INTERCONNECTION INNOVATION e-XCHANGE
U.S. DEPARTMENT OF ENERGY

Data Transparency Solution eXchange
Improving Interconnection Data | 7/6/23

An initiative spearheaded by the Solar Energy Technologies Office and the Wind Energy Technologies Office

Meeting Notes

Notes synthesizing keys points, insights and questions from the meeting can be found here: Box Link

The first half of this Teams call is being recorded and may be posted on DOE's website or used internally. If you do not wish to have your voice recorded, please do not speak during the call. If you do not wish to have your image recorded, please turn off your camera or participate by phone. If you speak during the call or use a video connection, you are presumed consent to recording and use of your voice or image.

Agenda

- Introduction to i2X and Data Transparency topic (10 min)
- Stakeholder Panel (20 min)
  - Tristan Kessler (Federal Energy Regulatory Commission)
  - Sarah Toth (Rocky Mountain Institute)
  - Kevin McAuliffe (nFront Consulting)
  - Katherine Wyszkowski (Sunnova)
- Open Q&A (15 min)
- Open & Interactive Discussion (45 min)
  - Note: Open discussion is *not* recorded

Interconnection Innovation e-Xchange (i2X)

Mission: To enable a **simpler**, **faster**, and **fairer** interconnection of clean energy resources while enhancing the **reliability**, **resiliency**, and **security** of our **distribution and bulk-power electric grids**

Stakeholder Engagement

Nation-wide engagement platform and collaborative working groups

Data & Analytics

Collect and analyze interconnection data to inform solutions development

Strategic Roadmap

Create roadmap to inform interconnection process improvements

Technical Assistance

Leverage DOE laboratory expertise to support stakeholder roadmap implementation

Key Outcomes from Our e-Xchange Meetings

- Inform and formulate a ***publicly available***, strategic roadmap for interconnection
  - Topical challenges and issues
  - Practical solutions to implement and scale
  - Knowledge and data gaps and new solutions to pilot
  - Success goals and measures of success
- Summary documentation for each meeting regarding ideas discussed and opportunities for targeted stakeholder action
- Provide platform for ongoing engagement before and after meetings
- **Longer term vision** → Solution e-Xchanges to continue building a national forum for all stakeholders as a community of practice, excellence, and innovation

Upcoming Solution e-Xchanges to Consider Joining

1. July 11, 2023, 2-4 p.m. ET: Interconnection Workforce and Training
2. July 12, 2023, 2-4 p.m. ET: Improving Interconnection Study Methodologies in the Bulk Power System
3. July 19, 2-4PM ET: Equity and Energy Justice: Collecting and Considering Feedback in Public Policy
4. July 26, 2023, 2-4 p.m. ET: Queue Management & Cost Allocation (DER): Implementation Planning and Agreements

Follow the schedule of events on the i2X website.

https://www.energy.gov/eere/i2x/i2x-solution-e-xchanges

Virtual Meetings Code of Conduct

1. *Assume good faith and respect differences*
2. *Listen actively and respectfully*
3. *Use "Yes and" to build on others' ideas*
4. *Please self-edit and encourage others to speak up*
5. *Seek to learn from others*

Mutual Respect . Collaboration . Openness

Opportunities to Improve Interconnection Data to Enhance Value & Support Metrics

Key Themes from 5/31 Solution eXchange on Pre-Application Data

- Interconnection stakeholders generally agree that increasing the transparency of pre-application interconnection data could help improve the speed, efficiency, and fairness of the process
- Stakeholders saw value in providing the following *pre-application* data:
  - Projected interconnection costs, including network upgrade costs, for a POI or a region
  - Available MW capacity to connect at each POI.
  - Information on other generators at a POI or in the vicinity (location, type and capacity of other generators).
  - Historical interconnection costs, including network upgrade costs, for a POI or a region
- But, there are major barriers to making these data widely accessible, e.g.:
  - Cost to provide adequate and timely data
  - Technological or software constraints
  - Labor / workforce constraints
  - Confidentiality / CEII protection
- Notably, developers and grid operators alike do not see pre-application data as a panacea to resolve queue backlogs absent substantial other improvements around, e.g., workforce and automation
  - Simply reducing queue processing time could reduce need for pre-request information

