2022 Distributed Generation Developer's Workshop

July 20th, 2022

Housekeeping

Pleas raise your hand to ask a question or place it in the chat.

For the sake of time, we may not get to all questions, but will reply to all questions placed in the chat.

All cameras have been turned off.

The workshop will be recorded.

We kindly ask that all microphones remain mute unless asking a question.

Attendees will receive the slides via email after the workshop.

Agenda

Welcome and Opening Remarks
- Shaun Smith, Director Distribution Planning

SIR Updates
- Joe White, DG Ombudsman

Tariff Updates
- Raanan Korinow, Project Manager

Non-Wire Solutions (NWS)
- Casey Siwinski, Sr. Specialist

Bulk Solicitation
- Brian Schaitkin, Sr. Planning Analyst

Hosting Capacity
- Jared Trumpetto, Project Manager

Distributed Energy Services
- Anthony Santamaria, Customer Project Manager

Distribution Engineering
- Shobhit Sujan, Associate Engineer

Closing Remarks
- Julio Tardaguila, Project Specialist

Welcome and Opening Remarks

Shaun Smith

Director Distribution Planning

Standardized Interconnection Requirements (SIR) Update

Joe White

Distributed Generation (DG) Ombudsman

Interconnection Process Agenda

New York Interconnection Framework

Standardized Interconnection Requirements (SIR) Process

Cost Sharing 2.0

Best Practices & Interconnection Resources

Interconnection Process
New York Interconnection Framework

Standardized Interconnection Requirements

Ideally for Distribution Interconnection Up to 5 MW for VDER Compensation

Utility Process

Ideally for Distribution Interconnection **not** seeking VDER Compensation **and** not under SIR or NYISO jurisdiction

Consult with interconnecting utility.

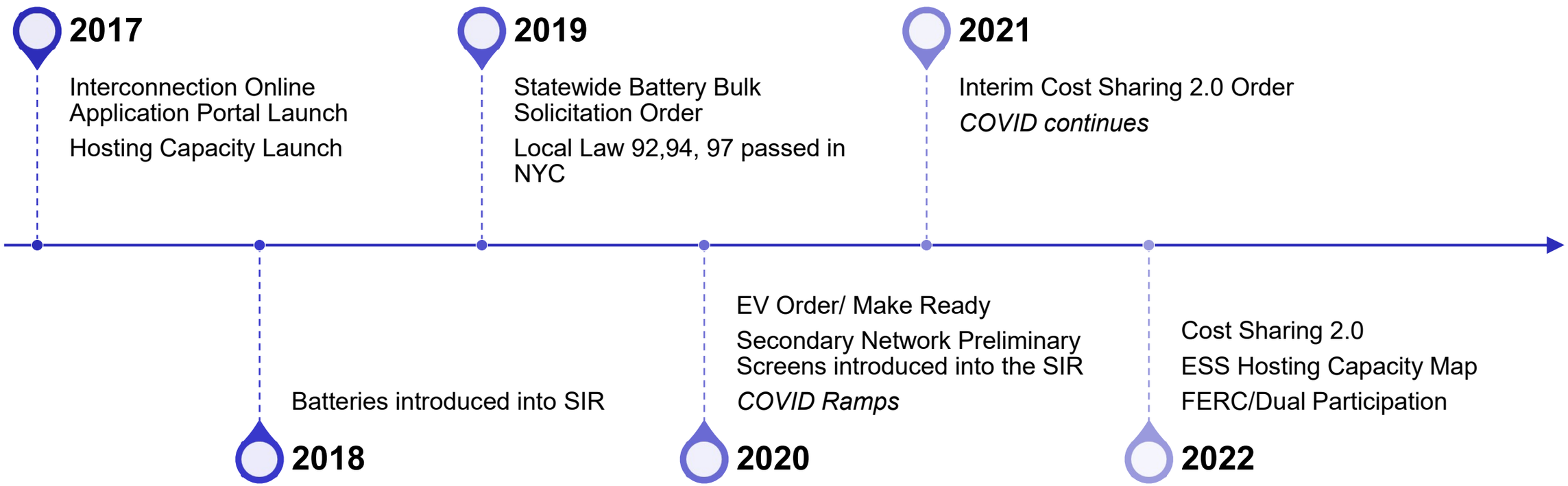
NYISO Process

Ideally for Distribution Interconnection from 2MW not seeking VDER Compensation or those on the Bulk system

Review the Transmission Interconnection Guide and the following training modules for interconnection:

- Module 1
- Module 2
- Module 3
- Module 4
- Module 5

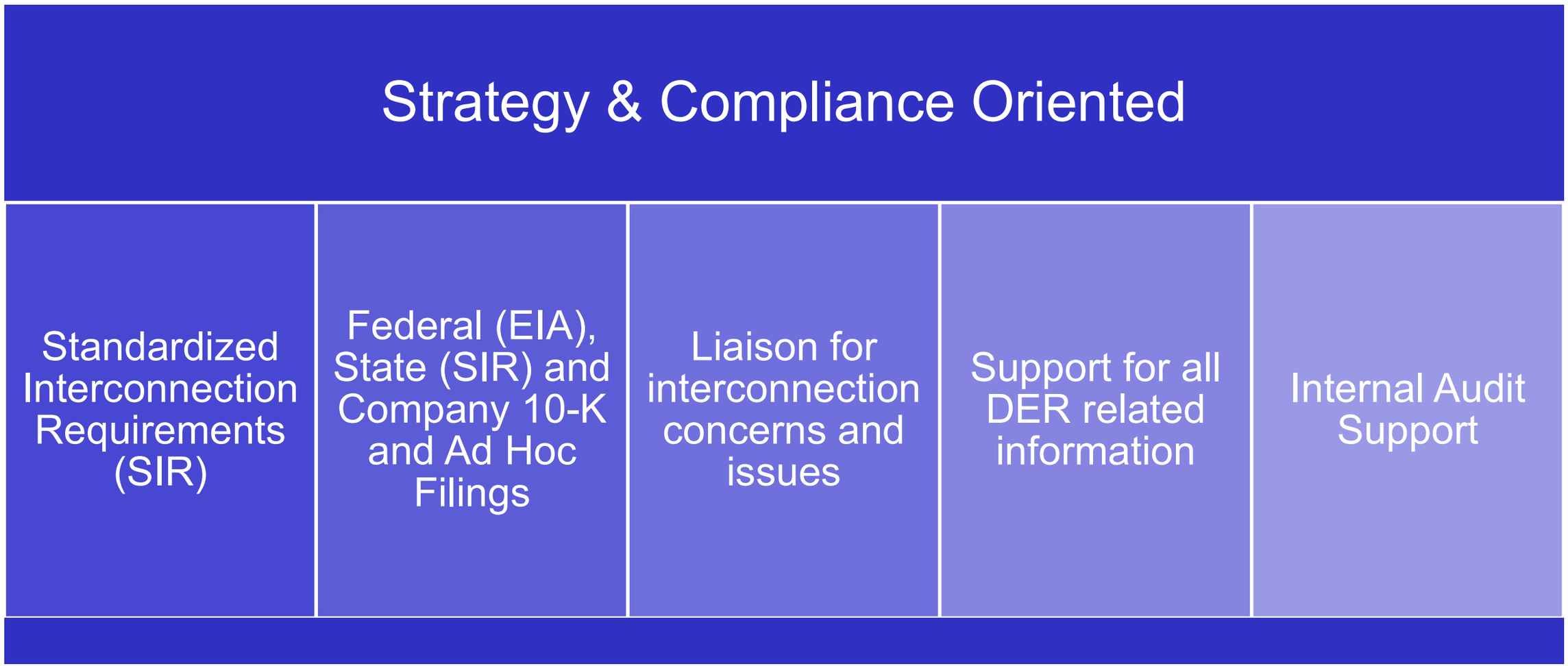
Interconnection Process
New York Interconnection Framework



Interconnection Overview – Interconnection Process Overview
New York Interconnection Framework

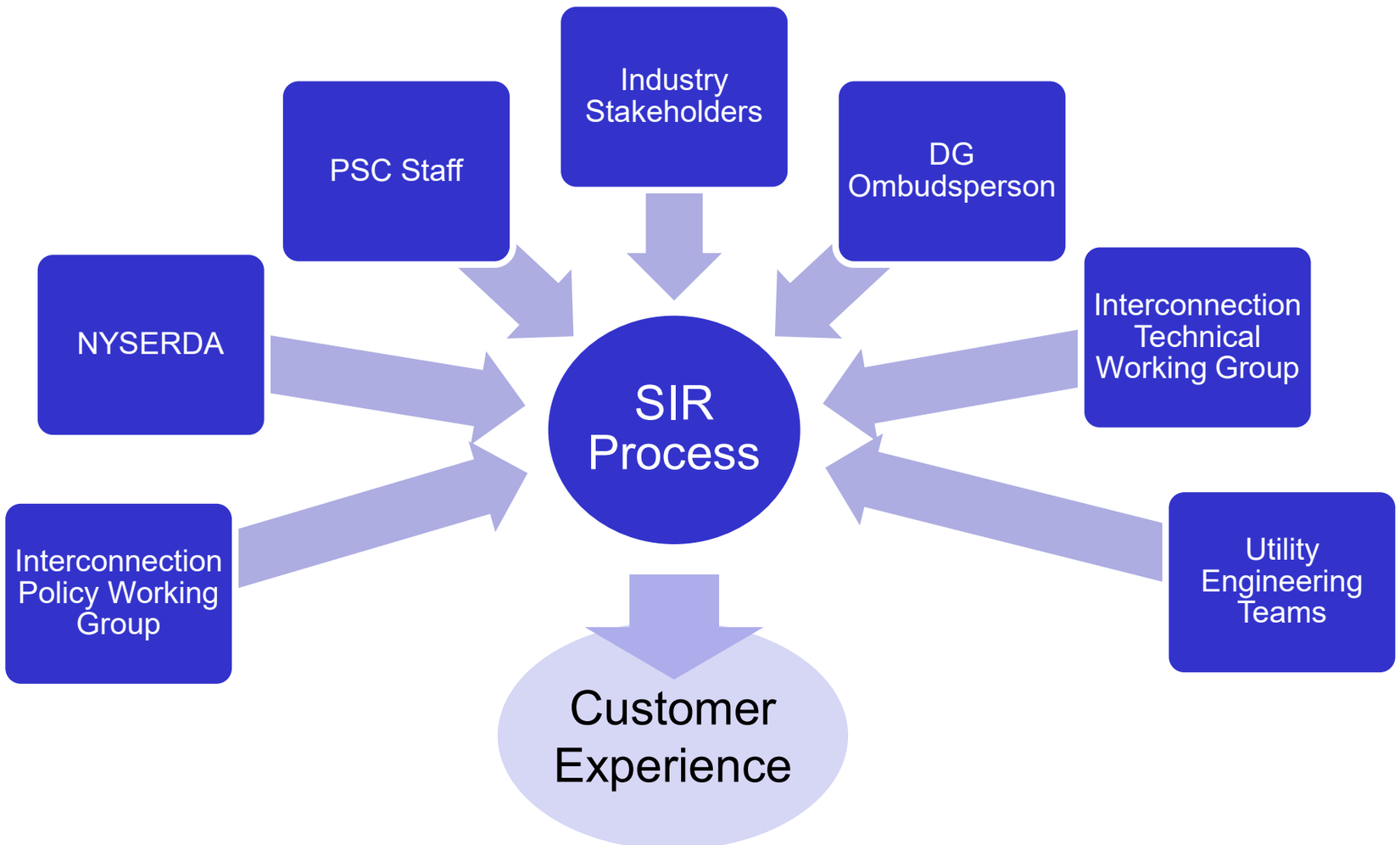
- Statewide working groups are chaired by Public Service Commission and NYSERDA
  - Interconnection Policy Working Group
  - Interconnection Technical Working Group
- Interconnection process is governed by the Standardized Interconnection Requirements (SIR)
- Each utility also has a Distributed Generation Ombudsman as of 2016
  - Con Edison has had an Ombudsman since 1999

Interconnection Overview – DG Team Introduction
Distributed Generation Ombudsman Group Overview



SIR Process Overview

Interconnection Overview – Interconnection Process Overview
Compliance & the Customer Experience



Interconnection Overview – Interconnection Process Overview
SIR Process Overview

Projects ≤ 50kW

- No fee to apply
- Mostly smaller residential applications
- Could incorporate small commercial installations in the city
- Timeline for installation is usually driven by developer's schedule

Projects > 50kW up to 5MW

- Application fee of $750 (non-refundable)
- Projects undergo a screen
  - Series of standardized questions
  - If all Pass, project is approved
  - If Fail, additional study is required
- Network Screens added in 2020

Interconnection Overview – Interconnection Process Overview
Appendix K

Utilities will:

- Study the requested Operational Performance as outlined in Appendix K
- Review charge and discharge requests prior to submittal to the utility
- Please review Hybrid Options A-D with your hardware and software configurations to be sure they meet the requirements
- Review ramp rate with hardware and software of your system

Cost Sharing 2.0

Interconnection Process
Cost Sharing 2.0 Overview

- Provides cost certainty to both the first in queue and all subsequent queued interconnecting customers as to the cost upgrades for which they will be responsible

- Acknowledges that a subset of upgrades implemented by the utility, under its capital plan, can be integrated to address system asset and reliability issues while enabling the delivery of renewable energy

- Proposes two categories for Upgrades:
  - Utility Driven
  - Market Driven
    - Triggering Projects
    - Sharing Projects

Interconnection Process
Cost Sharing 2.0 – Utility Driven Upgrades

- Utility Driven Upgrades
  - Allows a window for developers to fund an enhancement to a planned utility substation upgrade
    - *For example, if a utility is replacing a 25MVA transformer in kind due to an asset condition issue, the utility will review market interest and determine if they can upgrade to a 40MVA transformer.*
    - *If possible, then the utility will pay for the cost of a 25MVA transformer replacement, and any cost difference between the 25MVA bank and a 40 MVA bank will be the responsibility of participating projects.*
  - If funding isn't received during the open window, the utility moves forward with the originally planned substation upgrade
  - Utility mobilization for work begins at 75% of cost attainment. Costs of Qualifying Upgrades not recovered by projects being developed would be placed into the utility's rate base for recovery

Interconnection Process
Cost Sharing 2.0 – Market Driven Upgrades

Substation Upgrades – Other than Substation Transformer Installation/Upgrades	3V0 substation upgrades Substation LTC or Relay Modifications Substation modifications allowing for the implementation of advance inverter or command/control schema
Substation Transformer Installation/Upgrade (size increase) and associated equipment installation /upgrades	
Distribution Upgrades	Three phase extensions Three phase line reconductoring Three phase new feeders
Secondary network upgrades	Mainline installations (new feeders and/or conduit installations) manhole, structure, and/or service box installations for DG/ESS (new or enlargements) secondary transformer installations (new or upgraded)

Upgrades must support more than one project, cost greater than $250,000 and be >50kW up to 5MW.

