



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

Queue Management & Cost Allocation Cost Allocation (BPS) | 6/7/23

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 Solution e-Xchanges
- Stakeholder Presentations
 - Elizabeth Salerno, Federal Energy Regulatory Commission
 - Gabe Tabak, American Clean Power Association
 - Marcus Hawkins, Organization of MISO States
 - Ryan Westphal, MISO
- Interactive Group Discussion
 - Participant funding
 - Minimum interconnection
 - Generator cost sharing
 - Affected system cost allocation



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



Key Themes from 5/11 Meeting on Queue Management

- Multiple proposals for how generator interconnection can be integrated with transmission planning
- Some transmission providers are moving forward with integrated processes for generator interconnection and transmission (e.g. CAISO / SPP)
- Such integration involves parallel processes and consistent inputs, efficient management and sharing of data with generators, and likely involves at least some proactive transmission planning; there are questions about how much integration should be encouraged versus required.
- Most new projects apply for capacity interconnection (RA eligibility); it is unclear whether it would be easy to separate point of interconnection and network upgrades.
- There is significant scope for improving affected system study coordination; a key challenge is prioritization of studies between transmission providers.
- Current efforts to restructure securities and other requirements for interconnection customers may help to reduce late-stage withdrawals.

Review a more detailed notes document here: <https://app.box.com/s/p1jwr7o9wd9asa66mia9pzitg6lowrl6>

Upcoming Solution e-Xchanges to Consider Joining

BOLDED ITEMS FOCUSED ON BULK POWER SYSTEM TOPICS

1. June 21, 2-4 p.m. ET: DER interconnection cost allocation
- 2. July 6, 2-4 p.m. ET: DER+ BPS post-interconnection data for metrics and tracking**
- 3. July 12, 2-4 p.m. ET: Improving interconnection study methodologies in the bulk power system**
4. July 19, 2-4 p.m. ET: Collecting and considering feedback in public policy for equity

Follow the schedule of events on the i2X website.

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

Virtual Meetings Code of Conduct



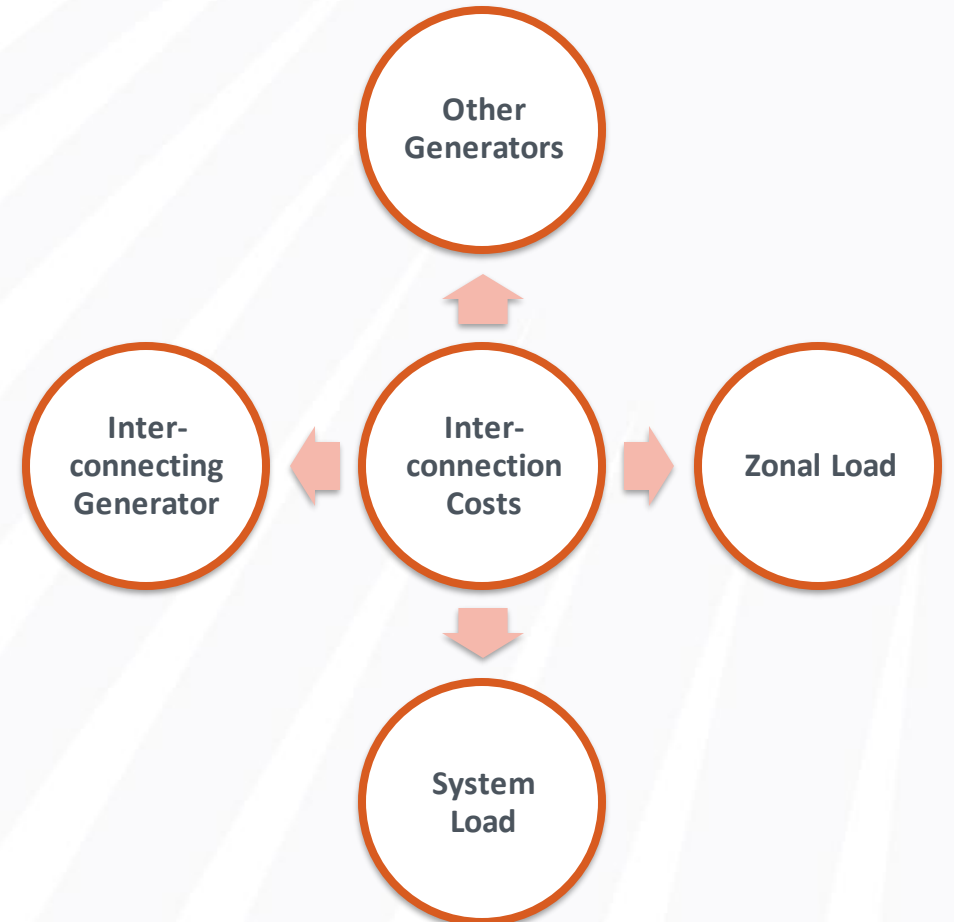
1. *Assume good faith and respect differences*
2. *Listen actively and respectfully*
3. *Use "Yes and" to build on others' ideas*
4. *Please self-edit and encourage others to speak up*
5. *Seek to learn from others*



Mutual Respect . Collaboration . Openness

Interconnection Cost Allocation

- Involves allocation between producers and consumers, but also allocation among states, different kinds of utilities and other load serving entities, and generators
- Closely tied to interconnection-transmission planning integration, deliverability, and other interconnection issues
- Touches on foundational questions around wholesale electricity markets



