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

Town Hall Dialogue: The Next 5 years of Interconnection Innovation

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

10:30 am– 12:00 pm | October 25th, 2023
GridTECH Connect NE

i2x@ee.doe.gov | energy.gov/i2x

AGENDA

1

Quick Overview

(15-mins)

2

Roadmap Activity

(45-mins)

3

Discussion Activity

(30-mins)

Why interconnection and why now?

From **40 MW/day** of new PV *to* **80-160MW/day** *within 12* years needs **2x/4x** faster **Interconnection procedures**

Zero-Carbon Future

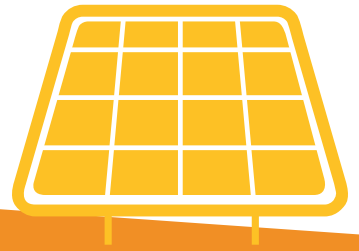
Irreversible path to zero-carbon electricity system by 2035 is contingent on paradigm-shifts in interconnection practices to deploy clean energy technologies at exponential scales

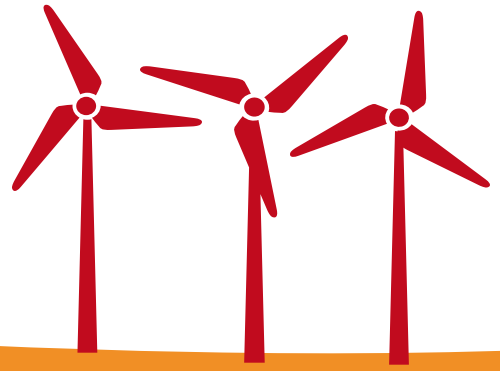
Complexity

The modern grid is transforming rapidly, and grid Interconnection processes are growing ever more complex as penetrations levels increase and technologies advance

Equity

Inclusive and just transition. Broad group of stakeholders required to fully understand the regulatory, technical, and process challenges in interconnection





5x **Increase in the expected number of solar & wind deployments every year to meet 2035 targets**

* Adapting Solar Futures Study findings of average +30GW/year (2020-2025) and +60GW/year (2025-2035) for solar

i2X Activity Highlights

Stakeholder Engagement

- 740+ people at 530+ partner organizations joined i2X
- 18+ public events and engagements
- 22 Solution e-Xchange meetings covering 6 topics organized and convened
- 75+ Office-Hour Calls with stakeholders
- Open Social platform for stakeholder engagement (under development)

Data & Analytics

- BPS interconnection cost reports for MISO, PJM, NYISO, SPP, and ISO-NE, plus a summary published (LBNL)
- 2023 Queued Up report updates published on BPS interconnection timelines (LBNL)

Strategic Roadmap

- Will soon release Volume 1 of the draft Roadmap through a request for information (RFI) asking for stakeholder comments and feedback.

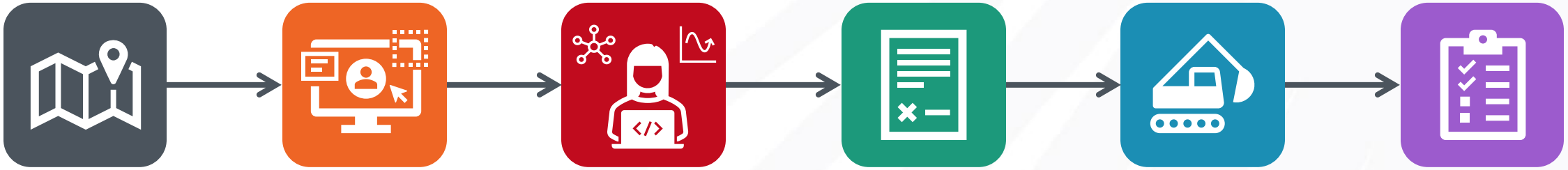
Technical Assistance

- Technical assistance projects covering flexible interconnection, utility data management, streamlining interconnection modeling, and alternatives to costly grid network upgrades
- Workforce upskilling with i2X/NERC bootcamps for BPS grid engineers on using Electromagnetic Transient (EMT) modeling methods and techniques

Interconnection is a dynamic and ever-changing landscape of challenges and solutions. Shaped by many, it demands careful coordination, communication, and collaboration.