Best Practices & Resources

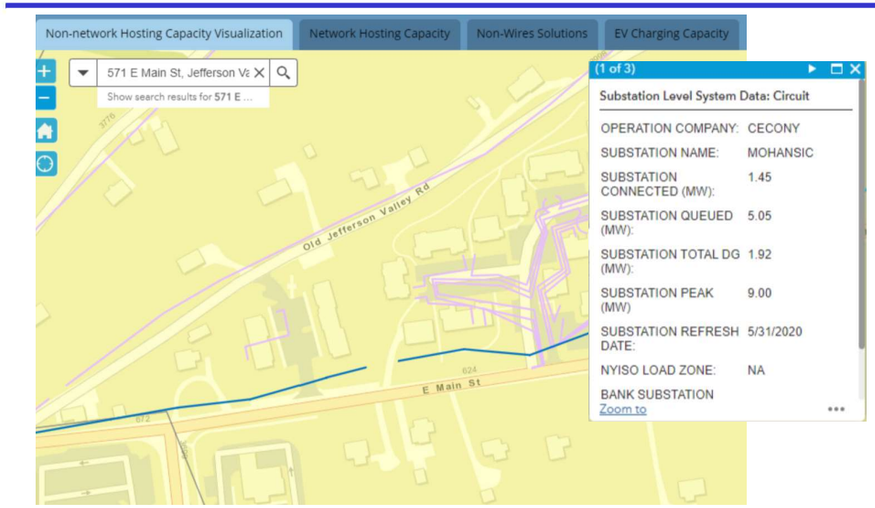
Interconnection Process
Best Practices & Interconnection Resources

- Submit an understandable Appendix K
- Engage the local fire department and/or Authority Having Jurisdiction (AHJ)
- Understand utility operating requirements and construction standards
- Identify the Operational Parameters of the ESS System (hardware & software)
- Develop a construction timeline
- Review the SIR Requirements and milestones

Interconnection Process
Best Practices & Interconnection Resources

Joint-Utility Efforts

- Distributed Generation Interconnection
- Non-Wires Solutions
- System Data
- Hosting Capacity Working Group
- Information Sharing Working Group



Interconnection Process
Best Practices & Interconnection Resources

- Developer Focus Groups with Energy Services
- Host Annual Workshops/Forums
- Support Annual CUNY Workshop
- Host Annual Webinar for Energy Storage
- Engagement with EPRI P174 (DER Integration) Working Group & Internal R&D group Support
- Hosting Capacity Map Support and Training
- ConnectDER Initial Launch and Ongoing Support

Tariff updates
Value of Distributed Energy Resources

Raanan Korinow

Project Manager, Customer Operations

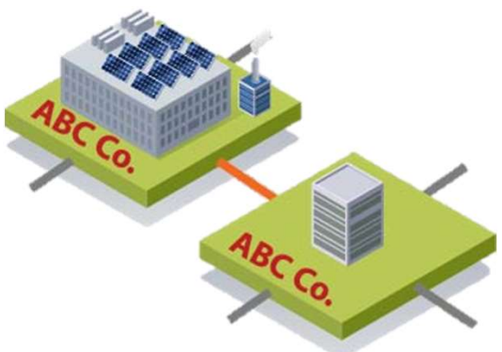
Topics

- New Remote Crediting program replaces Remote Net Metering
- Customer Benefit Contribution (CBC) charge for mass-market Solar PV customers

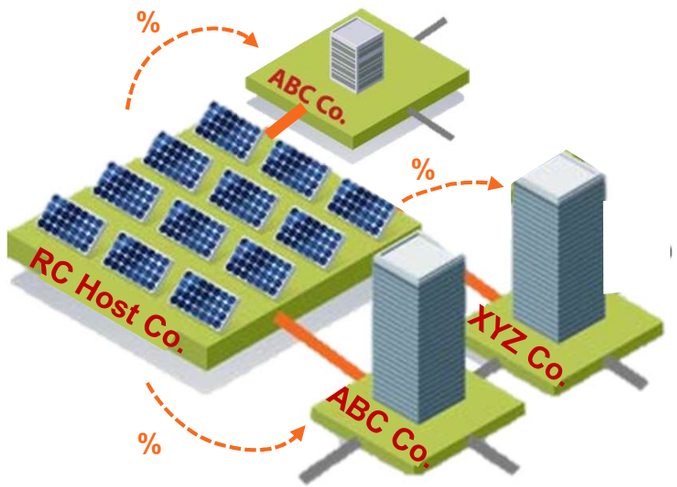
Remote Crediting

- The PSC sunset the Value Stack Remote Net Metering (RNM) tariff
- In its place, new “Remote Crediting” replacement program is available
- The same Value Stack rates that applied to RNM also apply to Remote Crediting
- The changes took effect September 1, 2021

Major differences between RNM and Remote Crediting



RNM Project



Remote Crediting Project

- Multiple unrelated customers can participate in the same project
- A satellite can now participate with multiple related *and unrelated* hosts
- Credit no longer applied in the order that satellites are billed
- Instead, Host allocates credit to each satellite as a % of the monthly generation by submitting an allocation form to the utility
- Unallocated credit offset's Host account's charges, and remainder can be re-allocated to satellites

Who can participate in Remote Crediting?

- Host
  - Any Value Stack-eligible project can apply for Remote Crediting, e.g.:
    - Solar PV
    - Energy Storage
    - Solar PV + Energy Storage (“Paired Storage” or “Hybrid”)
- Satellites
  - Up to 10 offtakers per project
    - Each offtaker can have any number of Con Edison Electric account satellites
      - May participate in one or more Remote Crediting projects
      - Cannot have non-Value Stack onsite generation (e.g., CHP)

Remote Crediting compensation is allocated to subscribers

- Submit Allocation Form (Excel file) with Form G

	RC Customer (designated above)	Con Edison Account Number	Con Edison Account Name	Allocation Percentage
1	ACME Corp.	850320671200012	ACME Headquarters	40.000%
2	ACME Corp.	850320672300003	ACME Warehouse	10.000%
3	Stark Industries	941320332520082	Stark Labs	10.000%
4	Stark Industries	155623447586120	Stark Midtown	10.000%
5	Stark Industries	965201160228540	Stark Helipad	15.000%
6	Wonka Chocolates	923525630310500	Wonka Industries	15.000%
7				
8				

- Allocation can be updated up to monthly, with 30 days' notice

Switching into Remote Crediting?

- PSC recently issued an order regarding switching compensation between Community Distributed Generation (CDG) and Remote Crediting
- The order describes rules & timelines for switching
- The process to switch compensation before and after PTO may differ
- Utilities are directed to file tariffs to be effective September 1, 2022

New Customer Benefit Contribution (CBC) charge

- In July 2020, the PSC issued its “NEM Successor Order” which applies to all NYS utilities
- Primarily impacts residential & small-commercial rooftop Solar PV
- **New monthly charge for mass-market NEM-eligible DG customers *beginning 1/1/2022***
- Surcharge recovers costs of public benefit programs, like Energy Efficiency, bill credits for low-income customers, and NYSERDA funding

Install DG before 1/1/2022	Install DG on or after 1/1/2022
Eligible for NEM credits	Eligible for NEM credits ***with a new non-bypassable “Customer Benefit Contribution” (CBC) monthly charge***

- Additionally, NEM-eligible customers on TOU rates to receive monetary crediting

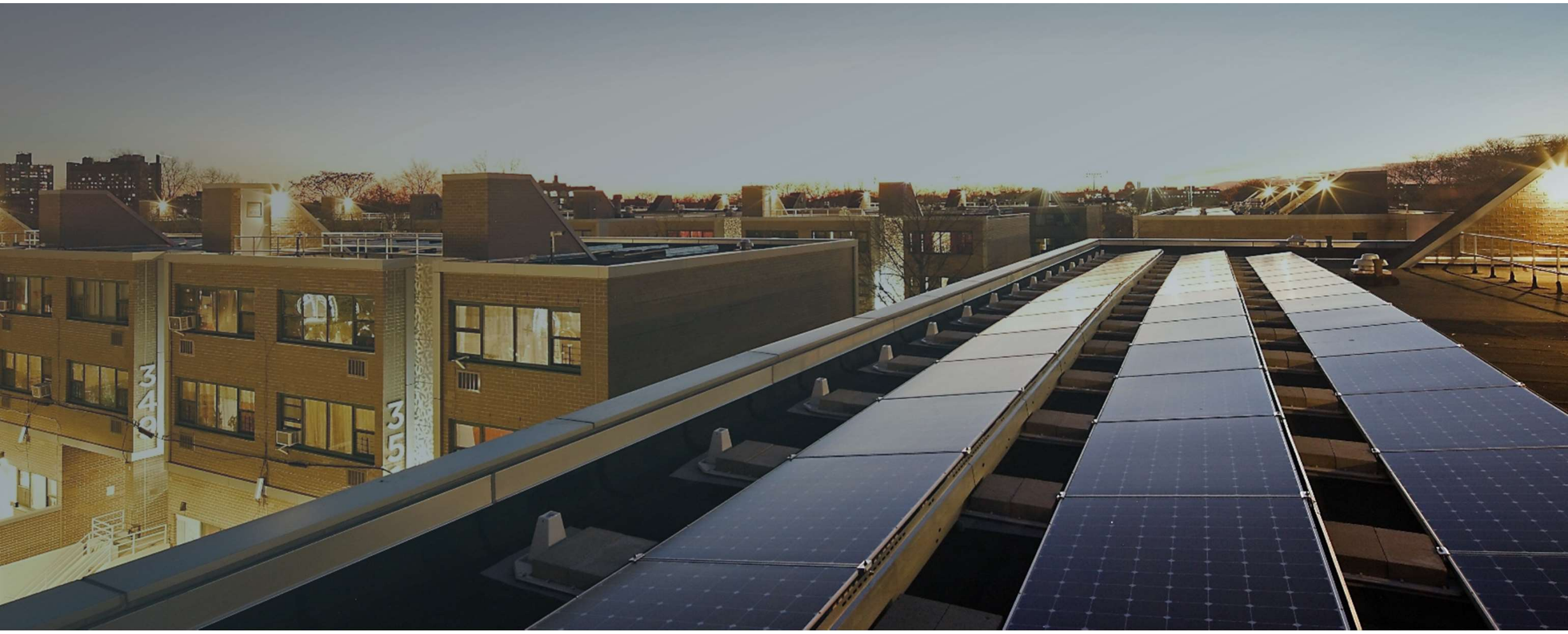
CBC Charge for mass market NEM-eligible customers

CBC Charge = **CBC Rate** ✖ **Size of DG**

- **The CBC Charge is assessed in every month of a DG customer's 20-year NEM enrollment term**

- **$ per kW of DG size**
- Recovers public benefit program costs associated with the avoided kWh revenues by 1 kW of DG
- There are different CBC rates based on SC & rate, DG technology, and crediting methodology
- A typical residential customer with Solar PV will have a $0.94/kW CBC rate for 2022
- CBC Rates are updated annually and will be posted on a statement found at coned.com/rates

- **kW-dc of DG nameplate capacity**
- Only factor the NEM-eligible technology (e.g., Solar PV DC panel ratings)
- Pairing Energy Storage with residential solar will not increase the CBC charge



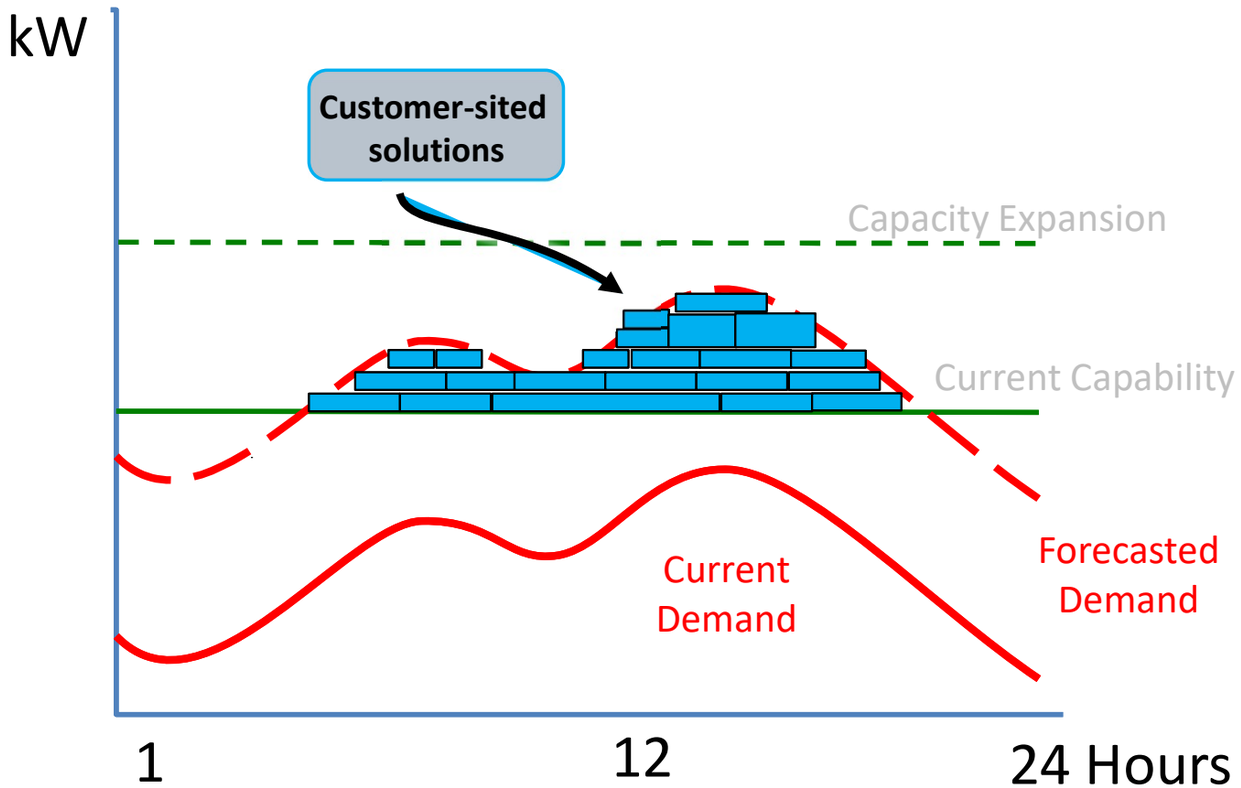
DG Workshop Non-Wires Solutions

July 20, 2022

conEdison

Non-Wires Solutions (NWS)