Topic #1: Participant Funding – Overview

- Since Order 2003, three main approaches to allocating bulk system interconnection costs:
 1. Crediting approach (FERC GIA/GIP, CAISO)
 2. Participant funding approach (most ISOs/RTOs)
 3. Transmission provider pays (ERCOT)
- Approaches to cost allocation are closely tied to congestion management and deliverability requirements for resource adequacy
- Rising interconnection costs are generating concerns over the efficiency and fairness of current participant funding models

Topic #1: Participant Funding – Proposals

- Several proposals to eliminate or reform participant funding, including:
 - Eliminate:
 - Transmission customers pay for all network upgrades, market participants assume congestion risk (akin to ERCOT approach, requires changing or eliminating deliverability requirements for resource adequacy)
 - Reform:
 - Create generator interconnection fee/tariff for proactive transmission investments
 - Allow states to approve and agree to pay for new transmission investments
 - More federal funding for national transmission corridors
 - Create subscription mechanisms for new transmission
 - Reduce barriers to merchant transmission (e.g., generator funded)
 - Limit generator cost responsibility on a predetermined percent, kV, or cost basis
 - Create new cost sharing mechanisms for deliverability upgrades
 - Better integrate interconnection and transmission planning, allow generators to fund residual parts of reliability projects that would otherwise not be selected

Topic #1: Participant Funding – Key Questions

- Should the participant funding model of interconnection cost allocation be left unchanged, reformed, or eliminated?
 1. If left unchanged, how should concerns around cost uncertainty and incentives be addressed?
 2. If reformed, what changes should be made?
 3. If eliminated, what should replace it?
 4. How much flexibility should FERC give transmission providers on cost allocation approaches and methods?

For verbal commentary, please use the raise hand feature and we will call on you

To make a written comment, please go to the slido poll: [slido.com](https://www.slido.com) and enter event code **i2x7**

Topic #2: Minimum Interconnection – Overview

- Energy resource interconnection service (ERIS) was originally conceived as an “as available” service, allowing generators to connect without significant upgrades
- Some ISOs/RTOs have explicit minimum interconnection requirements that adhere to this definition; others do not

Topic #2: Minimum Interconnection – Key Questions

- Should generators have the option to connect to the transmission system without congestion-related upgrades (i.e., should energy-only interconnection requests be responsible for upgrades that create additional transmission capacity)?
- Should generators pay for minimum interconnection (reliability-related) upgrades?
- To what degree should any minimum interconnection requirements be at the discretion of transmission providers versus being specified and enforced by FERC?

For verbal commentary, please use the raise hand feature and we will call on you

To make a written comment, please go to the slido poll: [slido.com](https://www.slido.com) and enter event code **i2x7**

Topic #3: Generator Cost Sharing – Overview

- Two main mechanisms allow network upgrade cost sharing among generators:
 - Cluster study and allocation
 - Reimbursement mechanisms that require later-in-time generators to compensate earlier-in-time generators for upgrades (i.e., across clusters)
- FERC proposed to make both mandatory in its 2022 interconnection NOPR

Topic #3: Generator Cost Sharing – Key Questions

- Are current mechanisms for sharing costs among generators sufficient? Should they be left unchanged or reformed?
- Should reforming generator cost sharing mechanisms be a priority?
- To what extent would larger reforms to interconnection cost allocation reduce the need for reforms to generator cost sharing mechanisms?
- How much flexibility should FERC give transmission providers on generator cost sharing mechanisms?

For verbal commentary, please use the raise hand feature and we will call on you

To make a written comment, please go to the slido poll: [slido.com](https://www.slido.com) and enter event code **i2x7**

Topic #4: Affected System Cost Allocation – Overview

- Interconnection customers may be required to pay for network upgrades in affected systems to mitigate impacts
- Market participants have raised concerns about the fairness of affected system cost allocation
- Interconnection NOPR proposals may change affected system cost allocation

Topic #4: Affected System Cost Allocation – Key Questions

- Will interconnection NOPR proposals address concerns about affected system cost allocation?
- What other changes in affected system cost allocation might be needed?

For verbal commentary, please use the raise hand feature and we will call on you

To make a written comment, please go to the slido poll: slido.com and enter event code **i2x7**



I2x Webinar – Interconnection Cost Allocation

6/7/23

American Clean Power

ACP is a national trade association representing a broad range of entities with a common interest in encouraging the expansion and facilitation of wind, solar, energy storage, and electric transmission in the United States.

The views and opinions expressed in this webinar do not necessarily reflect the official position of each individual member of ACP.

