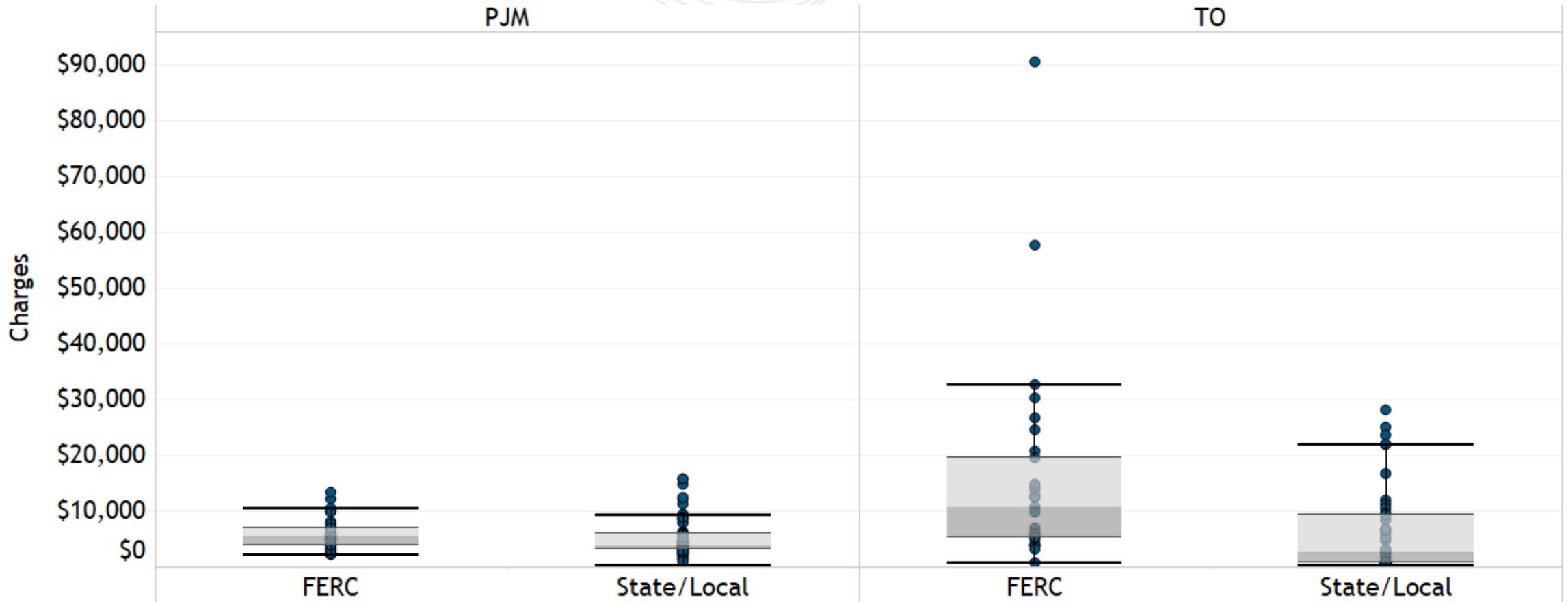


Feasibility Study Costs by Jurisdiction



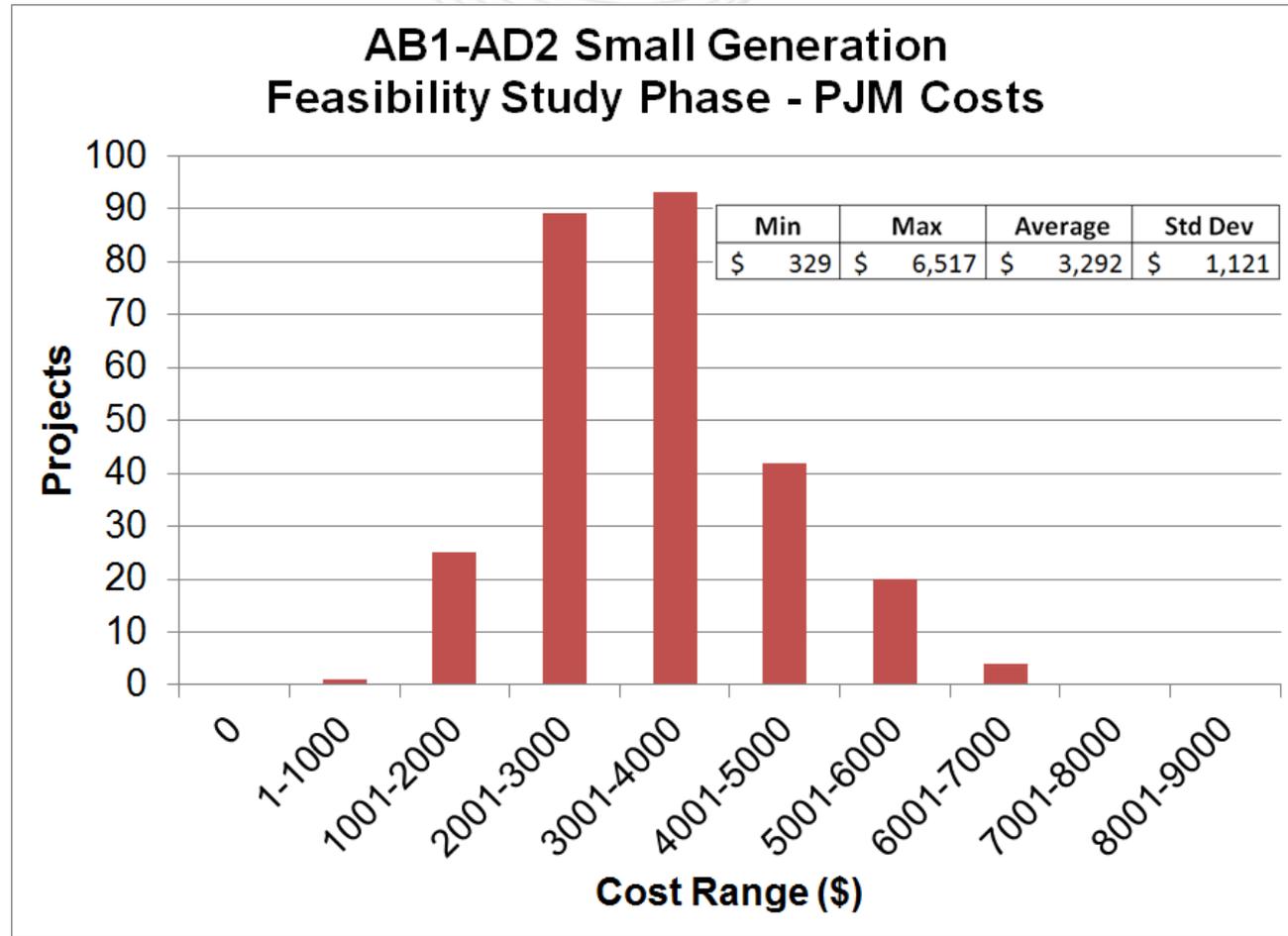






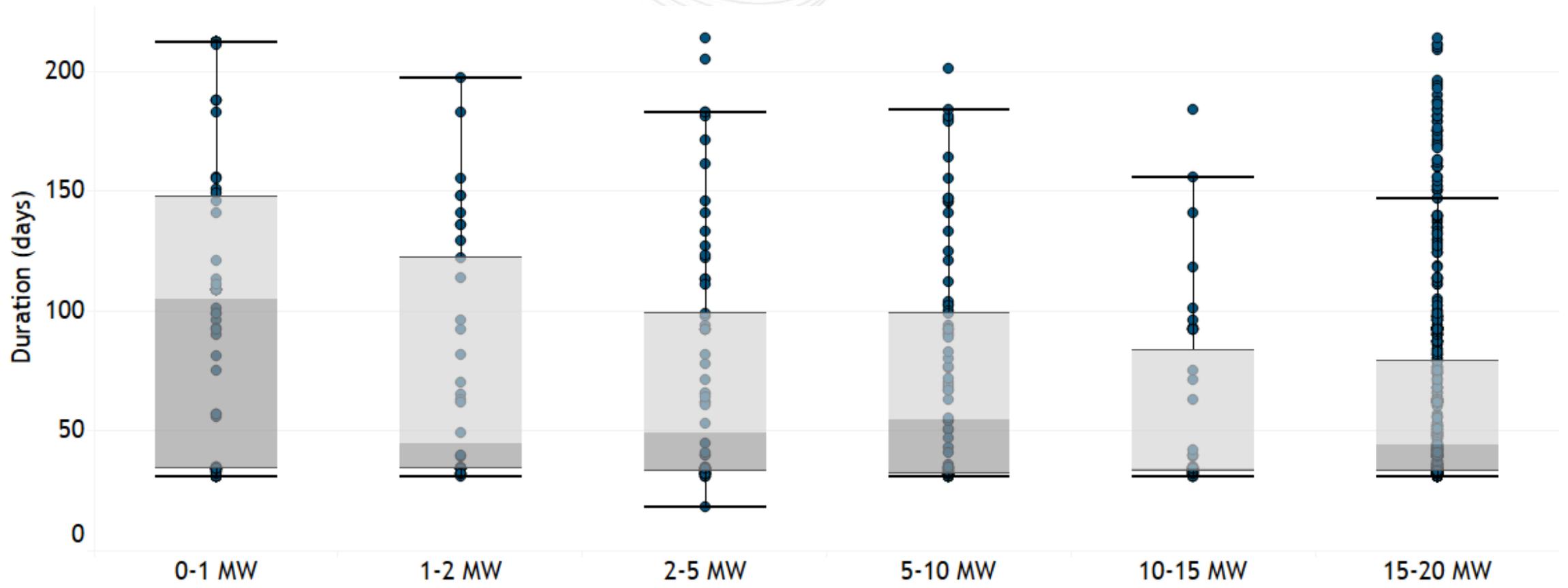
Project Durations

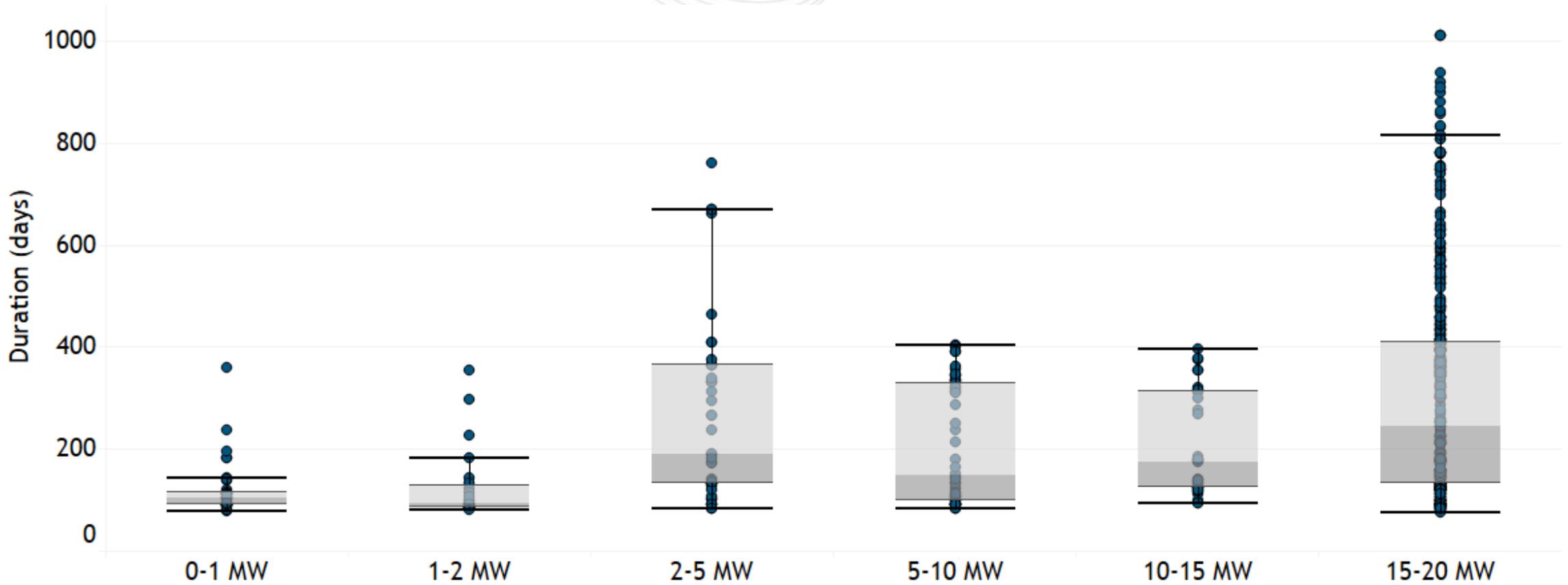
Chart	Represents
Queue Request to Start of Feasibility Study	Duration between the date the Interconnection Request was submitted to PJM and the start of the Feasibility Study phase. Projects that enter on the first day of the queue window will wait 7 months until the start of the study phase. Starting with the AD2 queue, projects are not responsible for cost allocations if they only contribute to loading below 100% of the facility rating.
Study Phases	Duration between the start of the Feasibility Study and the execution of an ISA or WMPA. This includes the defined study timeline plus any delay caused by re-studies (nearby project withdraws, reduction of output, etc.).
Complete Process	Duration between the date the Interconnection Request was submitted to PJM and the execution of an ISA or WMPA.