Non-Wires Solution projects are a **portfolio of non-traditional solutions** that seek to defer or eliminate traditional infrastructure projects for the benefit of the distribution system

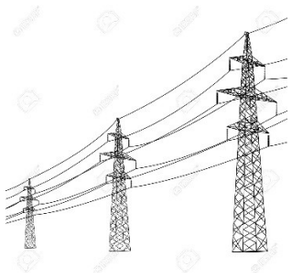


NWS leverages innovating technologies to reduce peak load including:

- Energy Efficiency
- Distributed generation technologies (CHP/Fuel Cells)
- Dispatchable battery energy storage

NWS currently has two active projects in eligible networks in Brooklyn and Queens

NWS Process Overview



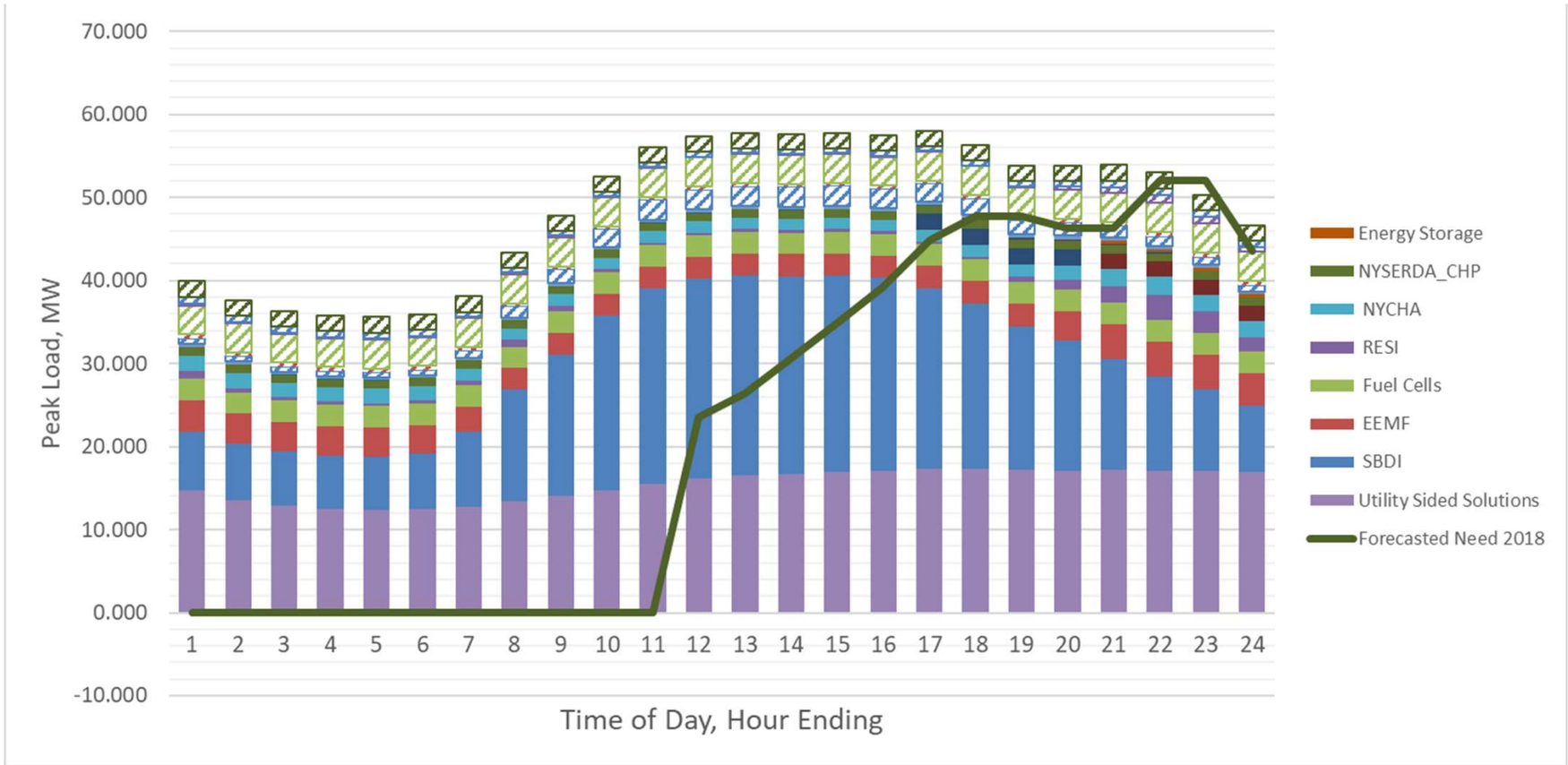
Identify System Needs

NWS Suitability

Competitive Solicitation

BCA Evaluation & Procurement

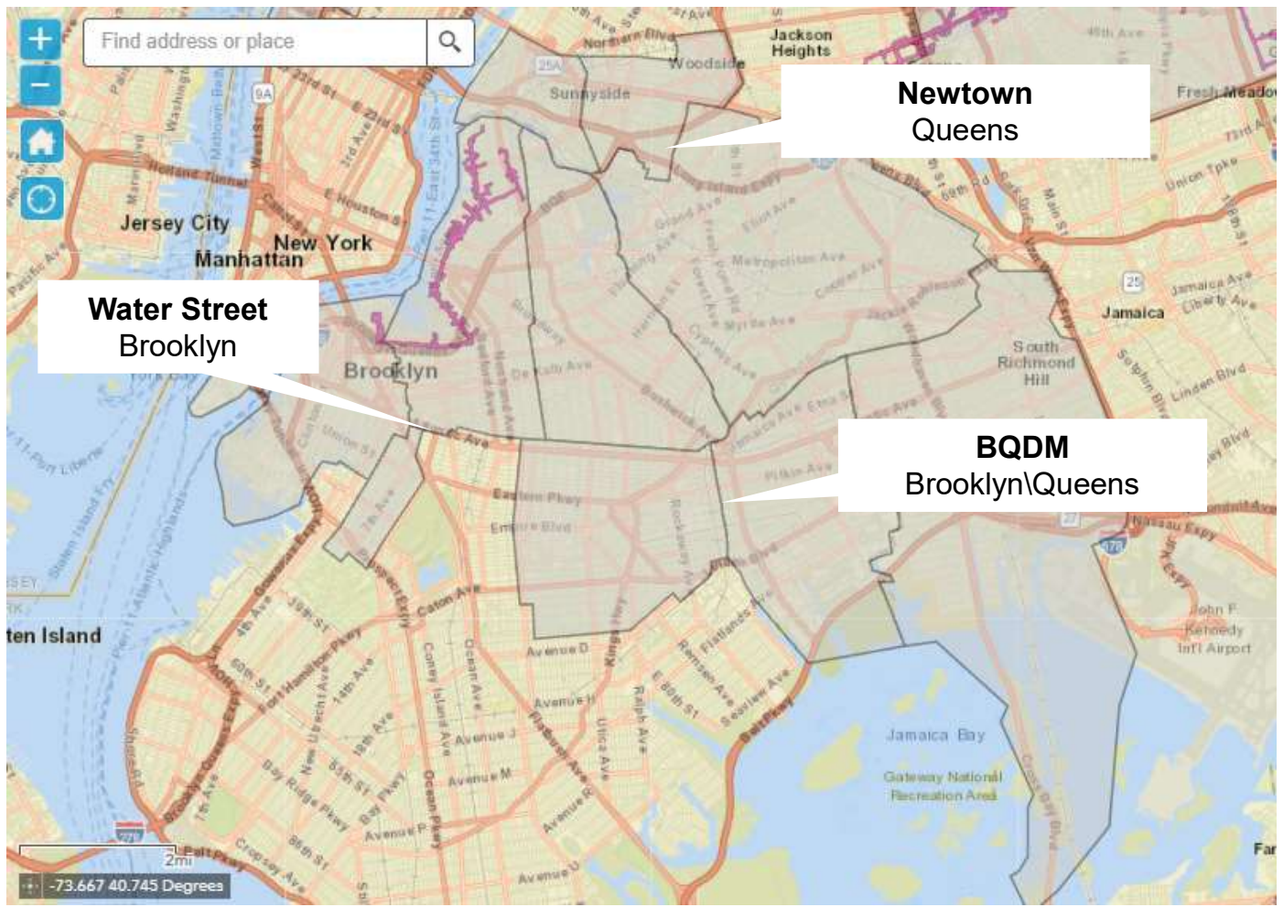
Portfolio Approach is Key



Key Considerations

- ✓ Ensure reliability
- ✓ Customer experience
- ✓ Diversified portfolio
- ✓ Integration of diverse technologies

Current NWS Portfolios Under Implementation



Eight RFPs released since 2017 →
- Streamlined evaluation process
- Vendor feedback

Newtown project
- Under implementation

Water Street project
- Recently closed

BQDM project
- Extended with **new offering**

New NWS opportunities evaluated on an on-going basis

New BQDM ESS Program

The BQDM project has been extended with new offerings for battery energy storage systems

Applications will be reviewed through December 2023 // Eligible system sizes: 50 kW – 5,000 kW

Load Following

(Behind-the-meter; does not require circuit level upgrades)

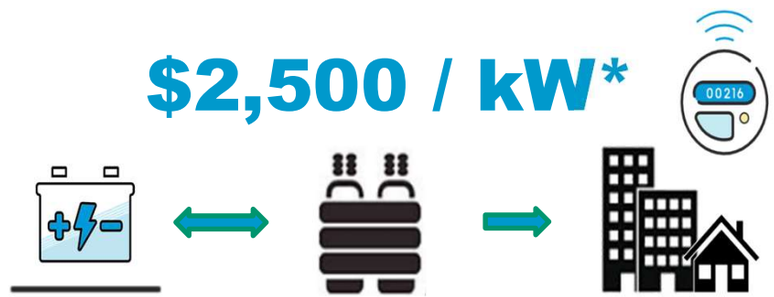
$3,000 / kW*

Energy Storage System | Existing Services | Electric Distribution System

Grid Connected

(Front-of-meter; requires circuit level upgrades)

$2,500 / kW*



Energy Storage System | Electric Distribution System | Existing Services

****Participating projects installed and operational prior to May 2025 are eligible for a 10% installation bonus***

To find out more – email DSM@coned.com and join the NWS team on July 28th for our webinar!

Energy Storage and NWS

Non-Wires Solutions procures battery energy storage systems for first dispatch rights during network peak hours on NWS days for 10-year performance contracts

Benefit System Needs

- Focus on “customer-sided” solutions
- ESS Program Agreement
  - Minimum 4-hour system duration
  - Operate for 10 consecutive Summer periods
    - Defined as May 1 – September 30
- Day-ahead notification
- Interconnection in accordance with NYS SIR
- Participating systems required to interconnect within local reliability standards

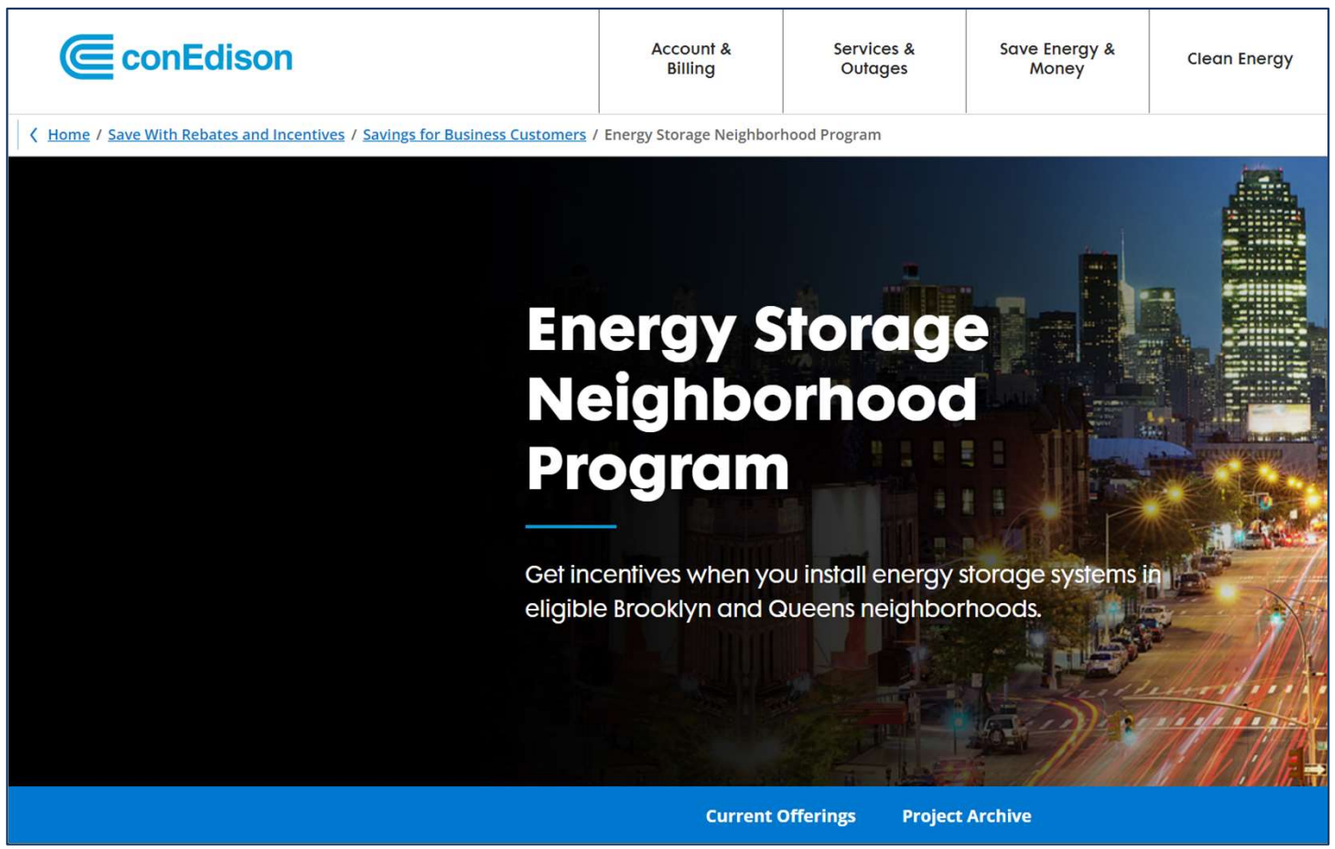
Revenue Structure

- NWS Payment:
  - 50% incentive payment at Operational Date
  - 5% annually for each Summer period
- Not eligible for Con Ed’s DR/DM/DLM
- Must meet NWS dispatch requirements before any other arrangement with the customer or applicable markets
- Maximize current and future ESS revenue streams