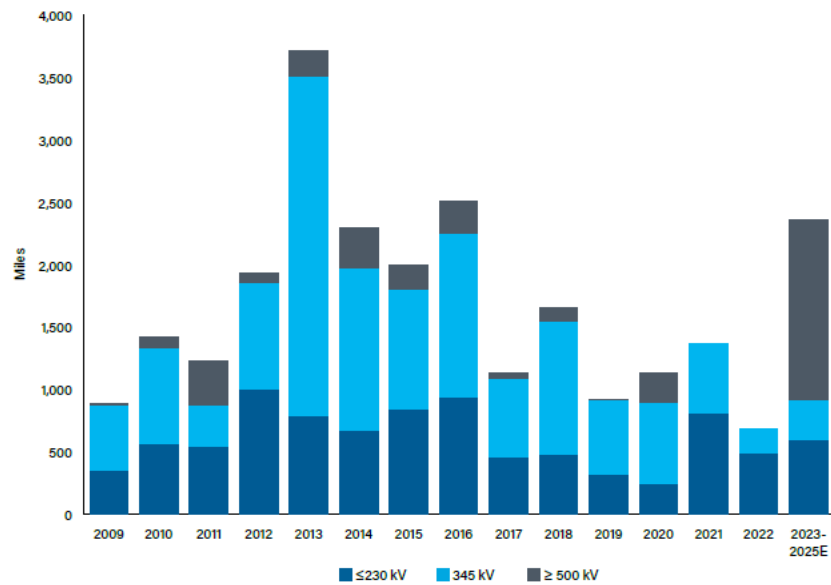


Interconnection Cost Allocation

1. Severity of interconnection costs
2. Participant funding
3. Possible alternatives

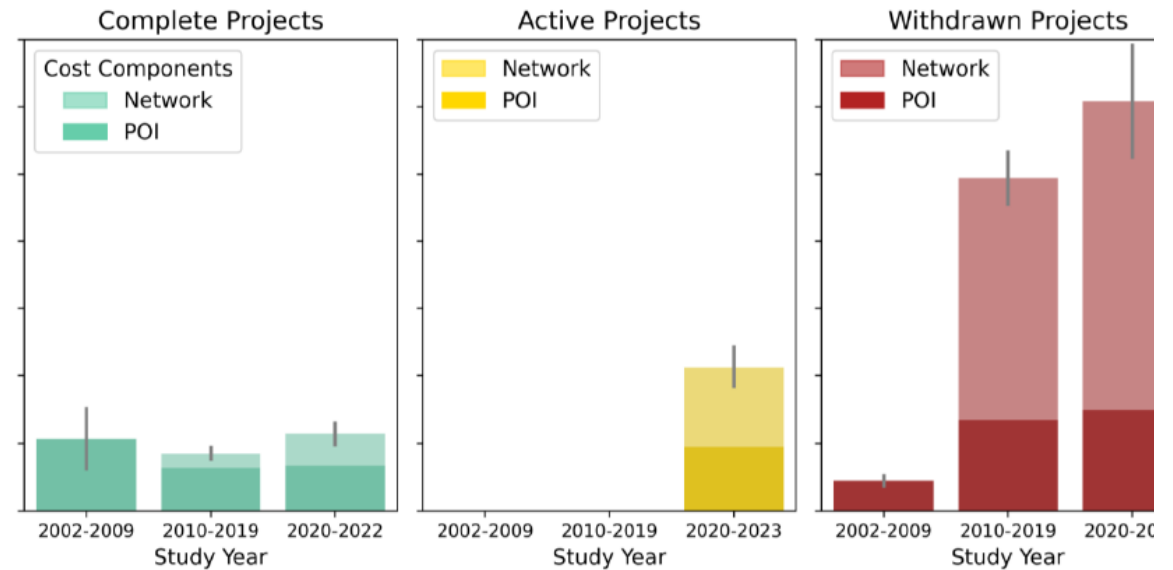


Miles of Transmission Projects Completed



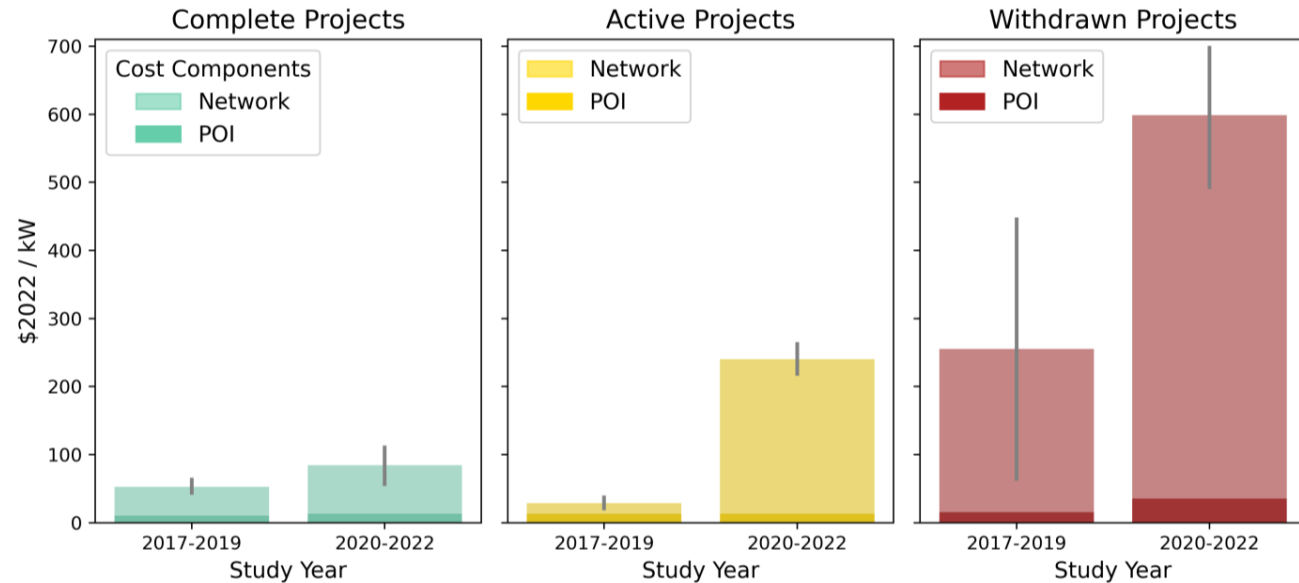
Source: Cleanpower 2022 Annual Report; FERC data

Network Upgrade Costs are Transmission Costs
 Anemic transmission build at a time of transition means more burdens fall on generators.



