



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

DER Queue Management and Cost Allocation Solution e-Xchange  
**Solutions Implementation and Agreements**

**Karyn Boenker, PNNL, 7/26/23**

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

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# Virtual Meetings Code of Conduct



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



Mutual Respect . Collaboration . Openness

# Meeting Notes

Notes synthesizing keys points, insights and questions from the meeting can be found here: [Box Link](#)

# 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 i2X 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



# i2X Solution e-Xchange Topic Areas



- **Queue Management and Cost Allocation**
  - Technology, regulation, administration, and organizational change focus
  - *What innovative interconnection solutions exist?*
- **Grid Engineering Practices and Standards**
  - Engineering and technology focus
  - *How can proposed solutions be executed?*
- **Equity and Energy Justice**
  - Multidisciplinary
  - *Who is impacted by and benefits from proposed solutions?*
- **Data Transparency**
  - Multidisciplinary
  - *What transparency concerns must be addressed?*
- **Interconnection Workforce and Training**
  - Multidisciplinary

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.



# Upcoming 2023 Partner Events & i2X Presentations

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- 8/4 i2X-NERC EMT Bootcamp session #1 (NERC's EMTTF). 4hr virtual
- 8/15 IEEE 1547 Work Shop, Everett, WA \*\*
- 9/14 i2X-NERC EMT Bootcamp session #2 (NERC's EMTTF). 4hr virtual
- 9/11-13 RE+ Workshop. Las Vegas, NV
- 10/3-4 ACP Offshore WINDPOWER. Boston MA
- 10/10-13 Clean Currents. Cincinnati, OH \*\*
- 10/23-25 GridTECH Connect NE. Newport, RI
- 10/23-26 ESIG Fall Workshop. San Diego, CA \*\*
- 11/8-9 IREC Vision Summit 2023. Minneapolis, MN

*\*\* i2X is not currently set up to present at these events*





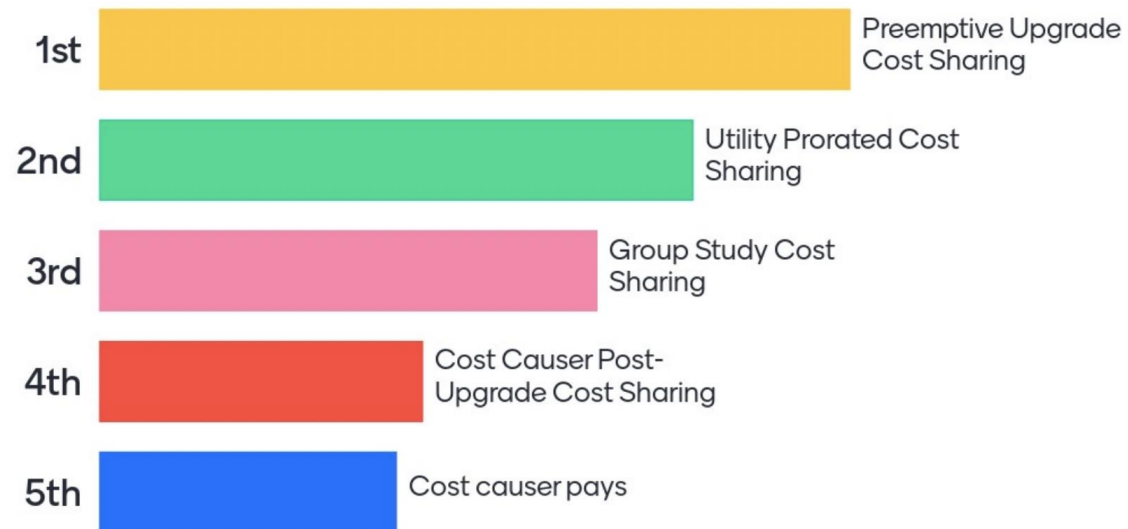
# Agenda

- **Innovation Presentations**
  - **Garrett Fitzgerald**, Sr Director for Electrification @ Smart Electric Power Alliance
  - **Kate Tohme**, Director of Interconnection Policy @ New Leaf Energy
  - **Matt Nelson**, Principal @ Apex Analytics
  - **Joan White**, Director of Storage and Interconnection Policy @ Solar Energy Industries Association
  - **Steven Rymsha**, Director of Grid Solutions @ Sunrun
- **Interactive Discussion**