Value and Use-Cases of Post-Application Interconnection Data

Informing Project Development:
Interconnection data is used by developers, consultants, and banks to inform project siting, characteristics, and financing

Assessing and Auditing Interconnection Processes:
Interconnection data are necessary to establish benchmarks and metrics in order to audit current processes, assess the efficacy of reforms, and propose alternatives

Transmission and Distribution System Planning:
Some transmission providers and system operators are beginning to interlink interconnection queues with transmission system planning

Other?
To be discussed today...

Menti Icebreaker

Introduction of Panelists

- Tristan Kessler (Federal Energy Regulatory Commission)
- Sarah Toth (Rocky Mountain Institute)
- Kevin McAuliffe (nFront Consulting)
- Katherine Wyszkowski (Sunnova)

FERC Interconnection Data

Disclaimers:

- **To facilitate understanding and discussion, this presentation simplifies or summarizes existing tariffs; see the specific tariff for details**
- **Any opinions expressed in this presentation are the presenters' own, and do not necessarily represent the views of the Federal Energy Regulatory Commission or any Commissioner**

Overview

- Interconnection Queue Data
  - Examples
- Order No. 845 Interconnection Study Metrics
  - Examples
- Interconnection Notice of Proposed Rulemaking (NOPR)

Interconnection Queue Data

- OASIS Posting Requirements
  - Facility electrical output (MW) and type
  - Location (county and state) and point of interconnection
  - Interconnection service type (NRIS / ERIS)
  - Queue position, in-service date, study reports
- Interconnection customer not identified until GIA

Interconnection Queue Data – Example (Southern)

Southern Companies' Transmission System
Active OATT Generator Interconnection Requests

Request	Queue Date	Service	Gen Facility Location	Proposed POI	Incremental Net MW	Total Net MW	Gen Type/Size	In-Service Requested	Inter Process: Request Phase	Comments
IC-1146	6/23/2023	ERIS & NRIS	Stone County, MS	Plant Watson - Hurricane Creek 230 kV Line	200	200	234 MVA Inverters (Solar PV) plus 237.5 MVA Inverters (Batteries)	6/30/2026	Study Scoping	
IC-1144	6/9/2023	ERIS & NRIS	Bartow County, GA	Kingston Substation 230 kV Bus	300	300	375 MVA Inverters (Batteries Only)	9/1/2026	Study Scoping	
IC-1142	5/30/2023	ERIS & NRIS	Baldwin County, GA	Gordon - Milledgeville (WHITE) 115 kV Line	183	183	159.6 MVA Inverters (Solar PV) plus 58.8 MVA Inverters (Batteries)	5/29/2026	Feasibility Study	
IC-1141	5/30/2023	ERIS & NRIS	Lamar County, MS	Hattiesburg Southwest - Adams Creek 230 kV LIne	200	200	243.6 MVA Inverters (Solar PV) plus 63 MVA Inverters (Batteries)	5/29/2026	System Impact Study	
IC-1140	5/8/2023	ERIS & NRIS	Taliaferro County, GA	Ray Place Road - Union Point Primary 115 kV Line	150	150	172.2 MVA Inverters (Solar PV) plus 33.6 MVA Inverters (Batteries)	4/13/2026	System Impact Study	IC-1037 & IC-1140 are the same Generating Facility to be studied in lieu of each other.
IC-1137	4/26/2023	ERIS & NRIS	Randolph County, GA	Cuthbert Primary - Dawson Primary 115 kV Line	100	100	122.4 MVA Inverters (Solar PV) plus 60 MVA Inverters (Batteries)	5/30/2026	Study Scoping	
IC-1136	4/14/2023	NRIS	Lincoln County, GA	Anthony Shoals - Washington 115 kV Line	105	105	131.24 MVA Inverters (Solar PV)	4/1/2026	Study Scoping	
IC-1135	4/4/2023	ERIS & NRIS	Washington County, AL	Bassett Creek - McIntosh 115 kV Line	80	80	93.6 MVA Inverters (Solar PV)	10/1/2025	Feasibility Study	
IC-1133	3/28/2023	ERIS & NRIS	Baldwin County, AL	Silverhill - Turkey Hill A 115 kV Line	73	73	79.8 MVA Inverters (Solar PV)	6/14/2026	System Impact Study	
IC-1132	3/24/2023	ERIS & NRIS	Hale County, AL	Demopolis - Greensboro 115 kV Line	80	80	93.6 MVA Inverters (Solar PV) plus 93.6 MVA Inverters (Batteries)	1/1/2026	System Impact Study	
IC-1128	3/3/2023	ERIS & NRIS	Perry County, AL	Greene County - North Selma 230 kV Line	79.9	79.9	100.8 MVA Inverters (Solar PV)	5/1/2026	System Impact Study	IC-1126 & IC-1128 are the same Generating Facility, to be studied in lieu of each other.
IC-1127	3/3/2023	ERIS & NRIS	Perry County, AL	Greene County - North Selma 230 kV Line	79.9	79.9	100.8 MVA Inverters (Solar PV)	5/1/2026	System Impact Study	IC-1125 & IC-1127 are the same Generating Facility, to be studied in lieu of each other.
IC-1122	3/1/2023	ERIS & NRIS	Montgomery County, AL	Pike County - Snowdoun 230 kV Line	79.9	79.9	100.8 MVA Inverters (Solar PV) plus 28.8 MVA Inverters (Batteries)	5/1/2026	Feasibility Study	IC-1122 & IC-1124 are the same Generating Facility, to be studied in lieu of each other.