Stay Informed on Upcoming RFPs and Incentives

www.coned.com/nonwires - For future RFP announcements

www.coned.com/neighborhood - For ongoing incentive offerings



To receive communications on new BQDM ESS Program offering, contact:

DSM@coned.com

Questions? Contact:

Casey Siwinski

Siwinskic@coned.com

Break – 10 minutes

DG 2022 Summer Workshop

Bulk Solicitation

Brian Schaitkin

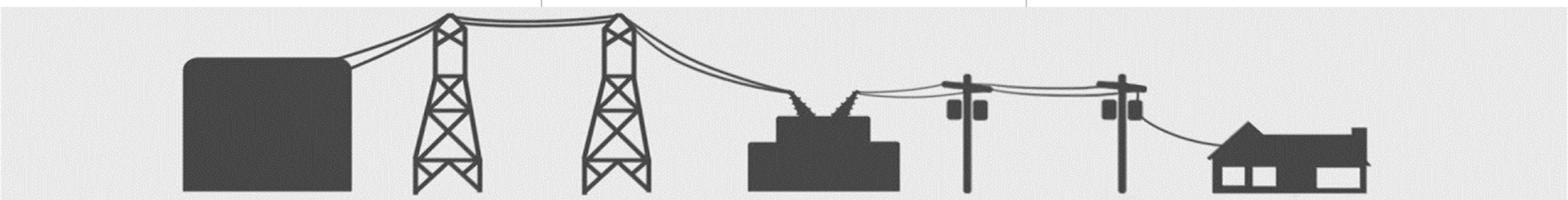
Utility of the Future

The bulk solicitation is designed to procure storage in line with New York State goals

- 2018 Energy Storage Order requires company to procure storage through RFPs
  - Two procurements held in 2019 and 2021 open to distribution and transmission connected projects
  - 100 MW currently under contract
- Climate Leadership and Community Protection Act (CLCPA) calls for 1,500 MW of storage deployed statewide by 2025 and 3,000 MW by 2030.
  - Governor Hochul has revised this goal to 6,000 MW by 2030
- To facilitate progress towards goal:
  - Con Edison will hold RFP for distribution connected projects starting Q4 2022
  - NYSERDA conducting second storage roadmap to help accelerate storage deployment

The procurements purchase dispatch rights to storage systems for up to 10 years with both transmission and distribution interconnections

Transmission	Distribution	Customer
Peaking capacity	Infrastructure deferral	Demand charge reduction
Energy arbitrage	Voltage support	Reliability and back up
Blackstart/voltage support	Avoided renewable curtailment	Voltage support
Frequency regulation	Energy arbitrage	Electric vehicle charging
Renewable balancing	Renewable balancing	

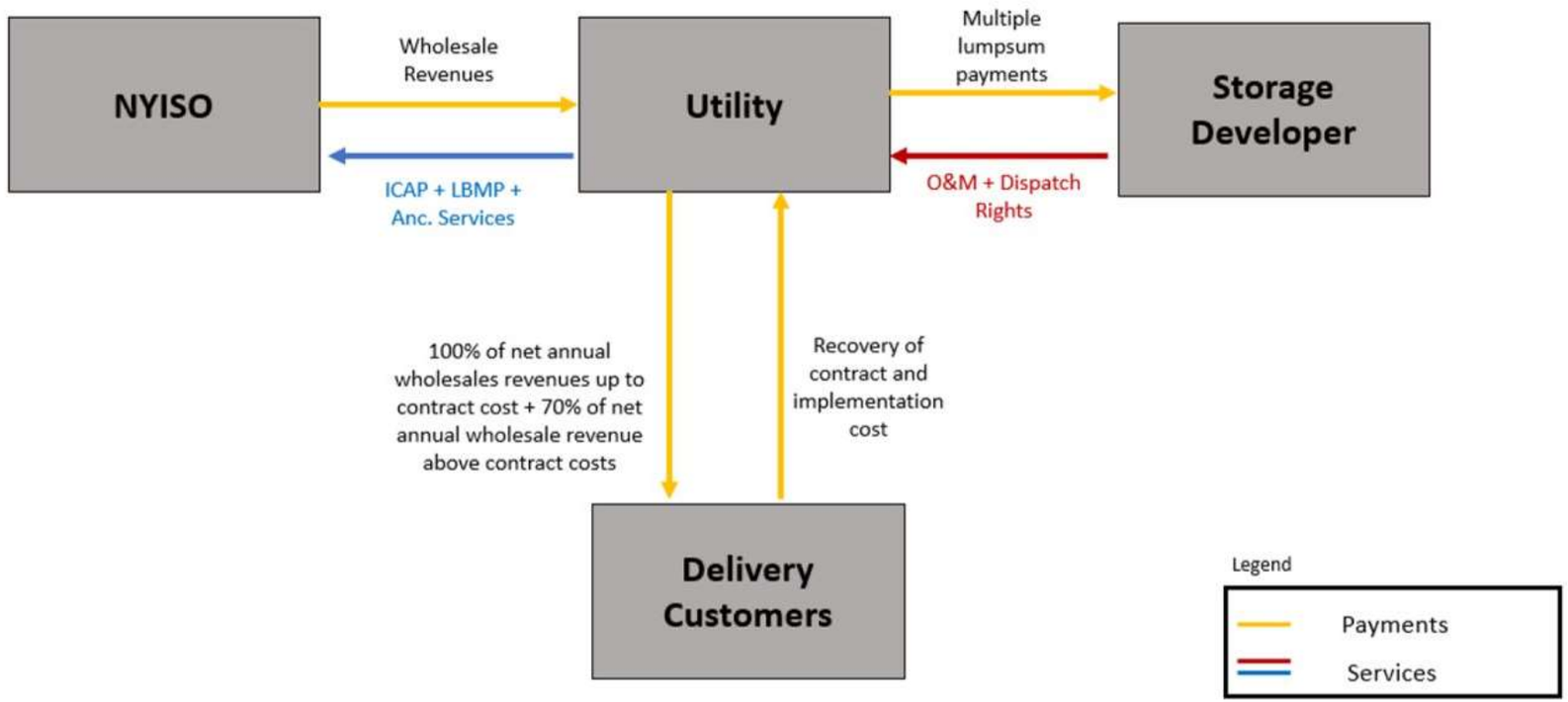


Key opportunities and challenges for bulk storage deployment in New York

- Ambitious goals for emissions reductions and deployment of renewable generation
- Engaged legislative and regulatory authorities
  - ACOS order including 15-year buyback demand charge exemption and other measures to reduce charging costs for storage projects
- Future structure and revenues in wholesale market uncertain
- Supply chain issues
- High costs of obtaining suitable locations
- Dense existing infrastructure and accompanying permitting challenges

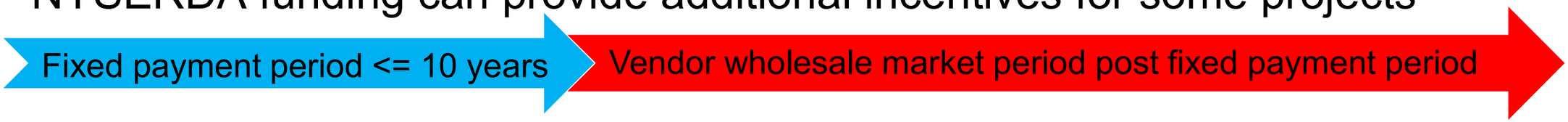
General arrangement of bulk energy storage

- CECONY issues RFP and evaluates responses based on technical, qualitative, and quantitative criteria
  - Each project must be over 5MW
  - Four-hour duration
  - Projects must be front-of-the-meter
- CECONY pays 70% at COD and the remaining 30% in annual payments
- The asset will be scheduled by Con Edison into the wholesale market daily
- Developer is responsible for maintaining the asset and meeting performance requirements over contract term.



Specifications and considerations for projects applying to 2022/23 distribution connected storage RFP

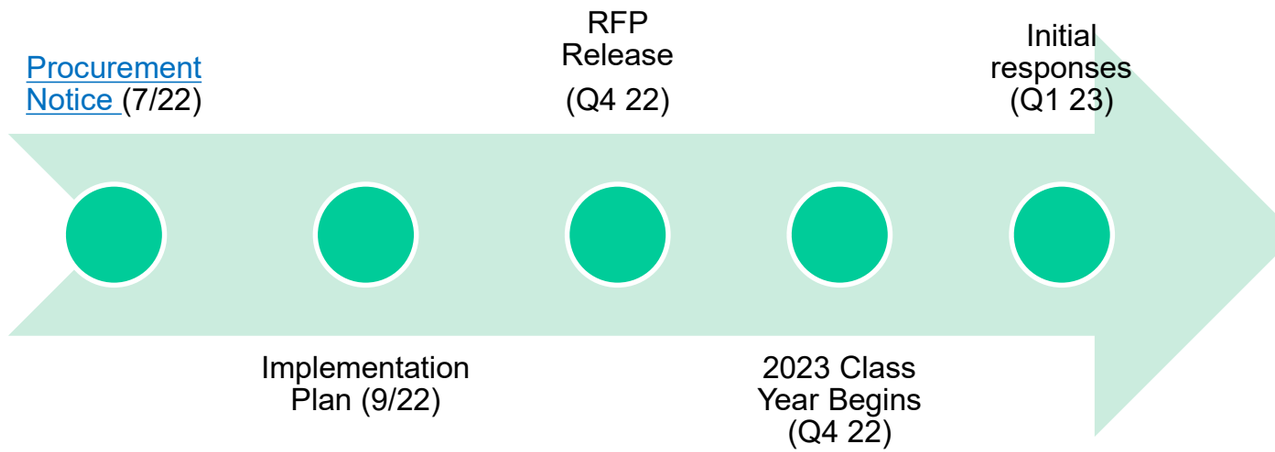
- Tariff adjusted based on ACOS order including 15-year buyback demand charge exemption
- 5 MW minimum
- Up to 10-year contracts with ownership reverting to developer thereafter
- Electrically connected inside Con Edison service territory
- Commercially available technology only
- Developers seeking contracts should develop offer prices considering ability to earn wholesale market revenue during post-contract period
- NYSERDA funding can provide additional incentives for some projects



The distribution connected solicitation is scheduled for Q4 2022

- Timing of distribution procurement
  - RFP Q4 2022
  - Project approval and contracting in 2023
- Action items for developers interested in upcoming procurement
  - Review 2021 bulk storage documents
  - Identify sites and begin interconnection and CRIS rights processes
  - Email bulkstoragerfp@coned.com with questions

Possible timeline



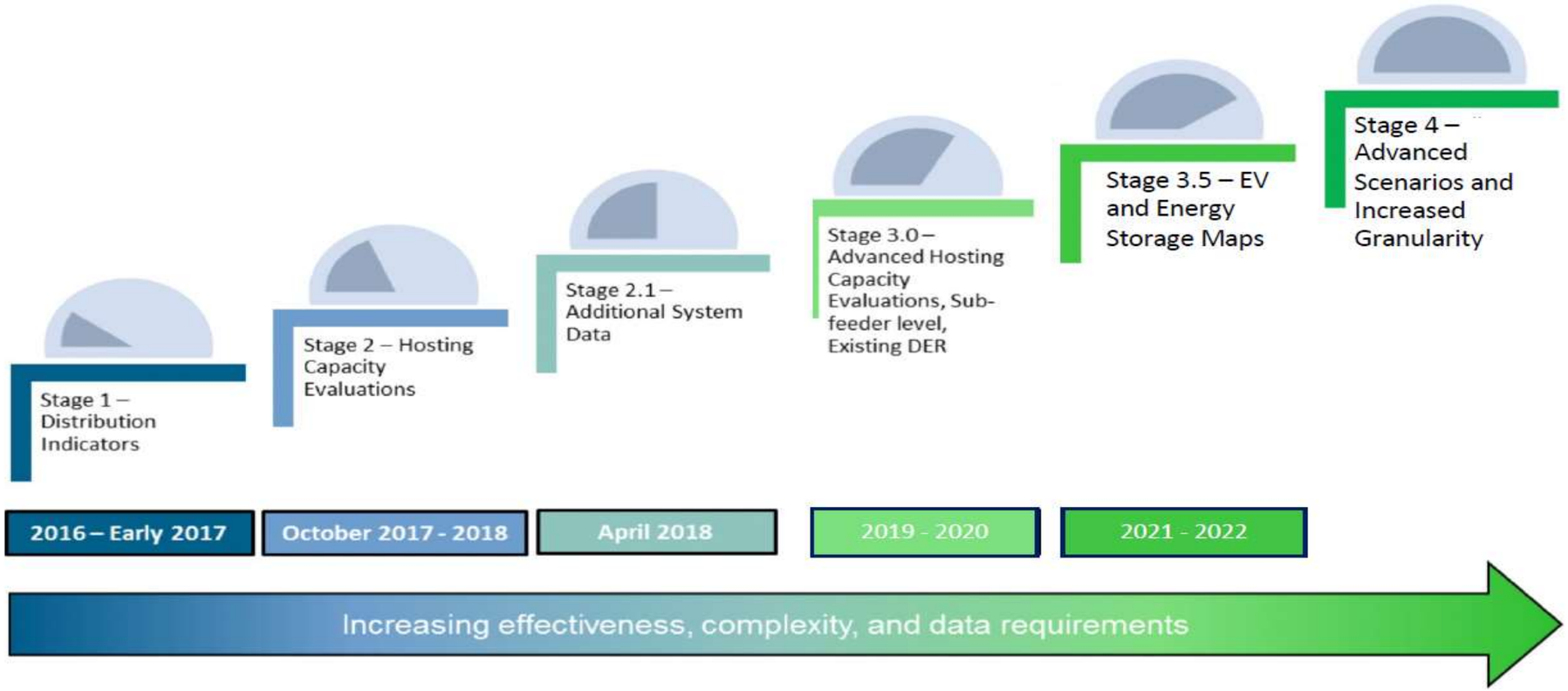
Hosting Capacity Road Map

Jared Trumpetto

Project Manager

Evolution of the Roadmap

The Joint Utilities, with guidance from stakeholders developed a four staged Hosting Capacity implementation roadmap. This was incorporated into New York Utility filings.