SPP

4. Interconnection Costs by Cost Category and Request Status (bars: means, gray lines: standard error of total costs)



PJM

Participant funding

- Created as an independent entity variation on Order 2003 for RTOs/ISOs (exception, not the rule)
 - In theory, P695: “[U]nder the right circumstances, a *well-designed* and independently administered participant funding policy for Network Upgrades offers the *potential* to provide more efficient price signals and a *more equitable allocation of costs* than the crediting approach.”
- In practice:
 - Generators are funding large-scale transmission without reimbursement.
 - Not speculative: 2017 SPP DISIS (2020) included 765kV transmission line over 165 miles long as participant funded.
 - Highly ineffective means of planning and building transmission; “sticker shock” causes interconnection queue problems.
 - High-voltage upgrades provide broader benefits.

Participant Funding vs Crediting



Differences Between the Two Pricing Policies

Crediting Policy	Participant Funding Approach
<p>Credits for the cost of required Network Upgrades are granted to the IC <i>only if</i>:</p> <ul style="list-style-type: none">• the project has achieved commercial operation and delivery service begins; and• the Network Upgrades are constructed <u>and</u> the IC has paid for them.	<p>Refers to the direct assignment to an IC of the costs of Network Upgrades that would not be needed <i>but for</i> the IC's project.</p>
	<p>Not "and" pricing if, for example, the IC is allowed to receive well-defined rights created by the Network Upgrades.</p>



Alternatives: Beyond Participant Funding

1. Transmission planning that accounts for future generation needs.
2. Crediting or “participant financing” – treat network upgrades as part of the integrated transmission system; rely upon generators to finance them, but reimburse once operational.
3. “Highway-byway” approach based upon voltage of upgrades.
 - Assign greater proportion of low-voltage upgrades (especially before interconnection substation) to generators; lower proportion of costs for higher-voltage upgrades beyond substation.
 - MISO uses a 90-10 allocation for network upgrades at and above 345kV today.
4. Apply a more precise usage-based method of assigning costs, such as distribution factor (DFAX)
5. Standardize study assumptions, and tailor upgrades based upon the service level.
 - Can be a “minimum interconnection” standard, allowing differentiation in upgrades based upon ERIS/NRIS status. ERIS could pay less for upgrades in exchange for “as-available” transmission service and risk of curtailment.
 - If applied as a “connect and manage” approach, the “manage” portion is essential. Transmission planning needs to account for and address congestion/curtailment.
6. Use a standardized fee-based approach (utilizing project size and distance assumptions) to identify upgrades.



Thank you.