# Results from previous e-Xchanges



## What should be the primary cost allocation approach used five years from now?



# Results from previous e-Xchanges



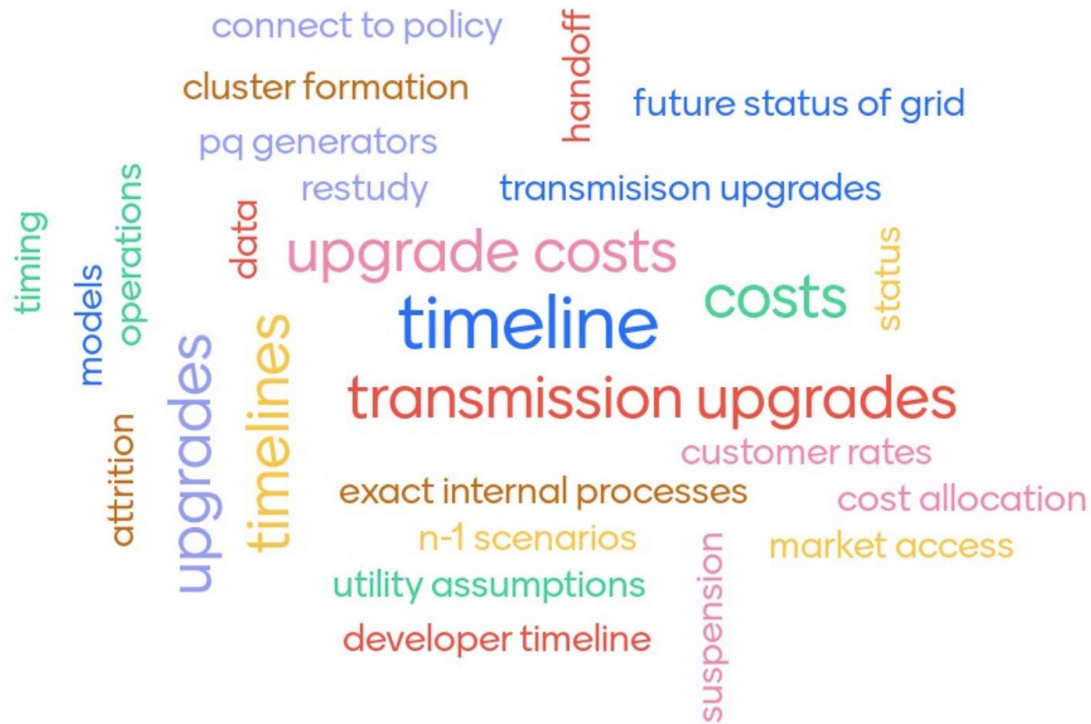
In one word, what are the most EXPENSIVE IX-related costs?  
(i.e. upgrades, fees, cancellation, engineering, headcount, etc.)



