ISO-Scale Transmission Expansion Expansion Transforming ENERGY



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State of the U.S. interconnection queue



Entire U.S. Installed Capacity vs. Active Queues

Interconnection delays and costs are the biggest barrier for utility-scale renewables, say developers

LevelTen and Advanced Energy Economy point to delays in the PJM grid region, in particular. Construction of the 300GW of renewables and storage projects in PJM's interconnection queue would support 1.7 million jobs, says AEE.

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INSTALLATIONS MARKETS & POLICY POLICY UTILITY SCALE PV UNITED STATES



[1] J. Rand et al., "Queued up: Characteristics of power plants seeking transmission interconnection as of the end of 2022," 2023.

The interconnection process is broken

- Queue generation (~2.5 years*)
- Delays are common based on modeling/engineer availability
- Adjustments require revision of lengthy modeling processes.

If all goes perfectly:* **4.5 years** of "coordinated" G&T approvals

*This never happens. The reality is this process identifies additional system upgrades and costs that delay or cancel many projects.





Feasibility study

Impact study

Facility study

System Planning:

Interconnection queue is highly speculative, and projects fail to complete because of slow study processes and unexpected interconnection requirements

Interconnection agreements

Operating facilities

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Capacity Expansion Modeling: Optimize system expansions to meet expected future conditions with simplistic representation of technical and economic project viability

All candidate generation & storage projects

Traditional Capacity Expansion Modeling (e.g. ReEDS) Operating facilities





Capacity Expansion Planning with interconnection queue awareness: Use a CEP+InterconnectionQ model to inform investment decisions while predicting which projects will actually reach operation

Interconnection agreements

Operating facilities

Project Outcomes

- Open-Source Software
 - Transmission Upgrade Screening Tool
 - Sienna\Inv
 - CEP+IntQ
- Journal Publications
 - Novel TNEP solution methods
 - Stochastic expansion planning formulations
 - Applied study results

Innovations and Efficiencies in Generator Interconnection

Docket No. AD24-9-000

NOTICE OF STAFF-LED WORKSHOP

UNITED STATES OF AMERICA FEDERAL ENERGY REGULATORY COMMISSION

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This panel will assess opportunities for greater efficiency in the processing and study of interconnection requests by automating different steps in the process and using advanced computing technologies, such as artificial intelligence, to shorten the timeline from interconnection request to generator interconnection agreement.⁵







Thank you