Questions? Contact gtabak@cleanpower.org

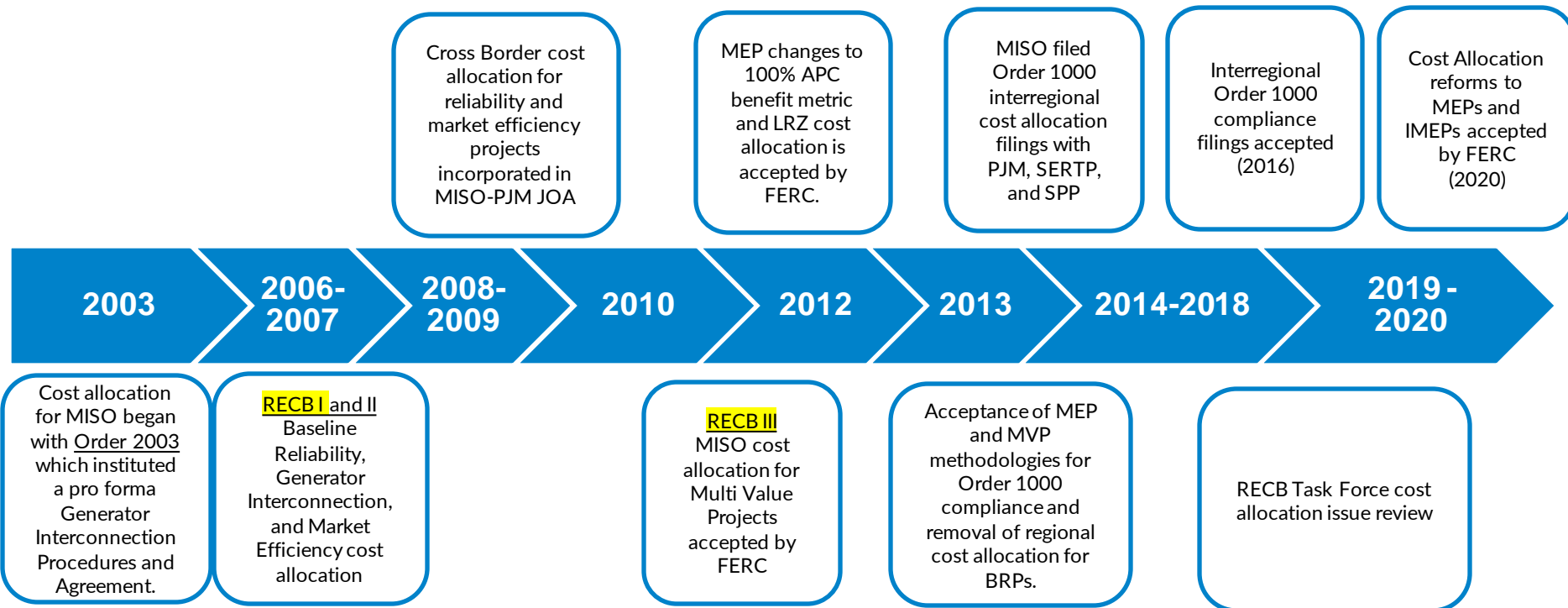


Cost Allocation in MISO Generator Interconnection Queue

DOE i2x Solution
Exchange

June 7, 2023

MISO Cost Allocation history outlines changes to reflect the changing resource fleet and FERC policy requirements



The *Regional Expansion Criteria and Benefits (RECB)* Task Force (now Working Group) was established in 2004 to develop criteria for all transmission projects in MTEP and methods for allocation and recovering costs based on measures of benefit.

RECB III Phase I changed GIP cost allocation to 100% generator interconnection customers with 90/10 allocation for 345kV voltage classes and above

- In RECB I, GIP costs were allocated 50/50 between Interconnection Customer and zones
- July 2009 – MISO and certain MISO TOs filed an interim RECB III Phase I proposal to address certain inequities experienced under the then-effective RECB cost allocation rules
- FERC accepted the Phase I proposal which included revisions to the Tariff for GIPs:
 - Eliminated the Line Outage Distribution Factor (LODF) allocation of GI related network upgrades to load in pricing zones*
 - Still recognized that extra-high voltage upgrades (i.e. 345 kV) provide benefits to more than just the interconnecting generator
 - 345 kV and higher: 90% directly assigned to generator/10% postage stamp allocation
 - Less than 345 kV:100% directly assigned to generator

There is a critical distinction between allocating costs for planning projects and generator interconnection projects

MTEP Planning projects

- Ensure a transmission system that can accommodate these future needs, including future needs of generation
- Designed to serve load reliably, economically and for the benefit of the entire grid and
- Are planned through a participatory stakeholder process.

Generator Interconnection Projects

- Designed specifically to connection new generators at the least cost
- Would require ratepayers to subsidize specific generating facilities, regardless of whether they buy power from that generating facility or derive quantifiable benefits from the Network Upgrades built specifically to accommodate them.
- Are driven by where a particular Interconnection Customer chooses to site their project without necessarily balancing the overall needs of others in the footprint.

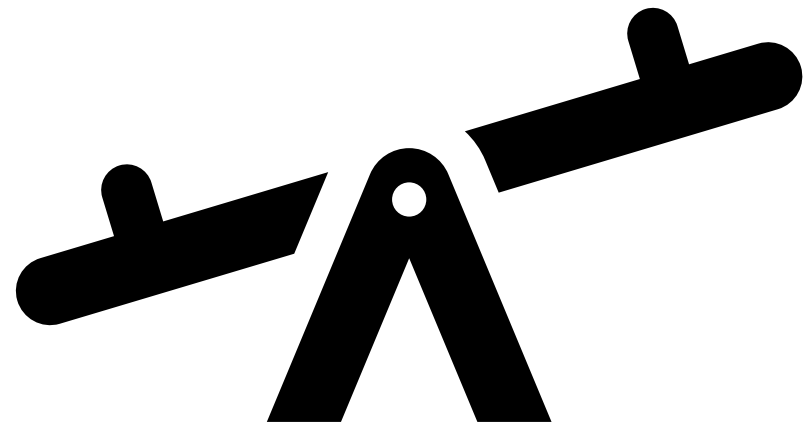
Participant Funding is a critical component of MISO's balanced, integrated planning process

- **Eliminating participant funding may create problems with the planning process, making it harder to quickly develop backbone transmission infrastructure.**
 - If LSEs are required to fund Network Upgrades, debates about specific lines will move from the regional planning process to State need, siting and routing proceedings
- **Abolishing participant funding may require further modifications to cost allocation to maintain fairness.**
 - GI customers are charged for Network Upgrades, but do not pay costs for regional backbone transmission infrastructure, like the Multi-Value Projects.
- **Participant funding and planning reform complement each other.**
 - Participant funding encourages the most efficient siting, and allows interconnection customers, who are best positioned to determine whether the costs of Network Upgrades are justified.
- **MISO continues to make improvements to the queue process.**
 - Eliminating participant funding would exacerbate existing concerns around the queue process duration by allowing an influx of new projects

Participant funding model continues to be just, reasonable and appropriate for the needs of MISO's footprint

Participant funding:

- Balances the needs of load and generators
- Avoids involuntary cost allocations without corresponding quantifiable benefits;
- Encourages efficient siting of new generation





Questions?