# Results from previous e-Xchanges



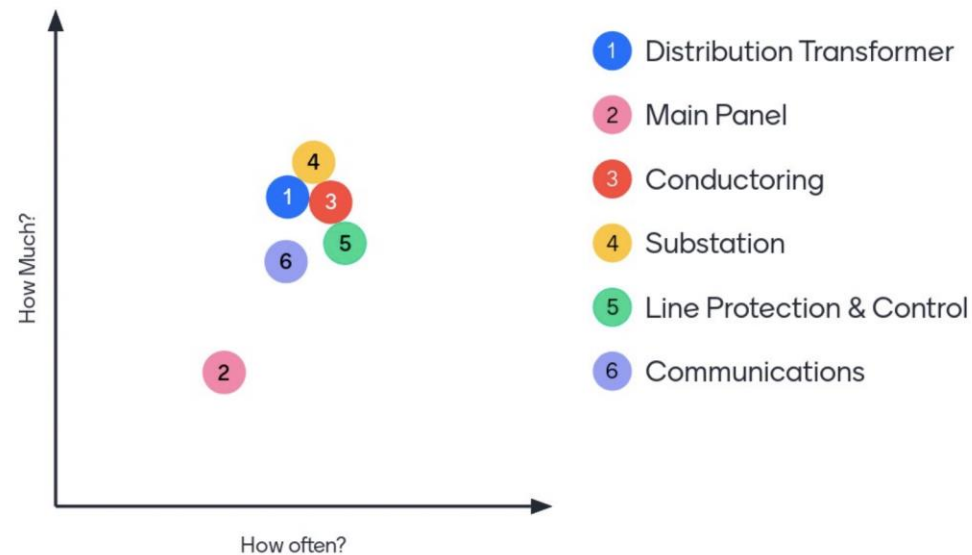
In one word, what is most **UNCERTAIN** about IX?



# Results from previous e-Xchanges



## How often are these upgrades triggered during IX and how expensive are they?





# Guest Presentations

# i2X Solution e-Xchange Cost Allocation & Queue Management: Implementation Planning and Agreements (DER)

**Matt Nelson and Kate Tohme**

July 26, 2023



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# Initial Problem

State Goals wanted to connect significant amounts of solar, but utility business model didn't align with quick interconnection

## Overarching Goals

- Enable DG to meet state climate and clean energy goals
- Decarbonize and electrify
- Regulatory certainty
- Affordability of technology
- Equitable allocation of costs



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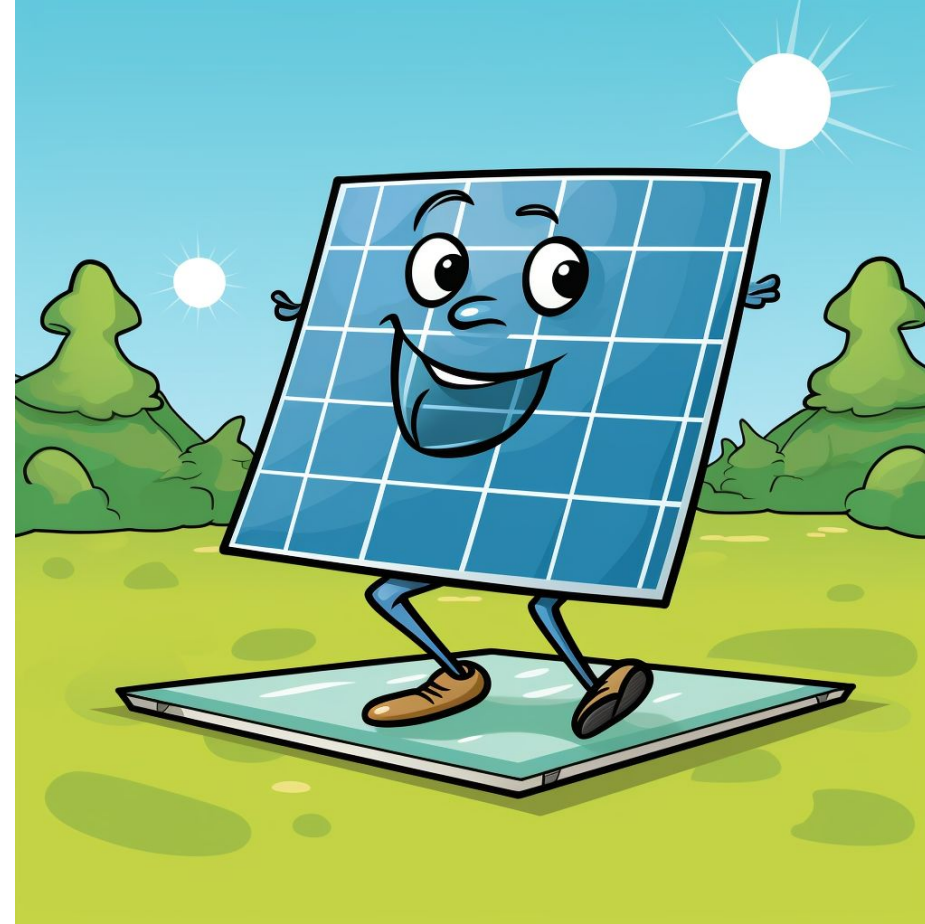