Overview: Stage 1

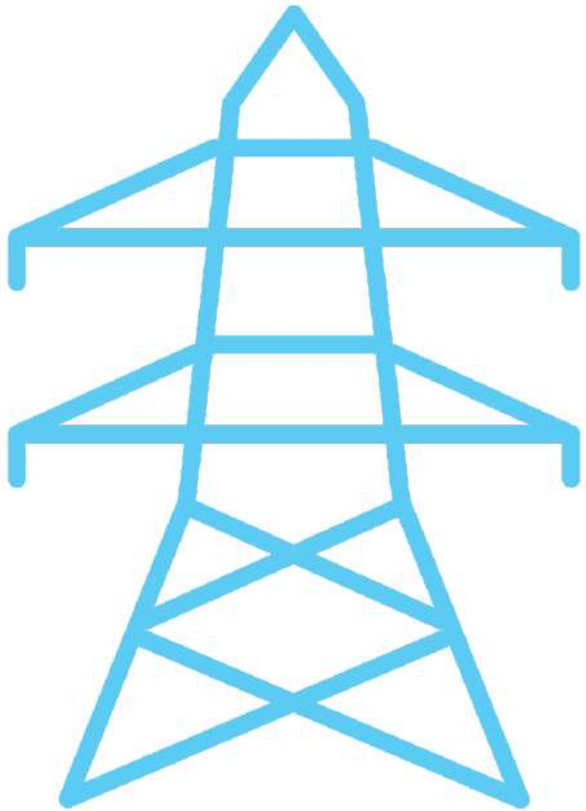
In 2021, the JU proposed Stage 1 of the HCA maps show…

1. Feeder-Level Hosting Capacity (min/max)
2. Additional System Data
3. Downloadable Feeder-Level Summary Data
4. Reflect Existing DER in Circuit Load Curves and Allocations

Due to stakeholder feedback, all map views now also show…

- post sub-transmission circuits that are available to host distributed generation on their individual portals to help developers best evaluate options for storage connections.

Daytime Minimum Load and Peak Load



The JU have discussed the use of one or two input load files tied to:

- Daytime minimum load
- Peak load

The JU has agreed to the following outputs:

- From the storage run in DRIVE, an output file providing charging limits (from peak load analysis) and discharging limits (from daytime minimum load analysis)

Pop-up Items

All Utilities

Date.

Local hosting capacity (MW). Depending on the map view. the popup will either show the min/max hosting capacity for charging or the min/max hosting capacity for discharging.

Substation/bank name. The substation that the selected feeder is connected to.

Feeder. The selected circuit's name/number.

Substation/bank rating (MW). The substation / transformer bank design rating in MW.

Feeder voltage (kV). Voltage level of the selected feeder.

Most Utilities

Anti—islanding HC limit (MW). Except for National Grid, all utilities will also show anti-islanding HC value (it will not be used to color the feeder range for hosting capacity).

Disclaimer/Awareness

When the Hosting Capacity Tab is selected a screen appears showing a legal disclaimer.

- The maps represent the feeder level energy storage hosting capacity only and do not account for all factors, such as other loads in queue, that could impact energy storage interconnection costs.
- The maximum hosting capacity value is indicative of the available hosting capacity at a specific location across the feeder segment, most often located at the beginning of a feeders three-phase mainline.
- The minimum hosting capacity value is indicative of the available hosting capacity across the length of the feeder and most often defined by the hosting capacity value located at the end of the three-phase mainline.
- This data is being provided for informational purposes only and is not intended to be a substitute for the established customer application process.

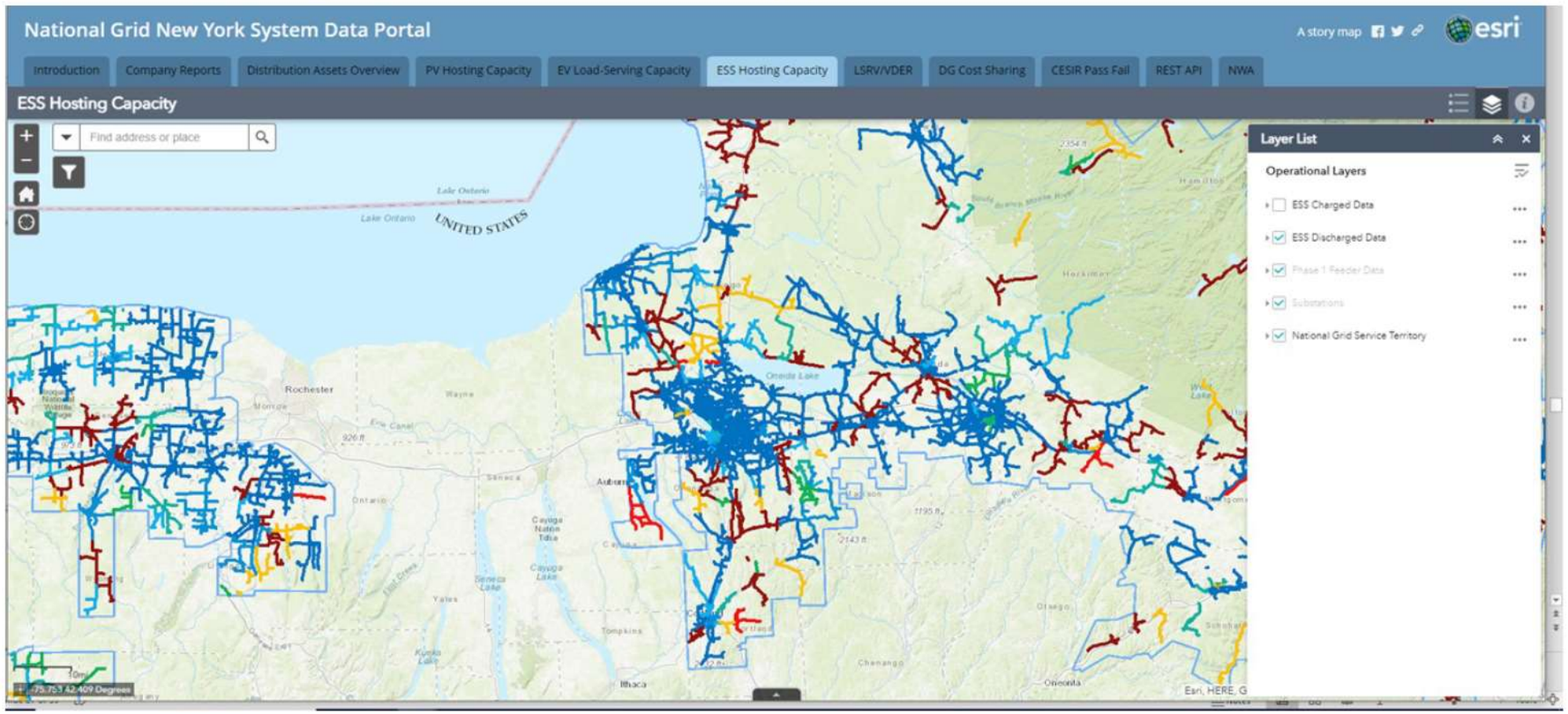
The Disclaimer links to ESS Hosting Capacity Analysis Methodology and Assumptions

- This document explains the assumptions and methods used in calculating the hosting capacity values and sheds light on how the results should be interpreted

Layer 1: Discharging

The ESS Hosting Capacity has two layers.

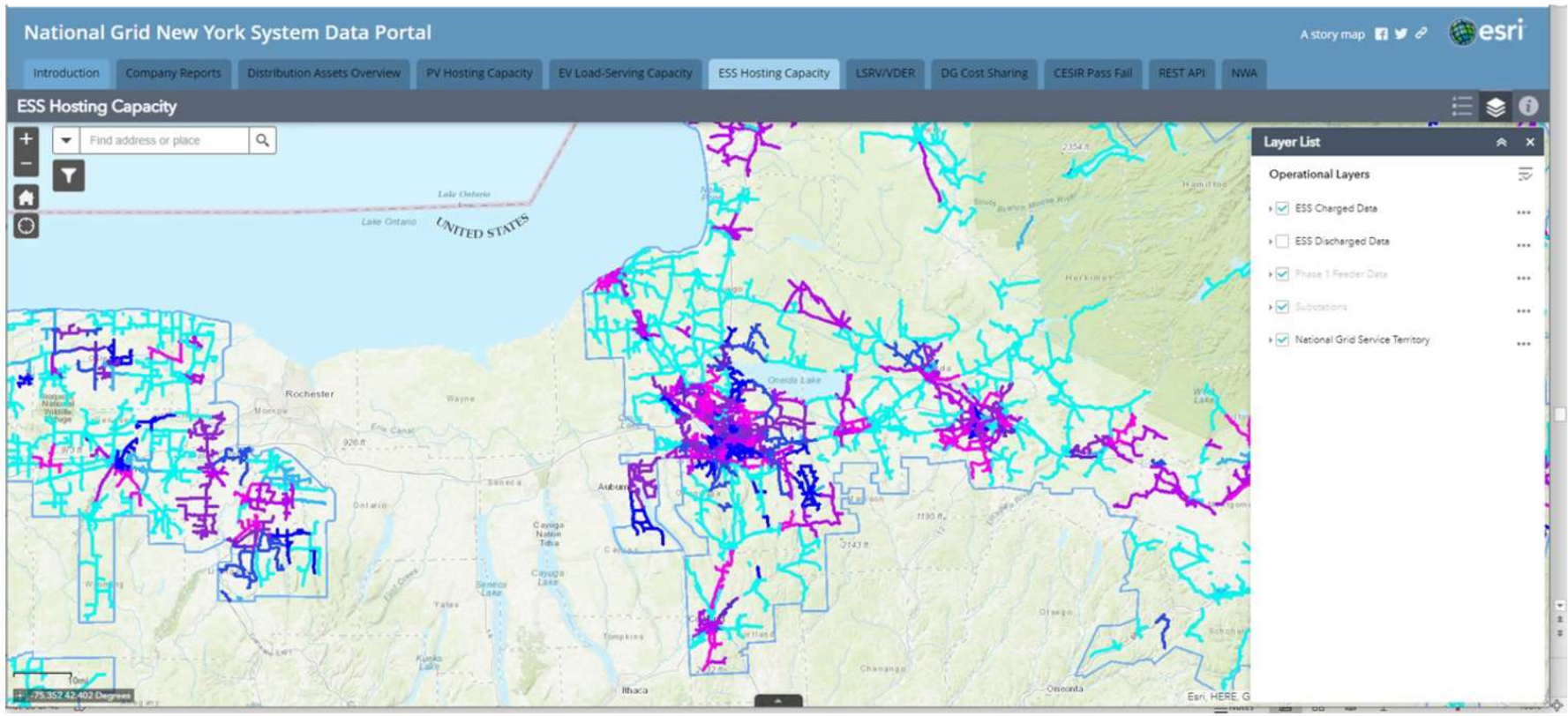
- Discharging is for exporting Power onto the Grid
- The data is mapped for the feeder ESS Hosting Capacity max.
- The min Hosting Capacity is provided in the popup.



Layer 2: Charging

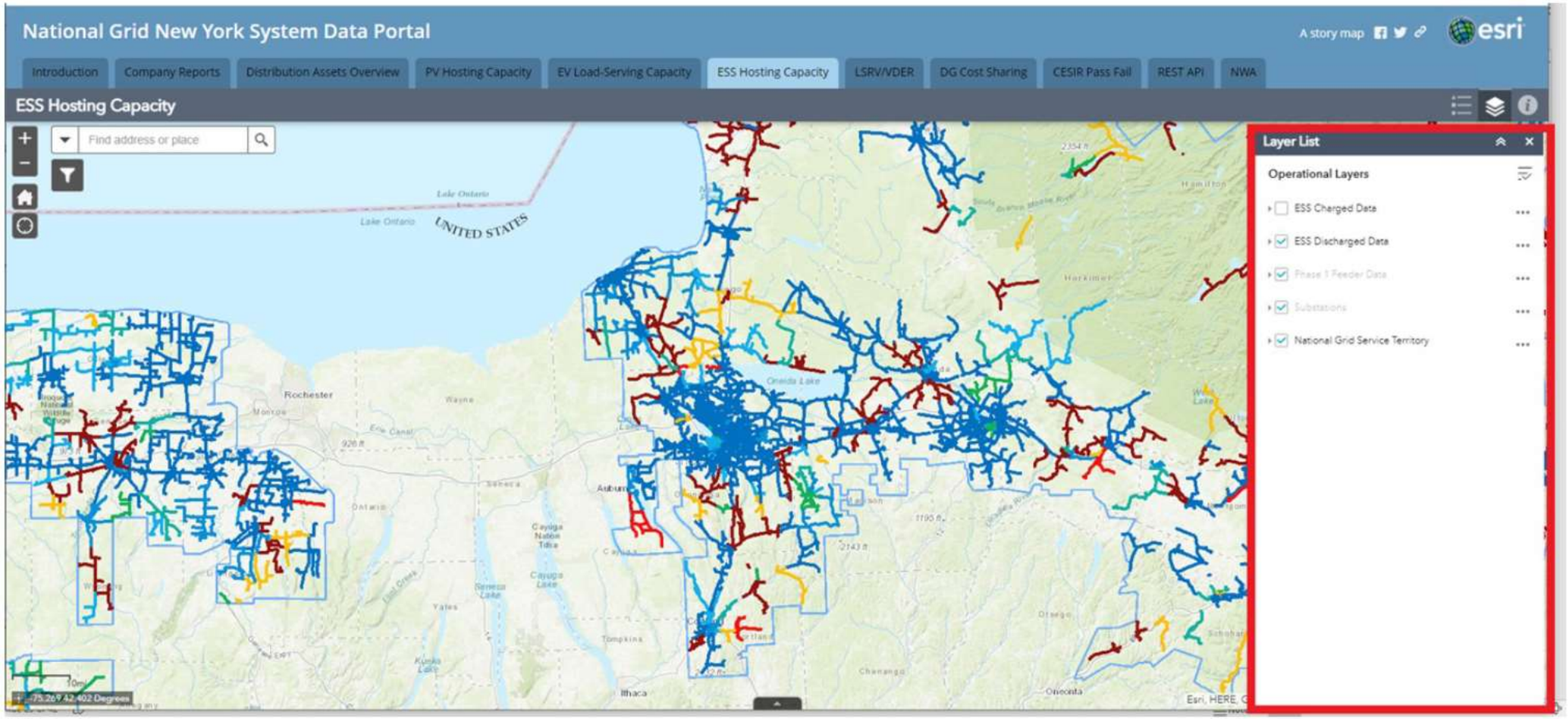
The ESS Hosting Capacity has two layers.