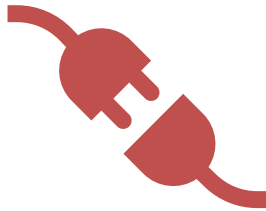
State Perspectives on Interconnection Cost Allocation

Marcus Hawkins

June 7, 2023



States are focused on all types of cost allocation to generators



Grey Area!



Interconnection

- Specific project impacts studied
- Identifies necessary network upgrades
- Could share costs with other new or existing generators

Regional Plan

- Whole system is studied
- Includes new generation
- May evaluate “enabled generation”

State involvement in changes to interconnection process & cost allocation is key

Interconnection Process

- OMS has filed comments in support of all recent generator interconnection process changes
 - Modifications to milestone payments
 - Three phase study cycle
 - Site readiness requirements
- OMS also filed [comments](#) in FERC's queue reform NOPR (RM22-14)
 - Speed is important
 - Status quo is not sustainable

Regional Planning Process

Generators and load each can be considered cost causers, beneficiaries, or both and should be allocated costs accordingly.

- OMS Cost Allocation Principles re: Long-Rang Transmission Planning

MISO's cost allocation framework is from 2010

MISO filed to create
Multi-Value Project
(MVP) Cost Allocation
(ER10-1791)

- Created method for GIPs to share costs of network upgrades
- Maintained 100% (90% for 345kV+) participant funding for all other network upgrades (approved by FERC in 2009)
 - OMS supported this – strong siting signal, avoids overburden on local loads

At that time OMS
States had split views
on MVP cost allocation
to generators

- No charge to generators: IN, MI, MN, ND, SD
- Charge to generators: IL, IA, MO, MT, OH
 - Wanted to assign 20% of costs to generators (new and existing)

Why are we discussing changes to cost allocation?

Regional planning process is contemplating \$10's of Billions of investment in EHV transmission

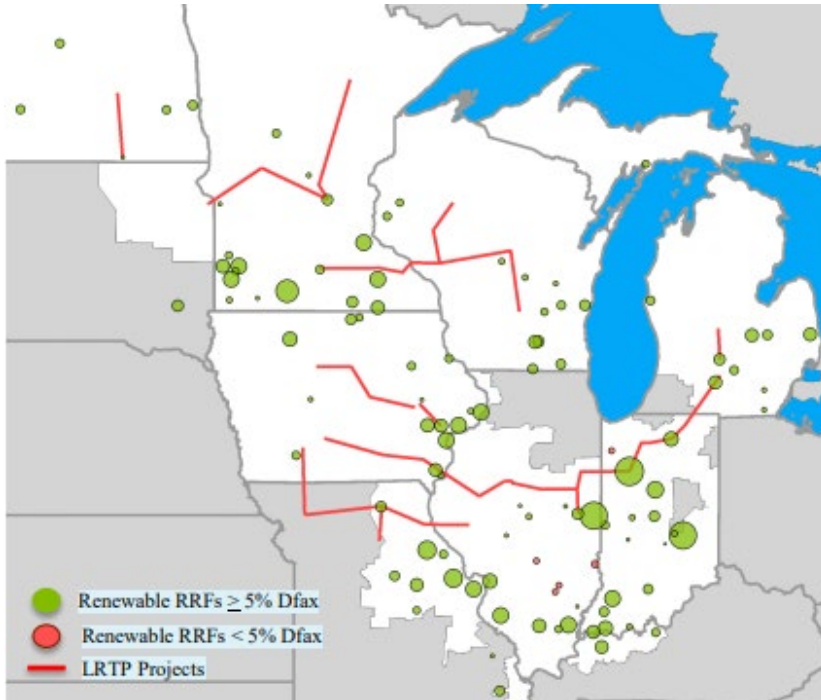
- Planning for 100+ GW of new generation

Generator Interconnection study cycles are growing, identifying larger network upgrades

- Identification of all beneficiaries is key

Affected System Study process broke down

Regional Planning & New Generation



- Top-down regional planning studies include many assumptions about new units, retirements, and model-built units of all types
 - A recent MISO study had 58 GW of retirements & 90 GW of additions
- MISO’s Long-Range Transmission Plan Tranche 1 identified 20.1 GW of model-built units that had a $> 5\%$ DFAX on LRTP projects
 - This is an example of “resource enablement”

Existing cost allocation methods are changing



Generator Interconnection

- Changes are proposed to study thresholds to that could increase number of upgrades required to interconnect (ERIS DFAX)
 - Attempting to avoid future congestion, based on observed gaps under existing method
- NOPR comments had new proposals for sharing costs with load



JTIQ Study

- A new study process that forecasts future generation in a specific area and identifies upgrades needed to address reliability issues
- Examined economic benefits as well, but costs will be assigned primarily to interconnecting generation



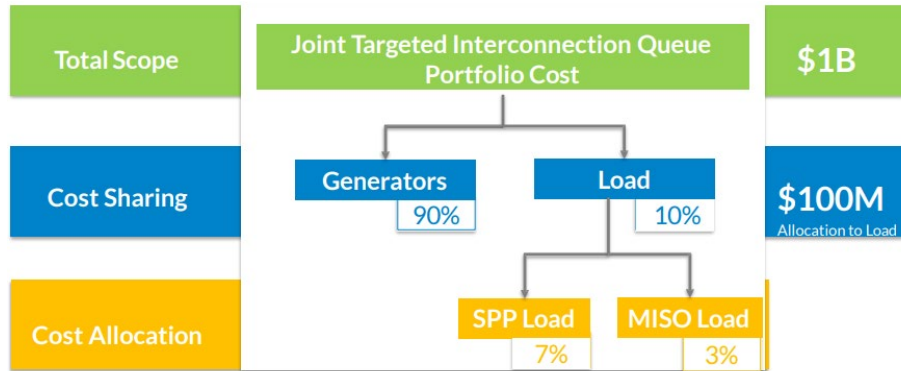
L RTP

- Stakeholders are currently investigating more granular cost allocation methods for future tranches
- Generator Pays ideas being discussed in stakeholder meetings & OMS forum

How should these changes impact each other?