# How We Get There

- Get the process started
  - 1st Stakeholder Working Group
  - 2nd PUC Docket/Action
  - 3rd Legislation
- Memorialization
  - PUC Order
  - Law/Regulation
  - Tariff
  - Technical Standard
  - Guidelines
- Where will the money come from?
  - Utilities:
    - Rate base
    - Sharing with Customers and CIAC to developers
    - Reconciling mechanism
    - Federal grants

- Developers
  - State Incentives
  - Generation Market Mechanisms
  - Customer Contributions
  - Legislative incentives
  - Federal tax credits



# Memorialization/Agreement Options

## Tariff

- Separate tariff for cost allocation
- Inclusion in existing DG interconnection tariff
- Reconciling mechanism tariff

## PUC Order

- Potential for broad stakeholder engagement
- Could result in directives, tariff revisions, guidelines

## Law/Regulation

- Broad or narrow scope
- Legislator education and understanding
- Necessity of resulting adjudicatory proceeding or rulemaking

## Technical Standard/Guidelines

- Required stakeholder engagement?
- Required govt approval?
- Uniformity?

## Queue Management Specific

- Hosting Capacity Maps
- Preapplication Reports
- Interconnection Application

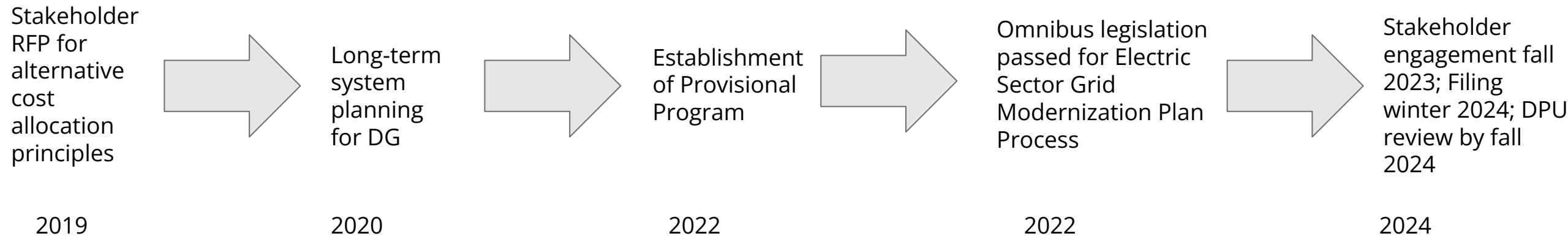
## PUC Education

- Establishment of an Ombudsperson
- Hiring staff dedicated to DG issues
- Building engineering knowledge

# Massachusetts Case Study

Massachusetts has set forth reforms related to queue management and affected system operator studies and piloted an alternative cost allocation methodology. Implementation has taken form as DPU Order, tariff, guidelines, technical standards, and legislation.

## Cost Allocation Timeline:



This was a fast process for state government

# Key Questions/Issues

## Distribution System Upgrades

- How to move from reactive to proactive?
- How to determine pro rata cost ratepayer vs interconnection applicant?
- How to keep DG from getting lost in overarching climate action?

## Transmission System Upgrades

- How to align necessary distribution and transmission upgrades?
- How to determine “common system modification”, recovery from interconnection applicant or state ratepayers? Who makes the determination?
- Jurisdictional obstacles (ASO studies, subtransmission, and cost assignment)
- Regional vs state resolutions

## Flexible Interconnection

- Who controls functionality? Who makes determination? Where should this be memorialized?
- ESS wholesale vs retail rates and operational parameters- where should they be memorialized and who should be making determinations?
- Should there be caps on distribution capacity size for ESS?
- Transmission upgrade mitigation- regional opportunities?