- This layer is for using the Grid to charge an Energy Storage System.
- The data is mapped for the feeder ESS Hosting Capacity max.
- The min Hosting Capacity is provided in the popup.



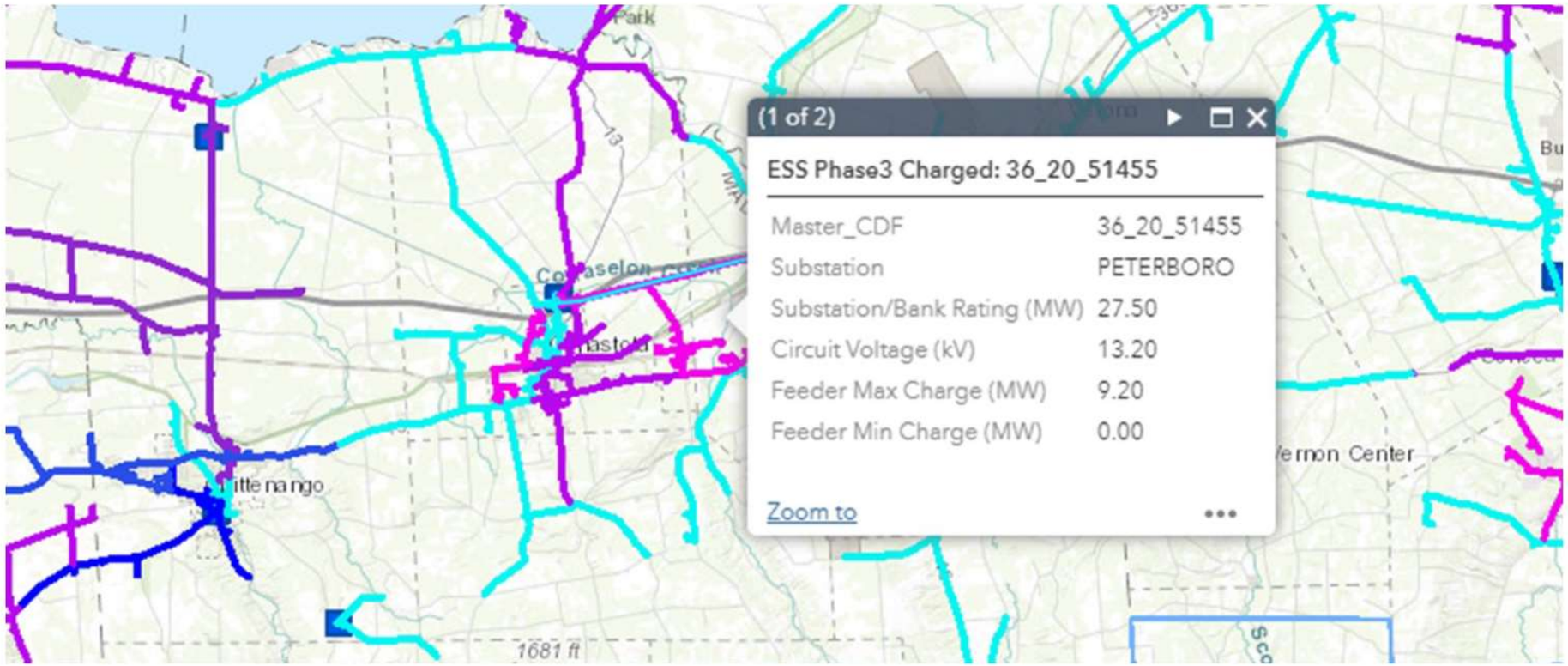
To toggle between displays…

Go to the layer list and select which mode you which to view charge or discharge.



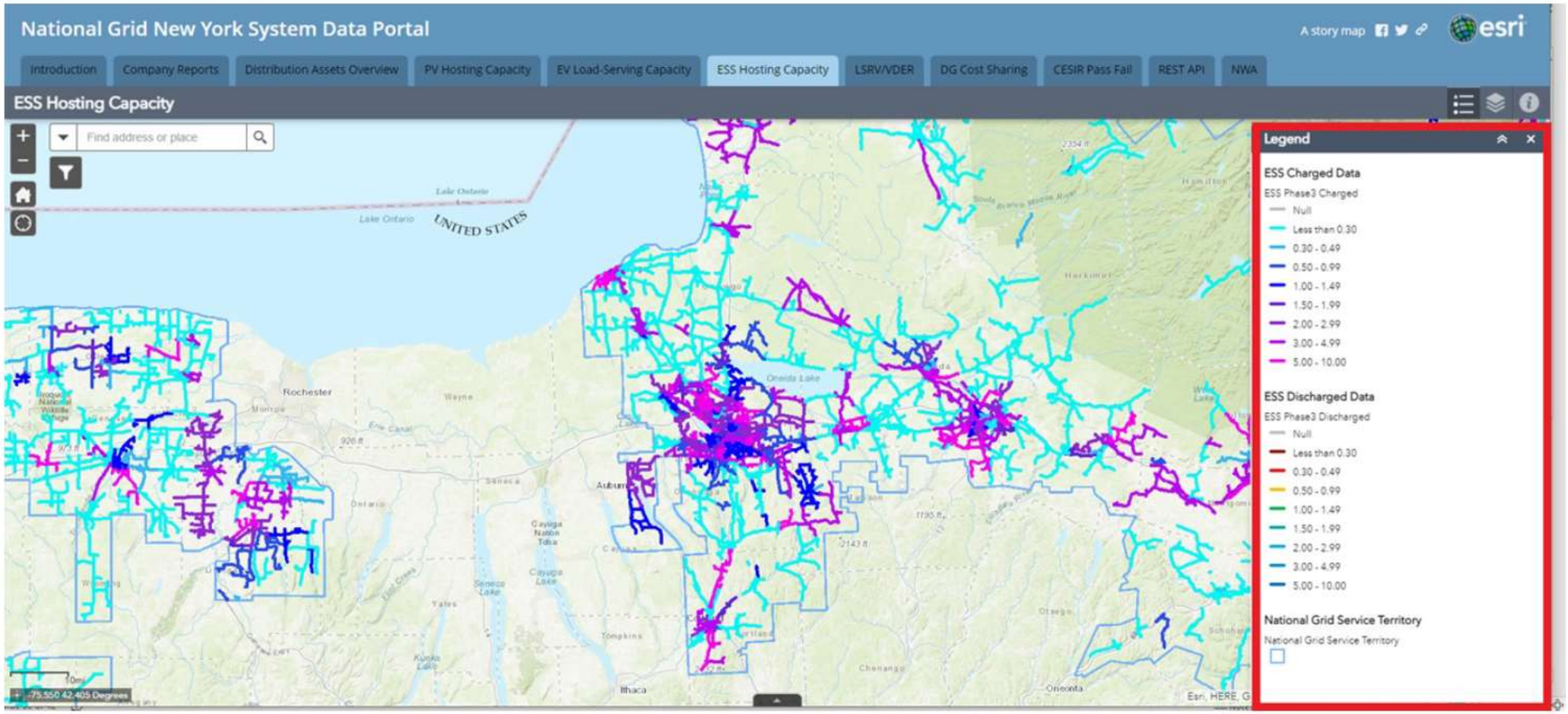
Pop-Up Data

Popup data is provided for feeder for more information.



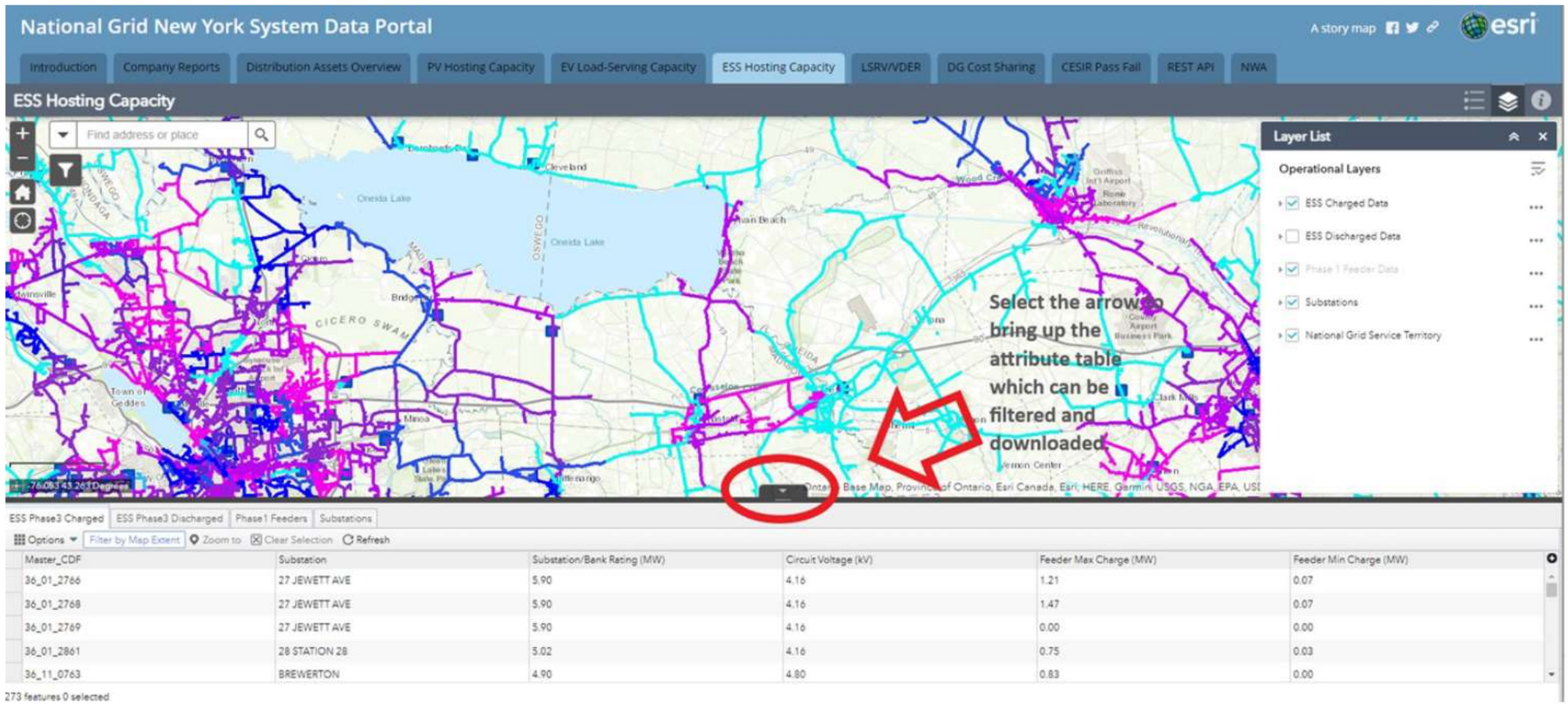
Color Schemes

Different color schemes were selected to differentiate between the modes of operation.



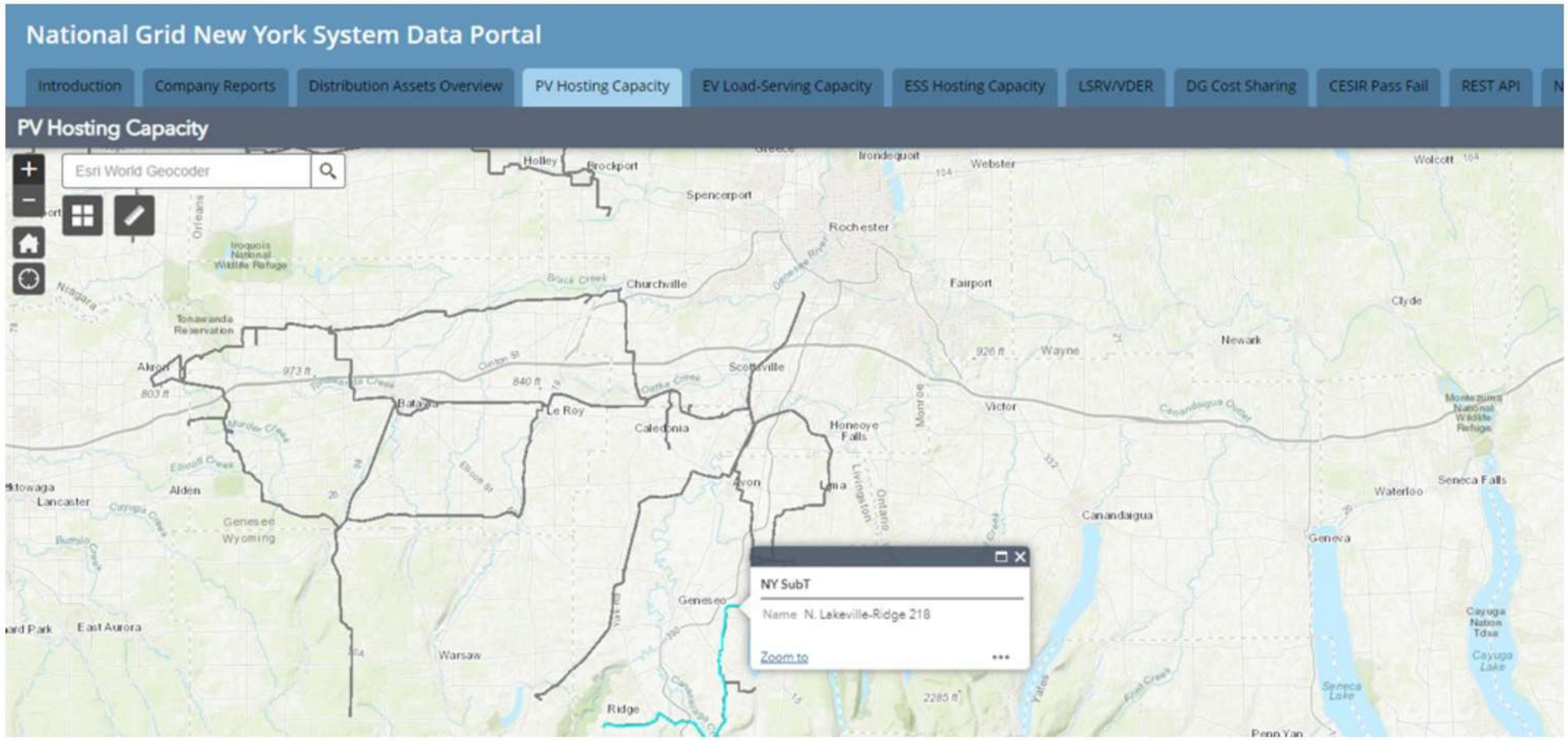
Downloading Data

The data can be downloaded as a CSV from the attribute table and filtered.