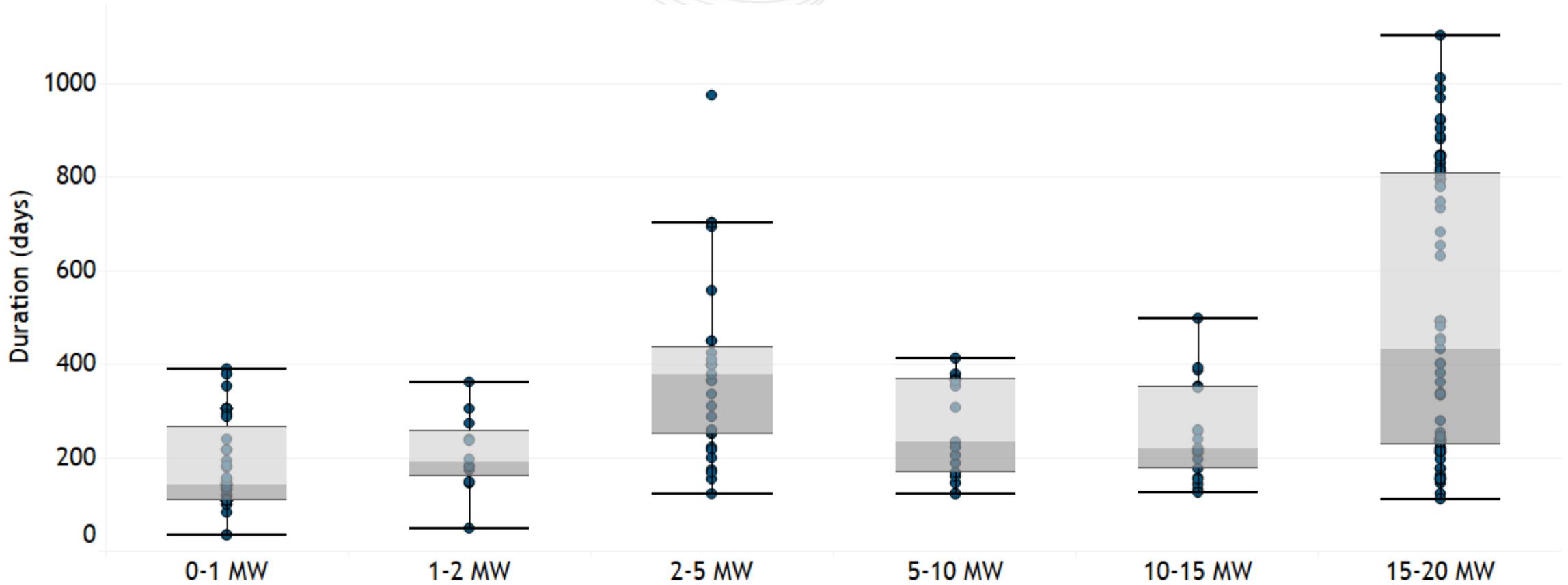


Duration by Project MFO

Queue Request to Start of Feasibility Study



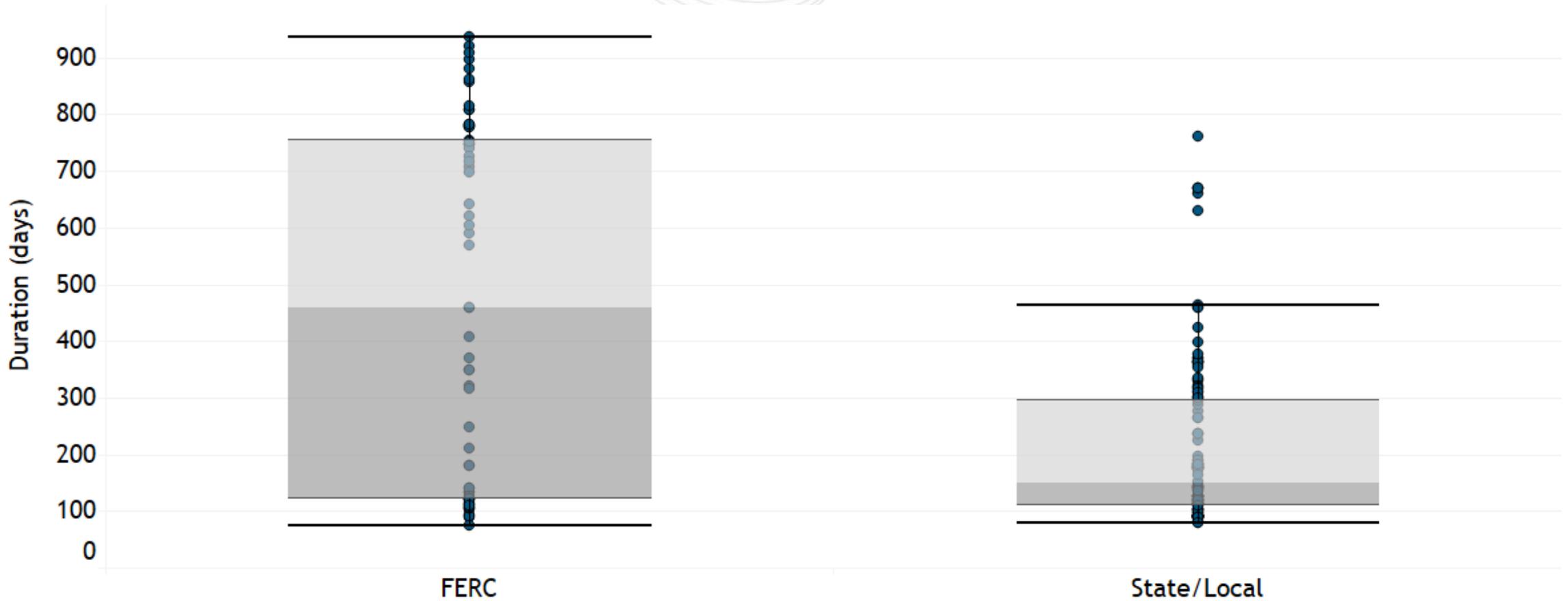




Duration by Jurisdiction

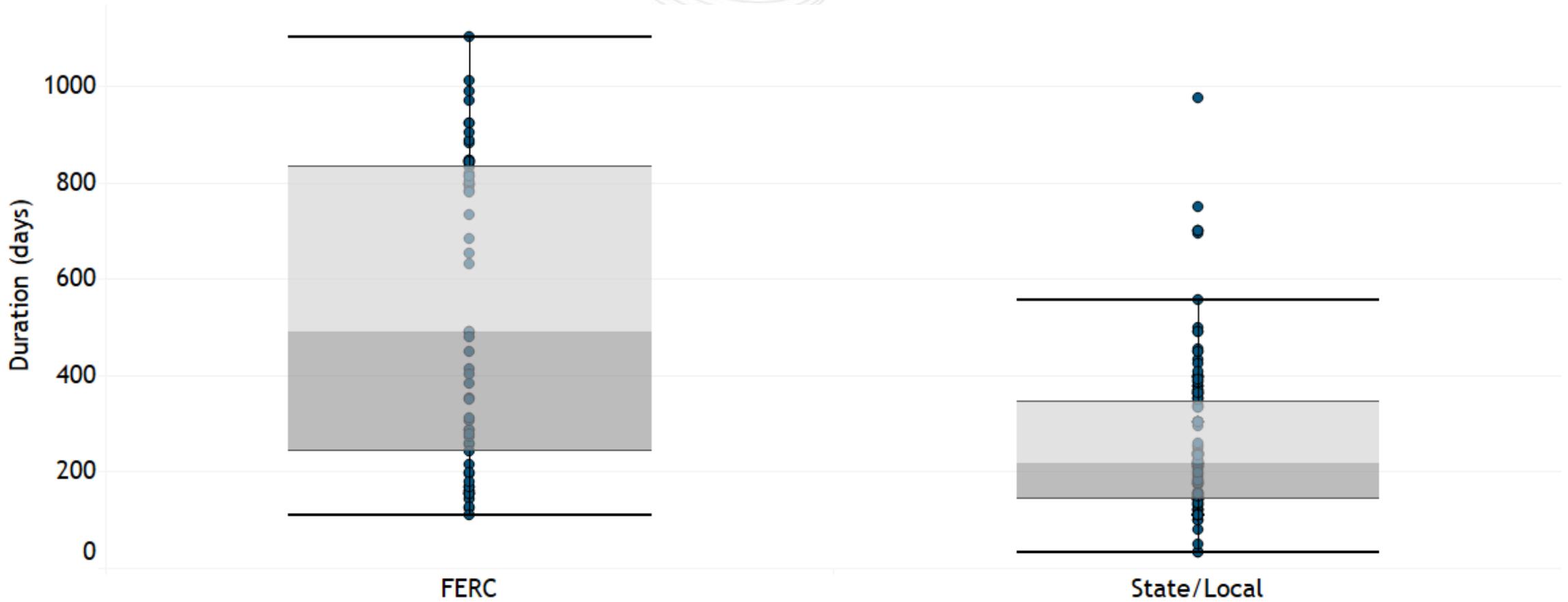
Queue Request to Start of Feasibility Study





Duration by Jurisdiction

Complete Process



Conclusions

- PJM responsibility is to the safe and reliable operation of the transmission system.
- Consistent costs validate the PJM spends time reviewing impacts of all projects on the transmission system.
- Small projects generally proceed through the process faster than larger projects.