# Thank you.

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Smart Electric  
Power Alliance

# i2X - Utility Perspectives

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Accelerating an Equitable Transformation

July 2023

# Who Are We?



**A membership organization**



**Staff of ~50**



**No Lobbying – 501c3**



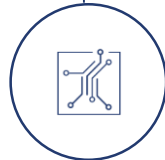
**Founded in 1992**



**Unbiased**



**Research, Education,  
Collaboration  
and Standards**



**Technology Agnostic**



**Local, State and  
National Focus**



# Membership



SEPA is a **membership organization** comprised of utilities, industry partners, regulators and other stakeholders.

**1,100+**

Total Members

**83%**

Of utilities with carbon-free or net-zero emissions goals

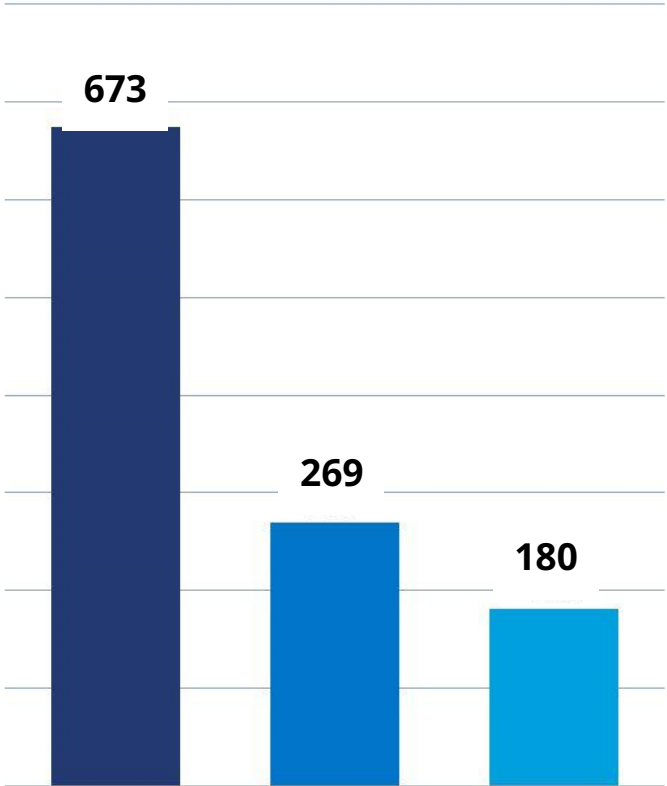
**72%**

Of U.S. customer accounts served

**84%**

Of utility commissions

- Utilities
- Corporations
- Government / Non-profit Education





We Accelerate the Transformation to a Carbon Free Energy System through:



## EDUCATION

Raise awareness  
of practical and  
actionable solutions



## FACILITATION

Drive collaborative  
problem solving



## CREATION

Develop and deliver  
strategies and guidance  
our members can use

# SEPA's Role in i2X – Enhanced Utility Engagement



- 1-1 interviews
- Input from EVSE interconnection workshops
- 60 minute roundtable discussions to explore perspectives in more depth

- Funnel utility input from roundtables, SX meetings, and Working Groups into the i2X Road Map

# Utility Only Roundtables

Utility Forum	Solution Exchange Meeting	System Level	Topic
6/12/2023	6/21/2023	DER	Cost Allocation
7/12/2023	7/26/2023	DER	Implementing QM/CA Reforms
Week of August 14th	Aug 31st	DER and BES	Close Season 1 for QM/CA

# 6/12/23: Cost Allocation

- It is **early days** for most on this topic. Just starting to consider what changes are necessary.
- Consensus around the **need for updated cost-sharing** due to rising DER interconnections.
- **Early developer engagement** streamlines costs and processes.
- Adapted cost modeling essential for diverse scenarios.
- **Urban vs. rural settings** and DER variations complicate cost allocation.