Interconnection Queue Data – Example (MISO)

Project #	Request Status	Appl In Service Date	Transmission Owner	State	Study Cycle	Study Group	Study Phase	Service Type	Summer MW	Winter MW	Fuel	Download Studies
J1132	Active	10/01/2021	ITC Midwest	IA	DPP-2018-APR	West	PHASE 3	NRIS	50	50	Solar	
J1189	Active	01/01/2019	Duke Energy Indiana, LLC	IN	DPP-2018-APR	Central	PHASE 3	NRIS	5	5	Battery Storage	
J1191	Active	07/31/2022	City of Columbia, MO	MO	DPP-2019-Cycle	Central	PHASE 3	NRIS	64	64	Solar	
J1194	Active	10/01/2021	METC	MI	DPP-2019-Cycle	East (ITC)	PHASE 3	NRIS	225.2	225.2	Wind	

Order No. 845 Interconnection Study Metrics

- Purpose
  - Increase transparency of interconnection study completion timeframes
  - Inform interconnection customer expectations
- Reasonable administrative burden
- Requirements
  - Report completed, completed late, and ongoing late studies for each type
  - Report average completion time and late percentage for each study type
  - Report withdrawals before each study type
  - Quarterly reports filed on OASIS or website
- Filed Report Requirement
  - Triggered if late percentage > 25% for 2 consecutive quarters
  - Report describing reasons for the delay, remedial actions, hours spent on studies

Interconnection Study Metrics – Example (Southern)

Interconnection Study Metrics
2022 Quarter 4

Southern Company

Report Date: January 31, 2023

Interconnection Feasibility Studies Processing Time

(A) Number of Interconnection Requests that had Interconnection Feasibility Studies completed within Transmission Provider's coordinated region during the reporting quarter.	8
(B) Number of Interconnection Requests that had Interconnection Feasibility Studies completed within Transmission Provider's coordinated region during the reporting quarter that were completed more than forty-five (45) Calendar Days after receipt by Transmission Provider of the Interconnection Customer's executed Interconnection Feasibility Study Agreement.	0
(C) At the end of the reporting quarter, the number of active valid Interconnection Requests with ongoing incomplete Interconnection Feasibility Studies where such Interconnection Requests had executed Interconnection Feasibility Study Agreements received by Transmission Provider more than forty-five (45) Calendar Days before the reporting quarter end.	0
(D) Mean time (in days), Interconnection Feasibility Studies completed within Transmission Provider's coordinated region during the reporting quarter, from the date when Transmission Provider received the executed Interconnection Feasibility Study Agreement to the date when Transmission Provider provided the completed Interconnection Feasibility Study to the Interconnection Customer.	44.5
(E) Percentage of Interconnection Feasibility Studies exceeding forty-five (45) Calendar Days to complete this reporting quarter (calculated as the sum of (B) plus (C) divided by the sum of (A) plus (C)).	0%