Joint Targeted Interconnection Queue Study

- Conducted a novel transmission study that projected future interconnection upgrade needs for the combined MISO/SPP Region
- Developed a new cost allocation method to primarily assign costs to generators, provide cost certainty, and replace affected system study process



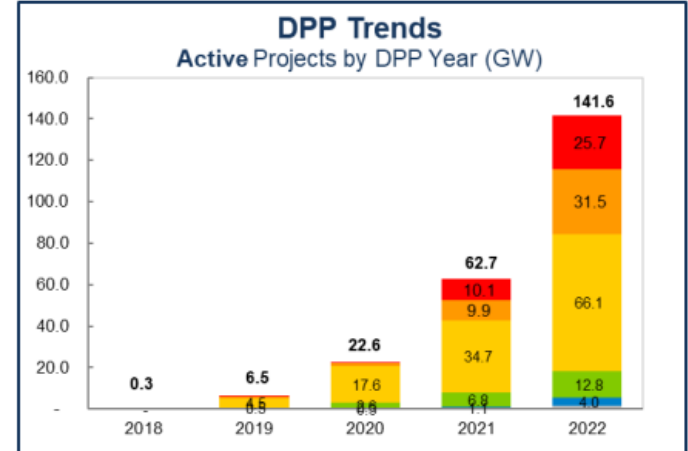
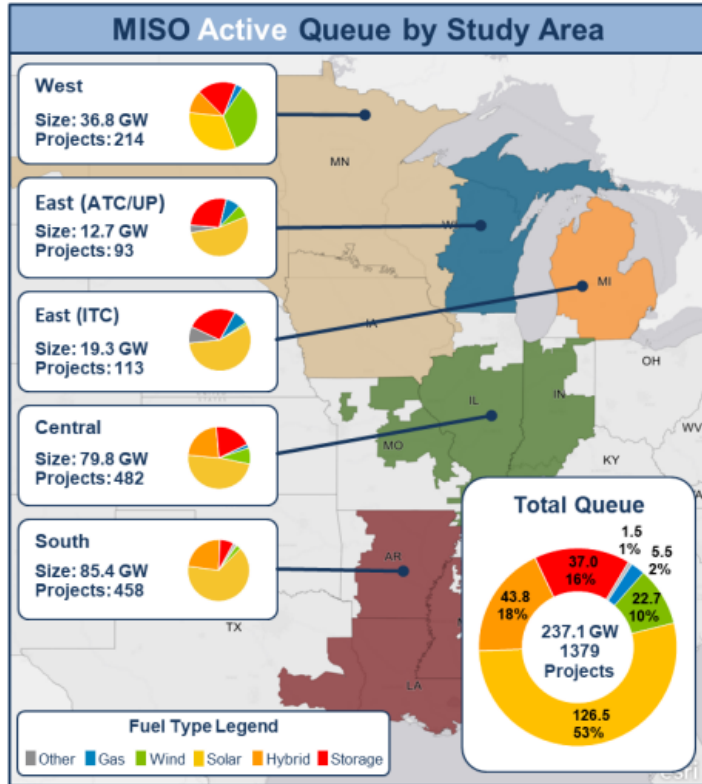
APPENDIX



Organization of MISO States

Generator Interconnection: Overview -

The current generator interconnection active queue consists of **1379** projects totaling **237.1** GW



MW Amount of Projects with a GIA and not online: 34,169 MW

i2x-QMCA3

06 - 08 Jun 2023

Poll results

Table of contents

- Should the participant funding model of interconnection cost allocation be left unchanged, reformed, or eliminated?
- Should generators have the option to connect to the transmission system without congestion-related upgrades (i.e., should energy-only interconnection requests be responsible for upgrades that create additional transmission capacity)?
- Are current mechanisms for sharing costs among generators sufficient? Should they be left unchanged or reformed?
- Will interconnection NOPR proposals address concerns about affected system cost allocation?

Should the participant funding model of interconnection cost allocation be left unchanged, reformed, or eliminated?

(1/4)

0 1 4

- Reformed.
- Deeply reformed. All NU costs should be socialized through rates up to a specific per-MW (deliverable) threshold (P90 of historical for each tech type) with excess allocated to IX customer
- A few key considerations should be factored into any cost allocation policy changes. 1) Better definition of the services offered (ERIS, NRIS, TSRs) and the associated benefits that should be received (e.g. grid connection, transmission hedging rights, credits, capacity rights, etc) is needed from FERC to guide policy development on cost allocation and study methodology.

Should the participant funding model of interconnection cost allocation be left unchanged, reformed, or eliminated?