# 7/19/23: Implementing Reform

- Several utilities are exploring group studies in pilots. **Mixed success** so far or too early to tell.
- **Fairness concerns** of preemptive cost-sharing is an important issue that is not adequately addressed.
- Consideration of incorporating costs into rate bases or ‘interconnection funds’.
- Cost allocation **needs to be based on impact**, not just size.
- **Difficult to standardize** cost allocation - location, size, etc.

# Upcoming Utility Only Forum: Session Close Week of 8/14/2023

## Agenda

- TBD

## Participants

- All utilities are welcome

## Prompt Questions

- Likely to be a reflective session.
- Discussion around key themes from '23 programming.
- Field suggestions for '24 programming.

Want to join the conversation?

[gfitzgerald@sepapower.org](mailto:gfitzgerald@sepapower.org)

# i2X Solutions e-Xchange

## Implementation, Planning and Agreements



*Powering the Solar+ Decade*



# Virtual Power Plants & Flexible IX

## What they share in common

Smart inverters and devices

Clear contract terms

Load or generation shifting and curtailment

3<sup>rd</sup> party players such as aggregators

Established Communications Protocol

Visibility into real-time grid conditions

Utility tools and know-how in the control room



# Virtual Power Plants & Flexible IX

## What is different

	VPPs	Flexible IX
Triggering events	If well managed, should occur hourly, daily, monthly, and annually	Limit export only when grid conditions could become out-of-bounds – very rare
Compensation/economic motivation	Captures value streams and savings related to energy, capacity, demand charges, and transmission fees	Reduces or eliminates the need for costly grid upgrades
End goal	VPPs should grow in size and number over time and become long-lived grid assets	Hopefully grid build-out reduces the need to activate export limitation over time (but this could go the other way)

# Hypotheses

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1. Flexible IX is more about **reliability** and **project financial viability**.
2. VPPs are more about **economic optimization** and **grid resilience**.
3. Jurisdictions and companies with experience in VPPs are well positioned to execute flexible IX.
4. The business model for VPPs can tap many more revenue streams than flexible IX.
5. An asset could participate in both a VPP and flexible IX agreement.
6. 3<sup>rd</sup> part aggregators have an important role to play in maximizing the value of assets while managing them to the constraints of a flexible IX agreement.

# A good flexible IX agreement will include

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Clear contract terms for when an event can be triggered: e.g. only under thermal loading conditions