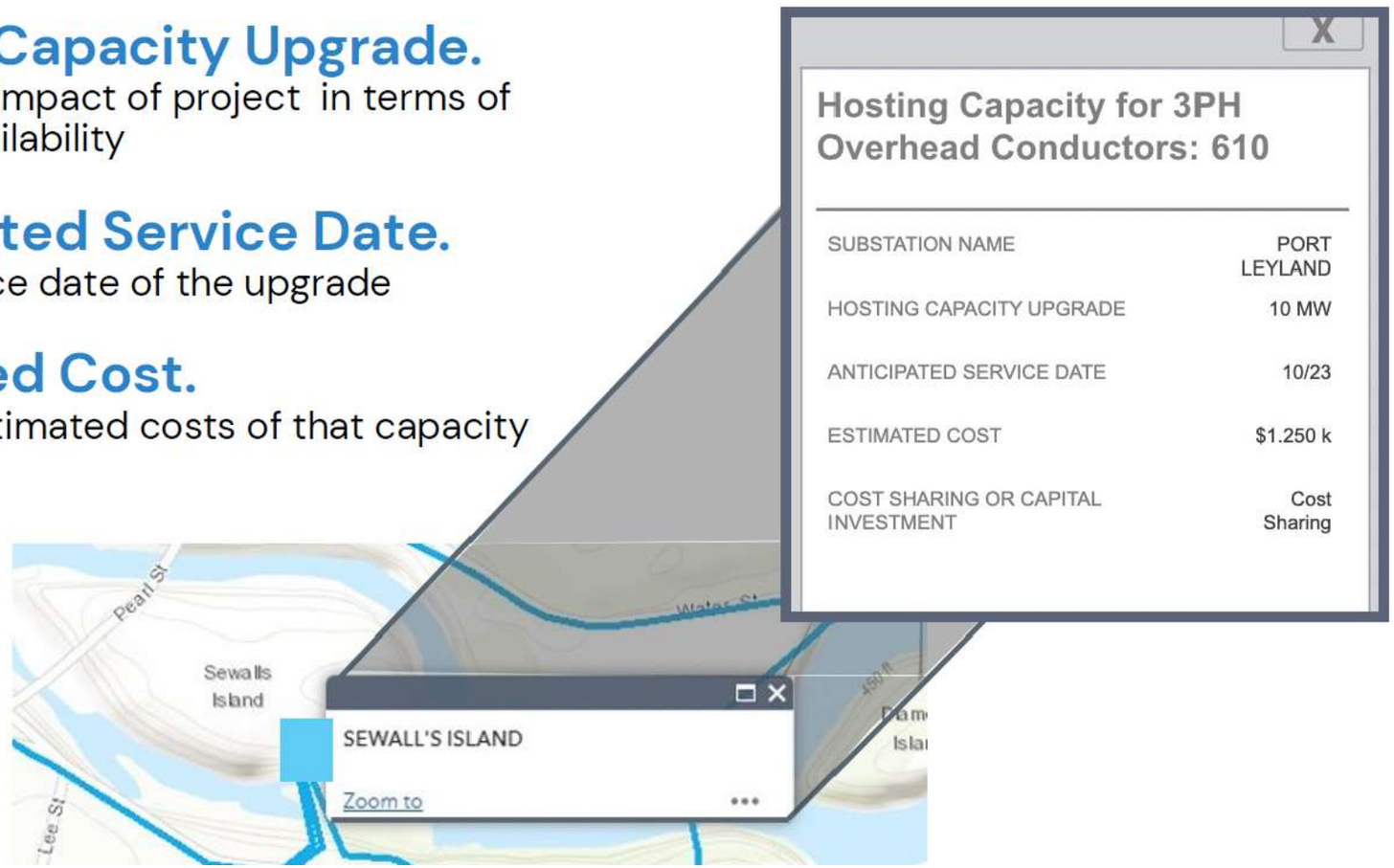
Additional Data: Sub-Transmission Lines

The Sub-Transmission lines available for interconnection have been added to our Hosting Capacity maps.



Cost-Sharing Mechanism: Additional Draw-down Items

- **Substation.**
  A planned upgrade's location
- **Hosting Capacity Upgrade.**
  Anticipated impact of project in terms of capacity availability
- **Anticipated Service Date.**
  The in-service date of the upgrade
- **Estimated Cost.**
  Known or estimated costs of that capacity



Storage Roadmap

2023	Late 2023-2024	TBD
▪ Sub Feeder Level HC ▪ Incremental Feeder Level Installed Since HCA Refresh ▪ Six-month Update for Circuits that Increase in DG > 500kW ▪ Continue to implement Cost Sharing 2.0	▪ Seasonal load profiles ▪ Additional 'scenarios' based on stakeholder input	▪ Continued granularity

At the interim, the JU proposes a seasonal, granular look at load profiles; offering data points outside of the most restrictive interconnection point throughout the year.

To provide different 'scenarios' in a year, beyond peak and minimum load, the JU would like **industry feedback** on additional 'scenarios' to run.

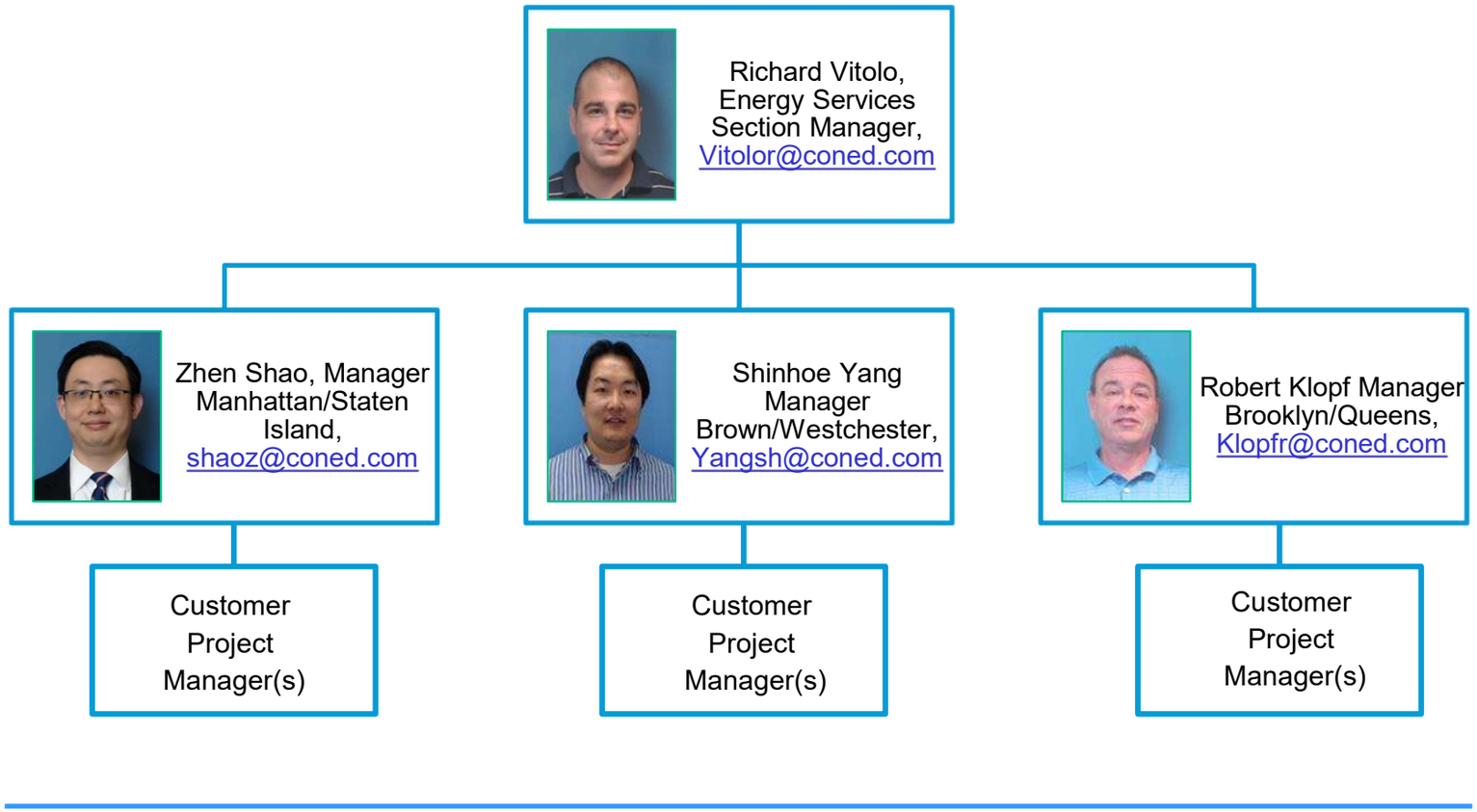
Distributed Energy Services

Anthony Santamaria

Customer Projects Manager

July 20, 2022

Distributed Energy Services (DES)



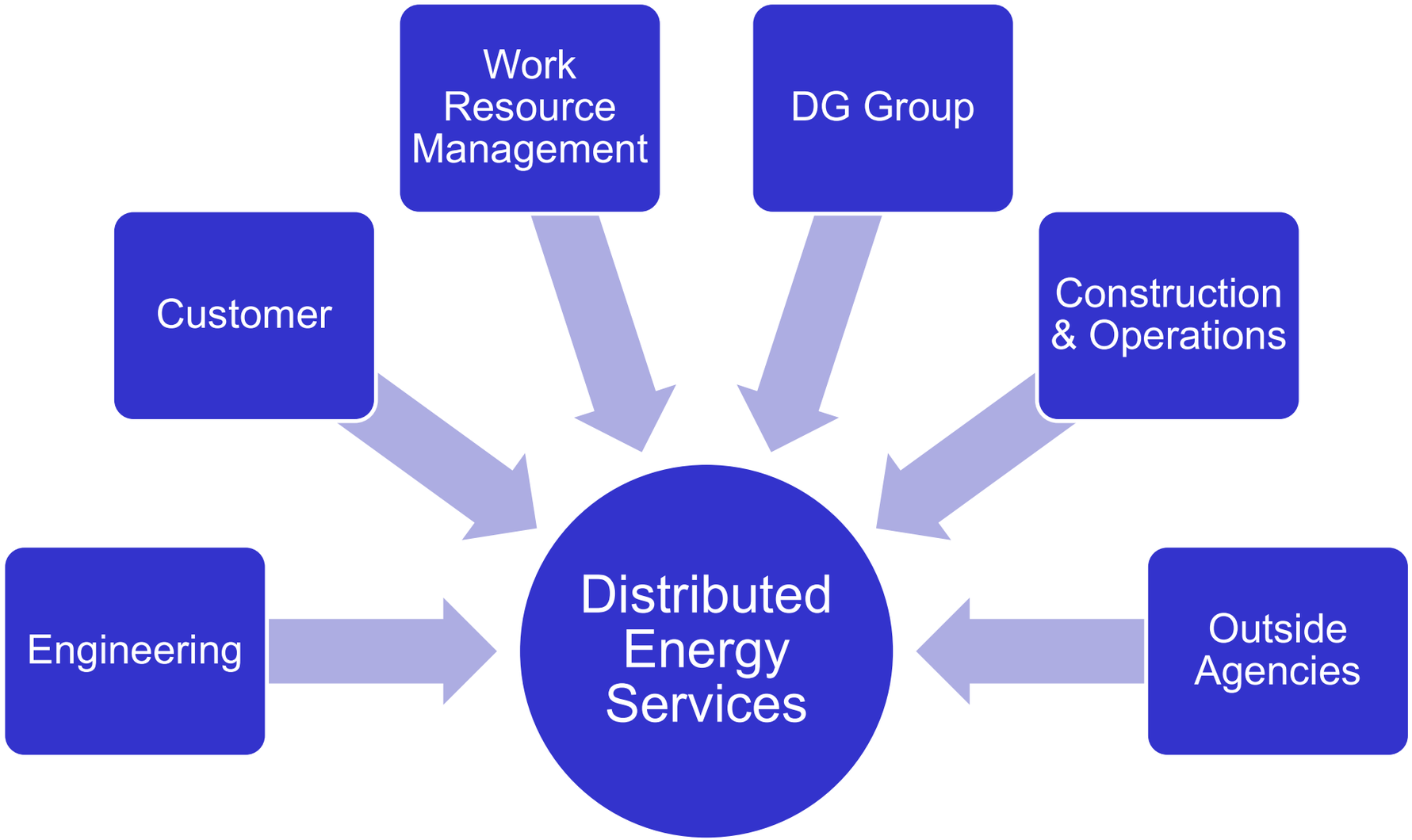
Distributed Energy Resources (DER)

Common Resource Types

- Combined Heat and Power (CHP)
- Battery Energy Storage System (BESS)
- Photovoltaic (PV / Solar)
- Fuel Cells