Navigate with a roadmap to discover new pathways and solutions

Solution options are many …



Site Selection	Intx Application	Impact Evaluation	Intx Agreement	Intx Equipment & Site Construction	Site Commissioning
Hosting Capacity Development & Validation Processes	Queue Application Processing Strategies	Engineering Resource Management & Study Process Strategies	Study & Upgrade Cost Transparency Practices	Construction Queue Management	Commissioning Staff Resource Availability
Grid Capacity Analysis & Transparency Requirements	Queue Management & Application Requirements	Standardized Evaluation Screening Criteria	Cost Allocation Methods for Capacity Upgrades	Third-Party Utility Equipment Installer Options	Standardized Commissioning Requirements
Hosting Capacity Analysis Methods & Tools	Application Intake Tools & Automation	Advanced Modeling & Automated Impact Evaluation Tools	Dynamic Controls & Operational Profiles	Non-Wire Alternative Technologies	Virtual & Off-Site Commissioning Tools

Technology & Engineering | Administrative Processes | Markets and Regulation

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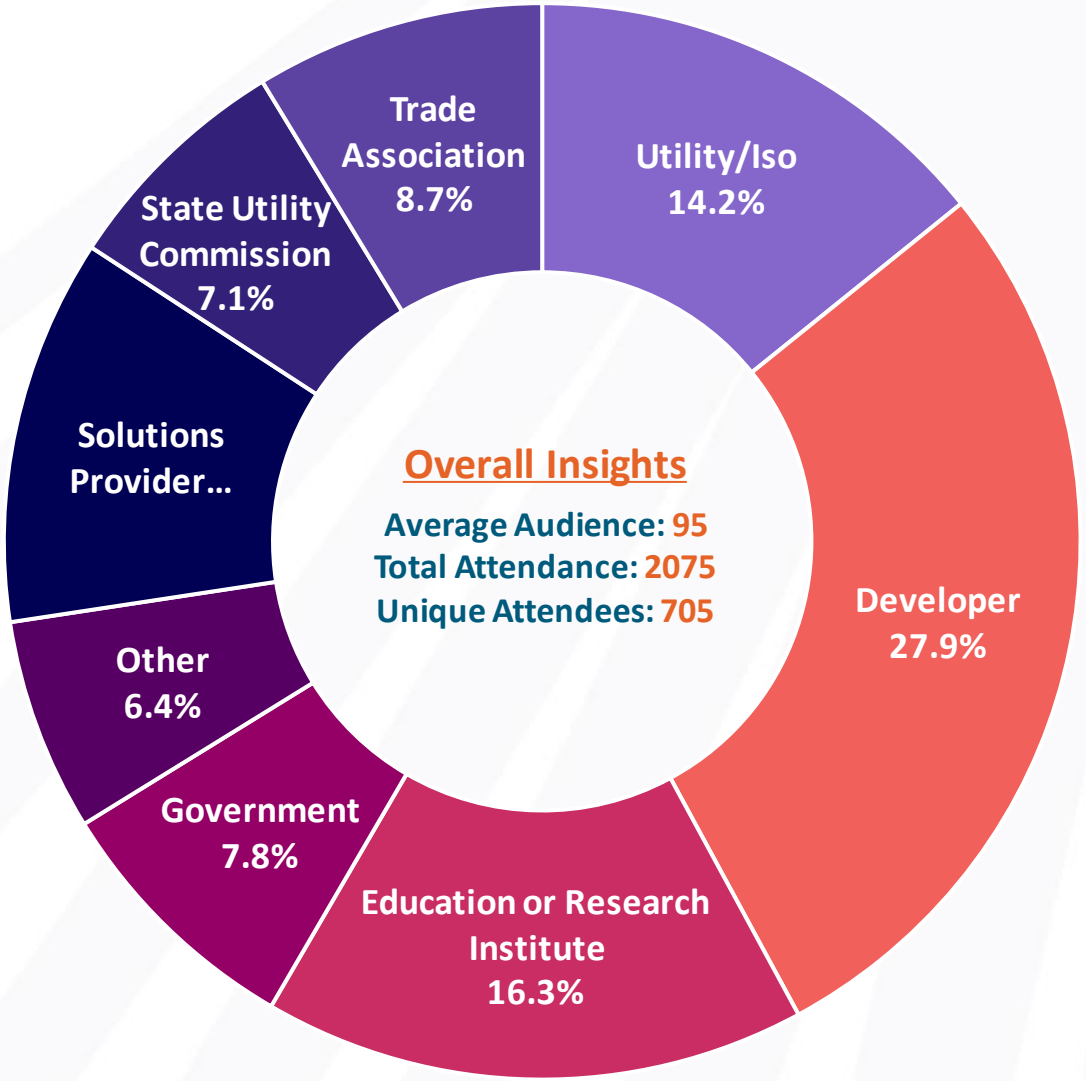
i2X Solution e-Xchange Attendance