Clear method of communication for triggering events

Don't limit the asset's participation in VPPs

A concrete plan for eventual grid upgrades

Clear contract terms for what the asset is supposed to do during an event

Opportunity for 3<sup>rd</sup> parties to manage dispatch signals

Spell out what happens when more DG comes on the circuit



# i2X Solution eXchange on Flex IX and Cost Allocation Implementation

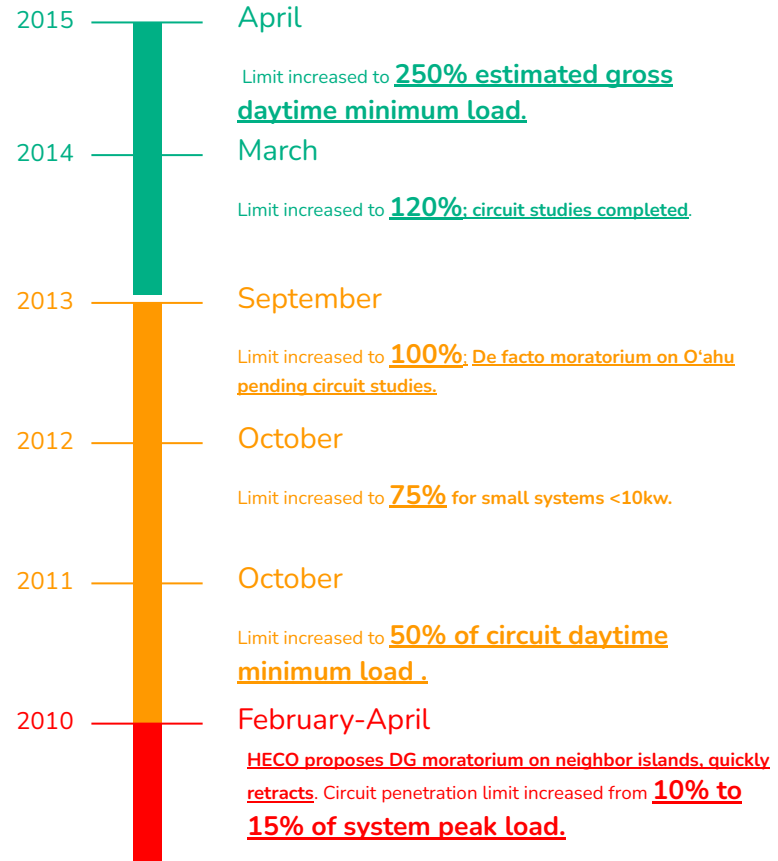
July 26, 2023 | STEVEN RYMSHA



# Hawaiian Electric IX Policies

## Managing High Levels of Distributed Solar Adoption with Smart Inverters

- Utility policies evolved ahead of formal interconnection proceedings at the PUC to keep up with customer demand, regulatory and political pressure.
- Hosting capacity screens and policies evolved from 10% of peak load to 250% of estimated gross daytime minimum load over a five year period.
- Solution of utilizing smart inverters to ensure open capacity can be replicated in states *before* critical issues.



# Flex IX Volt-Watt Stipulation (August 19, 2021) & Order

BEFORE THE PUBLIC UTILITIES COMMISSION  
OF THE STATE OF HAWAII

In the Matter of )  
PUBLIC UTILITIES COMMISSION ) DOCKET NO. 2019-0323  
Instituting a Proceeding to Investigate )  
Distributed Energy Resource Policies )  
Pertaining to the Hawaiian Electric )  
Companies. )

**STIPULATION FOR PROPOSED REVISIONS  
TO TARIFF RULE 14H VOLT-WATT FUNCTION**

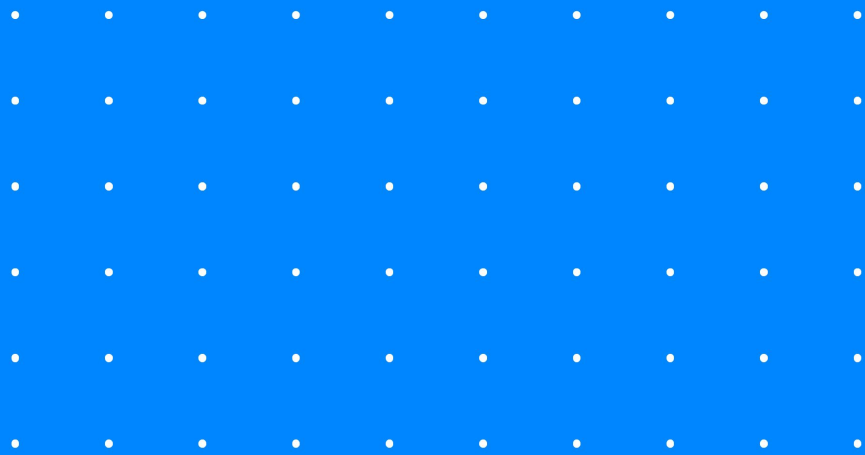




## Cost Allocation Recommendations for Small DER Deploy

- **Primary Distribution Costs**
  - No cost sharing requirements.
  - Consistent with MA, NY, & MD
  - Solution = Leverage smart inverters to defer need and ensure safety.
- **Secondary Distribution Costs**
  - Customer service upgrades are too costly for most individual system to afford, leading to cancelation.
  - Set, affordable, stable fee included in IX application.
  - Consistent w/ IL, MN; proposed DC & MD
  - Solution = Leverage smart inverters to defer need and ensure safety.

# SUNRUN<sup>®</sup>



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