(2/4)

2) "As available" ERIS interconnection service should be transitioned into a economic/congestion/curtailment analysis rather than a reliability analysis, as generators can always be curtailed to maintain reliability. 3) All cost allocation policies should take into consideration the difference between generation and load. Generation fundamentally provides a service that it is paid for. Load

consumes a service that it pays for. Generators invest significant capital in projects to be able to compete for profits associated with service customers. Load pays to receive the most cost effective, reliable services of these generators. These fundamental differences need to be kept in mind when cost allocation policy is designed.

- Eliminated. Move to "connect and manage" approach paired with holistic

Should the participant funding model of interconnection cost allocation be left unchanged, reformed, or eliminated?

(3/4)

transmission planning process that allocated costs based on benefits.

- Eliminated. The way I view the Electrical system is that everything is geared towards serving the load and thus at the end all upgrade costs should pass through to the load.
- Reformed. We will hit a wall soon in terms of the overall capacity of the grid to take on new

generators without major upgrades that cannot be economically financed by projects. This will stymie climate goals. Cost allocation must take into account the benefits that are shared and public - including the capacity of the grid to serve new, massive loads related to transportation and heating electrification. We should return to the principles laid out in FERC 2003.

- Reformed

Should the participant funding model of interconnection cost allocation be left unchanged, reformed, or eliminated?

(4/4)

- Reformed and much reduced or eliminated for deep network upgrades.
- Reformed- all beneficiaries should pay so the extent to which loads are receiving benefits of these transmission expansion they should pay a portion commensurate with benefits. Additionally transmission planning process should be reformed to more proactive plan and build transmission to facilitate the clean energy transition.
- Reformed.
- unchanged
- Reform or eliminate - the current approach is clearly not working.
- Reformed
- Reformed.
- unchanged

Should generators have the option to connect to the transmission system without congestion-related upgrades (i.e., should energy-only interconnection requests be responsible for upgrades that create additional transmission capacity)?

009

(1/5)

- It depends on who will benefit from the upgrade (generators applying, future generators, current or future loads). If the option to not pay is available, the associated conditions, like curtailment should be clear for everyone, utility, and developers.
- Yes, they should be responsible for local interconnection impacts including all necessary mitigation. However, for this construct to be functional the study outcome needs to be binding, thereby enabling investment and deployment.
- Energy only customers should pay less than NRIS, but should still contribute to broad upgrades based on deliverability studies
- MISO did lower their ERIS DFAX

Should generators have the option to connect to the transmission system without congestion-related upgrades (i.e., should energy-only interconnection requests be responsible for upgrades that create additional transmission capacity)?

009

(2/5)

from 20% to 10% in their 2022 queue cycle, however only did it for less than 345kV and because they approved \$10B in LRTP T1 that was included in the basecase of the 2022 cycle.

- Yes, but this question seems to infer that economic congestion is measured in a GI ERIS request today, which in some

it is not. NRIS itself is not an economic analysis either. If you are asking whether there should be a later option to decide whether additional upgrades are paid for in the

Should generators have the option to connect to the transmission system without congestion-related upgrades (i.e., should energy-only interconnection requests be responsible for upgrades that create additional transmission capacity)?

009

(3/5)

GI as a result of congestion analysis that demonstrates additional benefits from congestion relief. That is closer to what I think is proposed. It has both advantages and disadvantages to the process.

- Should generators have the option to connect to the transmission

system without congestion-related upgrades - YES, but curtailment thresholds need to be defined and Utilities must be mandated in policy to ensure (rate based) grid upgrades are done proactively to ensure

Should generators have the option to connect to the transmission system without congestion-related upgrades (i.e., should energy-only interconnection requests be responsible for upgrades that create additional transmission capacity)?

(4/5)

feeder specific (or area specific) curtailment thresholds for are not exceeded. Max curtailment thresholds are important to allow developers to model their projects over decades and make decisions before construction...

- In most ISOs, ERIS costs have increased substantially and no longer offer a cheap alternative to NRIS. Multiple

ISOs, such as MISO are currently lowering ERIS cost allocation threshold which will make this problem worse.

- No. If ERIS is treated the same as NRIS in a market, then yes ERIS should help address congestion in GI studies.
- Yes. Minimum requirements - "connect and manage" works as a short-term solution, but

Should generators have the option to connect to the transmission system without congestion-related upgrades (i.e., should energy-only interconnection requests be responsible for upgrades that create additional transmission capacity)?

(5/5)

009

to truly unlock the full potential of the resources we are building, we must have a long-term plan to alleviate congestion after generators connect. Costs could be subsequently allocated to generators and load based on benefits.

- Yes.

Are current mechanisms for sharing costs among generators sufficient? Should they be left unchanged or reformed?

- Unchanged in the case of queues with cluster processes where cost sharing is hardwired into the cost allocation construct. In regions where inter cluster funding does not exist those constructs should be reformed such that it discourages free riders by later queued generators.
- Unchanged using DFAX mechanism

Will interconnection NOPR proposals address concerns about affected system cost allocation?

002

- Proactive planning like JTIQ is a best practice. Also, affected systems should pay if they benefit from upgrades in adjacent systems.
- Likely not, however RTOs/ISOs already have rules that require interconnection projects to pay for affected system upgrade costs in the same manner as interconnection requests in that affected system.