Queue Management and Cost Allocation			
Meetings (including kick-off)	9	Avg Attendance	127
Grid Engineering Practices and Standards			
Meetings	3	Avg Attendance	96
Equity and Energy Justice			
Meetings	2	Avg Attendance	53
Data Transparency			
Meetings	2	Avg Attendance	104
Interconnection Workforce and Training			
Meetings	4	Avg Attendance	55
EV Grid Assist/Vehicle Grid Integration			
Meetings	2	Avg Attendance	56



Additional subjects, like capacity maps, cross these topics and will be addressed from these different perspectives. Follow the schedule of events on the i2X website.

i2X Solution e-Xchange Topic Areas

Queue Management & Cost Allocation

Managing big power sources connecting to long-distance lines, sharing big upgrade costs.

Grid Engineering Practices & Standards

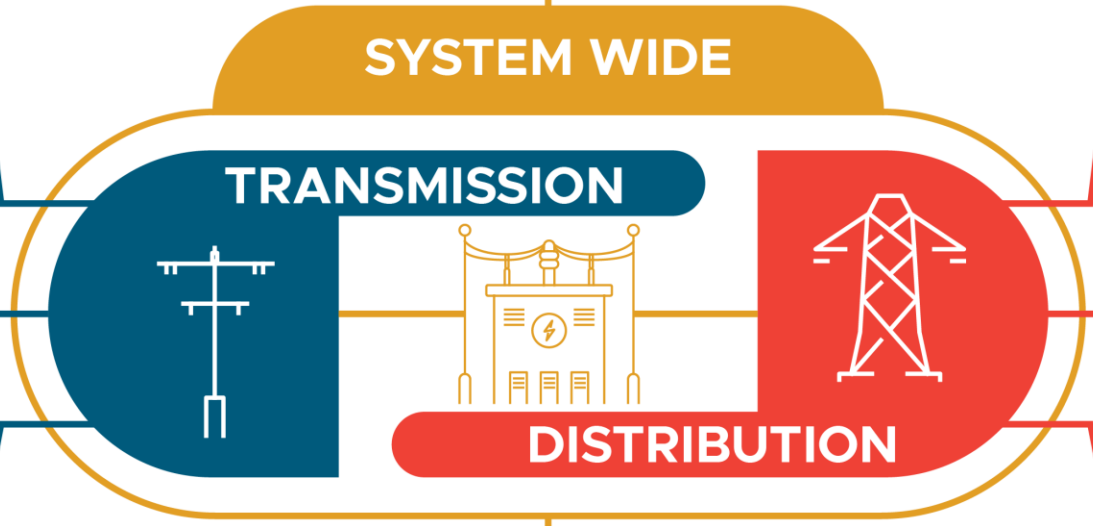
Designing distant power lines, keeping big grid stable and reliable.

Data Transparency

Sharing grid status and issues for stable electricity movement.

Equity and Energy Justice

Considering fairness for all in energy choices and access, across both transmission and distribution.



Interconnection Workforce and Training

Preparing skilled people for connecting energy, spanning both transmission and distribution areas.

Queue Management & Cost Allocation

Handling small energy sources joining local lines, dividing costs for nearby upgrades.

Grid Engineering Practices & Standards

Creating local networks, ensuring safe delivery to homes and businesses.

Data Transparency

Giving real-time data to consumers for wise energy use.