Interconnection Study Metrics – Example (MISO)

MISO Generator Interconnection Study Metrics

3.4.2.1 Preliminary Interconnection System Impact Studies in Definitive Planning Phase I

Updated: 1/31/2022

3.4.2.1 Preliminary Interconnection System Impact Studies in Definitive Planning Phase I

		2021				
		1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	
Requests w/ SIS Completed	(A)	101	0	225	70	Number of Interconnection Requests that had Preliminary System Impact Studies in Definitive Planning Phase I
SIS Completed > 120 days	(B)	101	0	225	70	Number of Interconnection Requests that had Preliminary System Impact Studies in Definitive Planning Phase I exceeding 120 Calendar Days
Requests Ongoing SIS > 120 days	(C)	352	355	152	85	Number of Interconnection Requests with ongoing incomplete Preliminary System Impact Studies in Definitive Planning Phase I exceeding 120 Calendar Days
SIS Mean # of days	(D)	599	0	474	283	Mean time (in Calendar Days from 90 days after Application deadline date), for Preliminary System Impact Studies completed in Definitive Planning Phase I*
Percentage > 120 days per Total Complete	(E)=(B+C)/(A+C)	100%	100%	100%	100%	Percentage of Interconnection Requests with Preliminary System Impact Studies in Definitive Planning Phase I exceeding 120 Calendar Days

Interconnection Study Metrics – Filed Report Example (APS)

III. DESCRIPTION OF THE REPORT

APS has identified 17 System Impact Study (SIS) reports for Q1 2021 that were not delivered to the customer within the timeframes set forth in APS's OATT.

All SIS reports were late despite APS's Reasonable Efforts.[5]

APS is continuing to review appropriate remedies including process changes such as implementing software tracking of customer interconnection projects and supplementing with additional resources via third-party support.

Interconnection Study Metrics – Filed Report Example (MISO)

MISO **Generator Interconnection Study Delay Report**

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List of Tables

Interconnection NOPR

- Reforms to Generator Interconnection Procedures and Agreements (RM22-14)
  - Need for reform: almost 1,900 studies delayed as of the end of Q4 2021, 16 Filed Reports (Appendix A)
- Proposed public interconnection information ("heatmap")

RMI uses interconnection data to identify ways to expedite grid decarbonization

RMI's mission is to **transform the global energy system** to secure a **clean, prosperous, zero-carbon future for all**

We are an **independent, nonpartisan nonprofit** that **uses data** to better understand problems and iterate on solutions

Interconnection data use cases so far have included…

Geography

Where are projects seeking interconnection the most?

Network Upgrade Cost

What reliability violations are triggering the most expensive upgrades?

Timing and Delays

How long are projects waiting for study results, and how long do they take to build post-ISA?

There is clear value to high-quality data—and limitations to bad data

High-quality interconnection data enables us to…

- ***Break down problems*** *in a way that* ***generates useful insights***
- ***Tailor actionable solutions*** *to a specific interconnection issue*

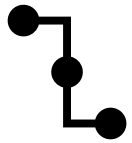
"Bad data" suffers from…

- *Lack of a standardized format*
- *Typos and other errors*
- *Overwritten data points*
- *Unreadable formats (e.g., scanned PDFs)*

Building high-quality data nationwide should address four key characteristics:

Accessibility

Standardized headers with data in easy-to-read format



Traceability

Full history of each project is recorded in the dataset, with no overwrites of past milestones

Transparency

Include as much data as possible, including what study assumptions went into calculating network upgrade costs

Linkage

Link together interconnection and transmission datasets to the maximum extent possible using numeric fields like project ID