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Queue Management & Cost Allocation

Technology, regulation, administration, and organizational change focus

What innovative interconnection solutions exist?

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Queue Management and Cost Allocation

Suggested Queue Reforms:

- **First-ready first-served cluster studies** and **deadlines** for DERs
- **Automated** or **pre-approved** interconnection studies based on known components and automated data collection
- **Fast-Track Processing** based on **Pre-Screening Criteria**
- Allow **Flexible Interconnection** Strategies:
  - Last-in-first-out
  - Pro-rata
  - Competitive bidding
  - Emissions-based priority

Queue Management and Cost Allocation

Concerns that **increase in utility costs** would be **passed to ratepayers.**

Alternative Cost Allocation Strategies Discussed:

- Group study
- Cost causer post-updated
- Preemptive upgrade
- Utility prorated
- Upgrade Fund

Queue Management and Cost Allocation

Improvements to queue backlogs and more fair and equitable allocation of costs can be improved via **enhanced coordination between interconnection and long-term grid planning processes**.

- For example, when an upgrade is triggered by DERs and that upgrade was already scheduled within 5 years, flexible interconnection could be used as a stop gap.

Discussion:

- How could interconnection and long-term planning be brought together?
- We have commercial and residential interconnection classifications at the DER level, does the rise of mid-size projects like community solar, multifamily, VPPs, and microgrids call for a third classification?
- States and utilities are facing differing levels of DER saturation? Should future i2X stakeholder efforts be grouped by saturation levels or something else?

i2X Solution e-Xchange Topic Areas

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Grid Engineering Practices & Standards

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Data Transparency

Sharing current information on grid capacity and projects in the queue.

Equity and Energy Justice

Considering fairness for all in energy choices and access, across both transmission and distribution.

Data Transparency

Multidisciplinary

What transparency concerns must be addressed?

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Data Transparency

Enabling cost-effective outcomes with grid hosting capacity and upgrade information.

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Grid Data Transparency

Call for centralized entities to track important metrics:

- Number and capacity of interconnection requests in a given queue
- Time to complete studies
- Time from submission of interconnection request to commercial operation
- Interconnection costs by fuel type
- Withdrawal rates
- Frequency of triggered upgrades
- Locational and spatial trends
- Labor hours required to complete interconnection studies
- Number of studies completed by study phase
- Discussion: What else?

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Who is impacted by and benefits from proposed solutions?

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Equity and Energy Justice

Recommendations:

- Incorporate EEJ community identification and socioeconomic vulnerability layers into interconnection hosting capacity mapping
- Technical assistance and education opportunities
- Improved grid data transparency and information accessibility
- Independent engineering and dispute resolution service
- Address disproportionately high cost of interconnection
- Regulatory relief to mitigate queue delays
- Center equity goals in planning and valuation efforts
- Incentivize and enable community and tribal ownership
- Discussion: What else?

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How to train experts for secure energy connections?

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Interconnection Workforce and Training

Challenges **hiring and retaining** qualified interconnection staff:

- Industry competition and shortage of qualified engineers
- Complex skills requirements, repetitive work
- Lack of training and education opportunities
- Low pay, inability to offer competitive salaries and benefits, flexibility, culture

Discussion: What are the unique benefits of a career in DERs that could be highlighted to recruit and keep employees excited about their societal impact?

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Program Status

(45-mins)

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Discussion Activity

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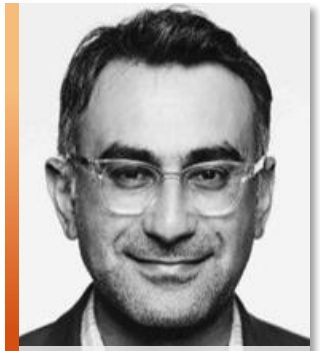
Ask us anything!

SETO



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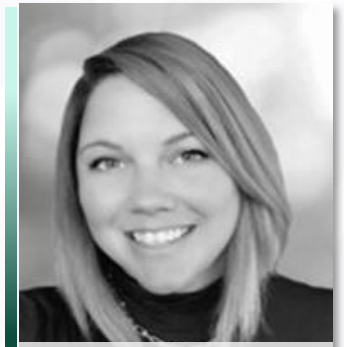

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