Resource Sizes

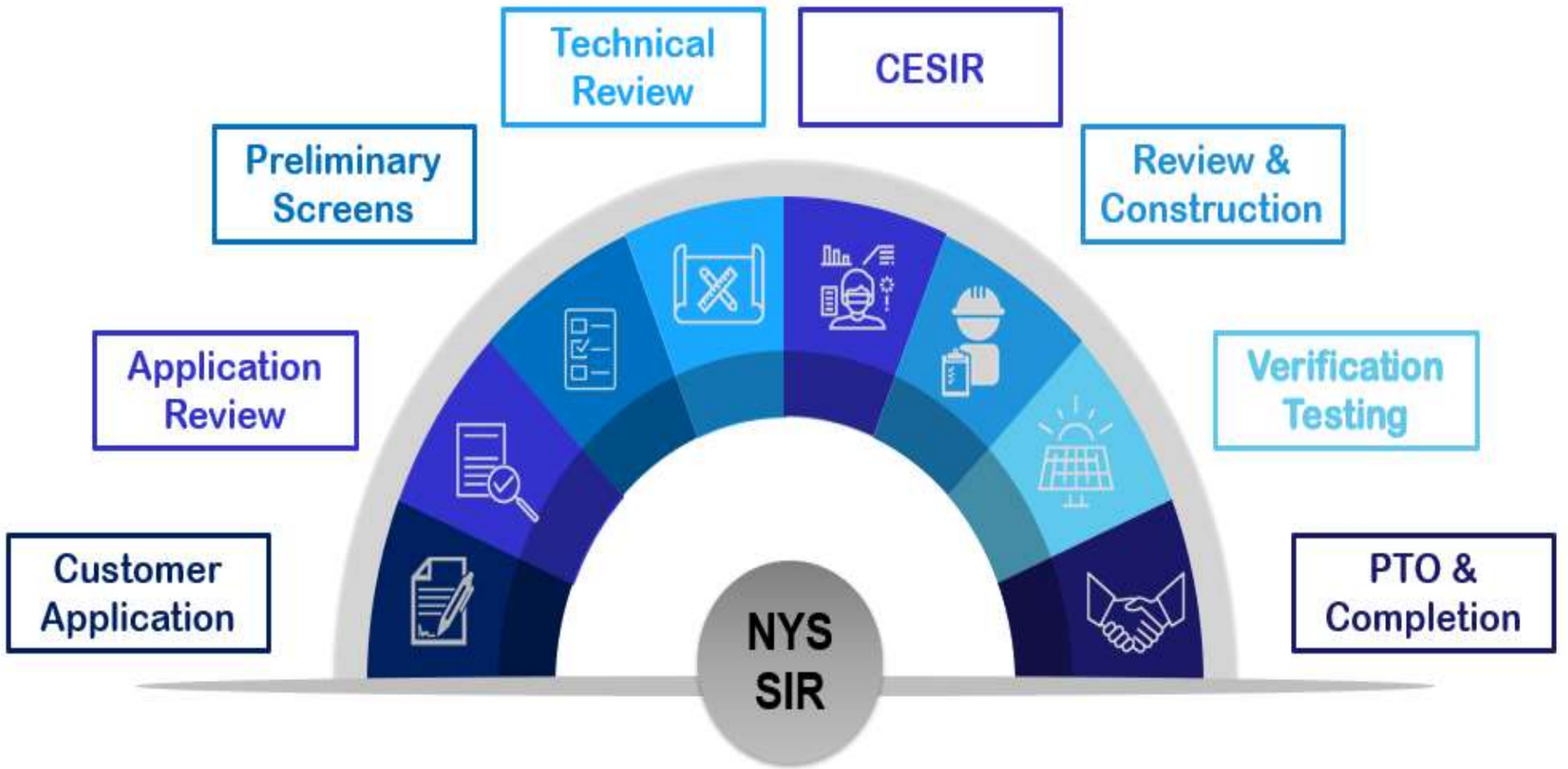
- PSN 1: 0 - 50 kW
  - Fast Track < 25kW (PV Only)
- PSN 2: 50 - 500 kW
- PSN 3: 501 kW – 5 MW
- Utility Process: > 5 MW


Work Resource Management
DG Group
Customer
Construction & Operations
Engineering
Distributed Energy Services
Outside Agencies

DER INTERCONNECTION

SIR REVIEW PROCESS

Governs distribution projects up to 5 MW



Preliminary Screening

SIR Overhead Screens

PRELIMINARY SCREEN

Preliminary Info | Preliminary Results | Correspondence Info

Screen	Result	Description
Screen A : Is the PCC on a Networked Secondary System?	Non-network	Non-Network - please see the results of Screens B - F below.
Screen B : Is Certified Equipment Used?	Fail	The proposed DG system does not utilize certified equipment and will require further study.
Screen C : Is the Electric Power System (EPS) Rating Exceeded?	Fail	This screen fails as the existing service rating and/or existing transformer rating is lower than the proposed installed DG capacity.
Screen D : Is the Line and Grounding Configuration Compatible with the Interconnection Type?	Fail	The Line and Grounding Configuration is not compatible with this interconnection type. Further analysis is required.
Screen E : Simplified Penetration Test	Fail	Further study is required to determine loading on the feeder.
Screen F : Is Feeder Capacity Adequate for Individual and Aggregate DER?	Fail	The feeder capacity is not adequate to accommodate both the individual and aggregate DER. Further analysis is required.

Preliminary Screen Fail

- 10 business days to choose one of the following options:
  - Screening Analysis Review Meeting or Conference Call
  - Proceed to Supplemental Review ($2500)
  - Proceed to full CESIR ($8000)
  - Withdraw Application: The project will not go forward, Con Edison will cancel the case

- Response required within 10 business days; we reserve the right to cancel this application.

- Updated SIR Process flow can be found here: simplified process flow chart (PDF).

Virtual Inspections / Verification Test

A Valuable & Useful Tool

- Encouraged for 500kW & Under
- Can be Combined With In Person (Not a Replacement)
- Enhances Productivity
  - Enables Time To Be Used Wisely, Eliminates Travel Time, Multi-tasking…
- Mitigates Concerns Ahead of Time
- Follow-up Items Can be Addressed

Areas for Review

Nomenclature

- Generator Disconnect Switch 89L
  - Lockable, Visible Break, Lever Switch with Accessible Door Acceptable
- Directory illustrating other Utility Services & Disconnects
- Warning Labels 277/480V (Orange & Red), etc…
- Panel Directory, Each Switch / Disconnect Labeled with Inverters Supplied

NYC Amendment 230.70(A)(1)

- Service to be located (Disconnecting Means) Indoors or Within a Structure
  - 1-4 Family Residential Exempt

Separately Derived System: No Direct Connection (Including Neutral)

- Consider Bonding Implications

CON EDISON DISTRIBUTION SYSTEM AND DG INTERCONNECTION

SHOBHIT SUJAN

DISTRIBUTION ENGINEERING

Agenda

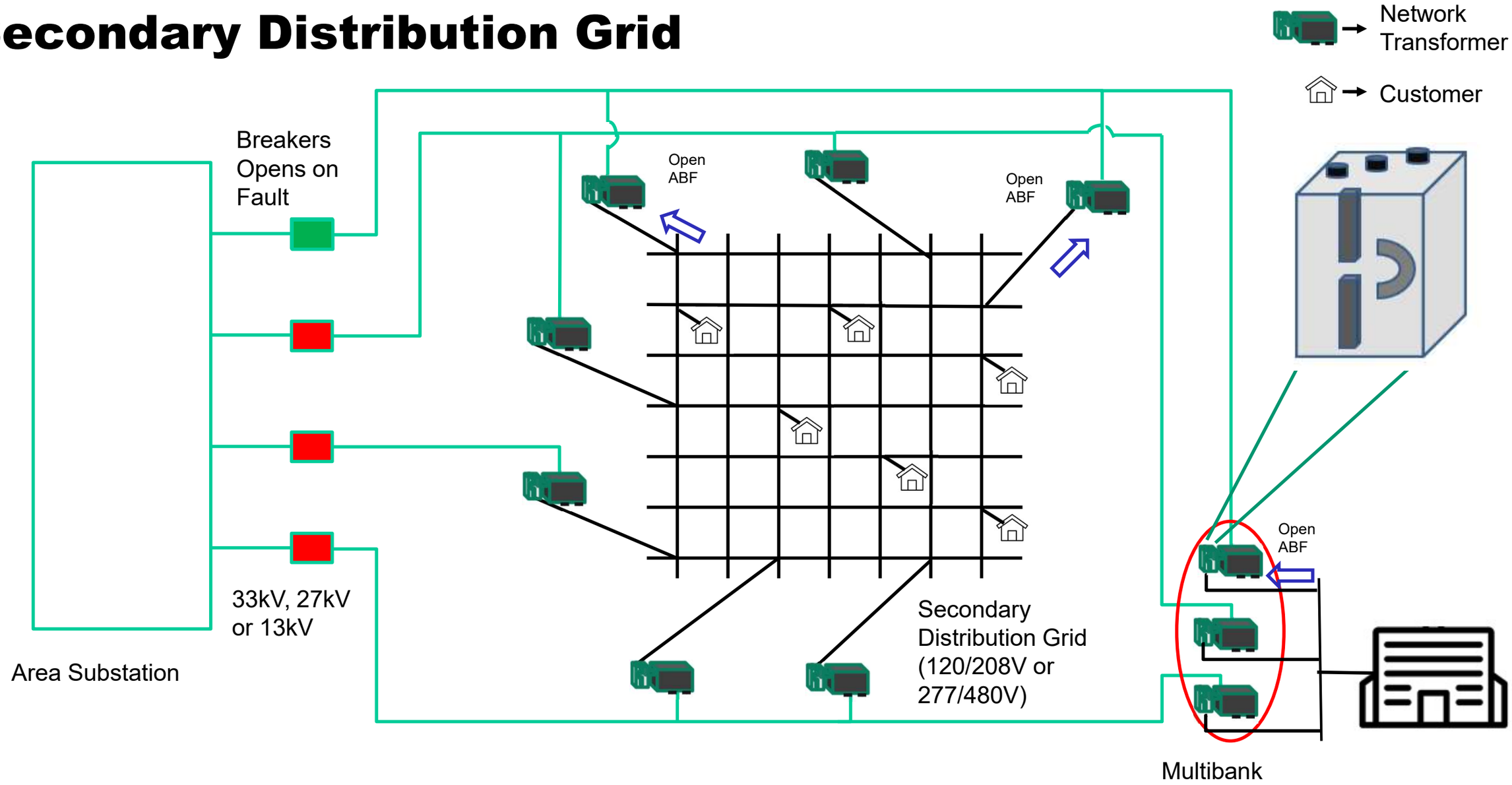
- Introduction to Con Edison Distribution System
  - Underground – Secondary Distribution Grid
  - Overhead – Autoloops
- Consideration for Interconnection of DER

Con Edison Distribution System

- Network Design
  - Secondary Distribution Grid (120/208V or 277/480V)
  - N-2 Contingency Design

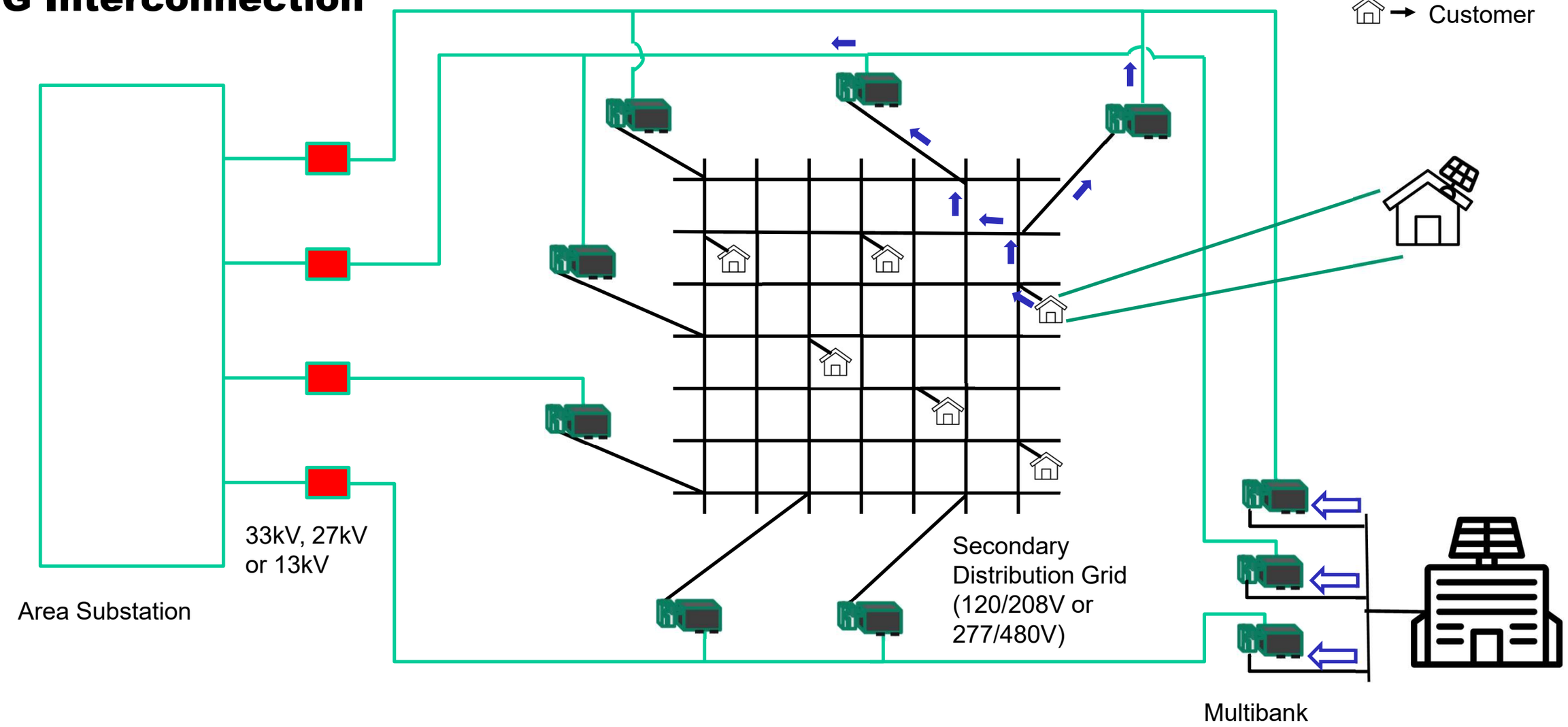
- Non-Network Design
  - Autoloops and Unit Substations
  - N-1 Contingency Design

Secondary Distribution Grid



Secondary Distribution Grid

DG Interconnection



Network Protector

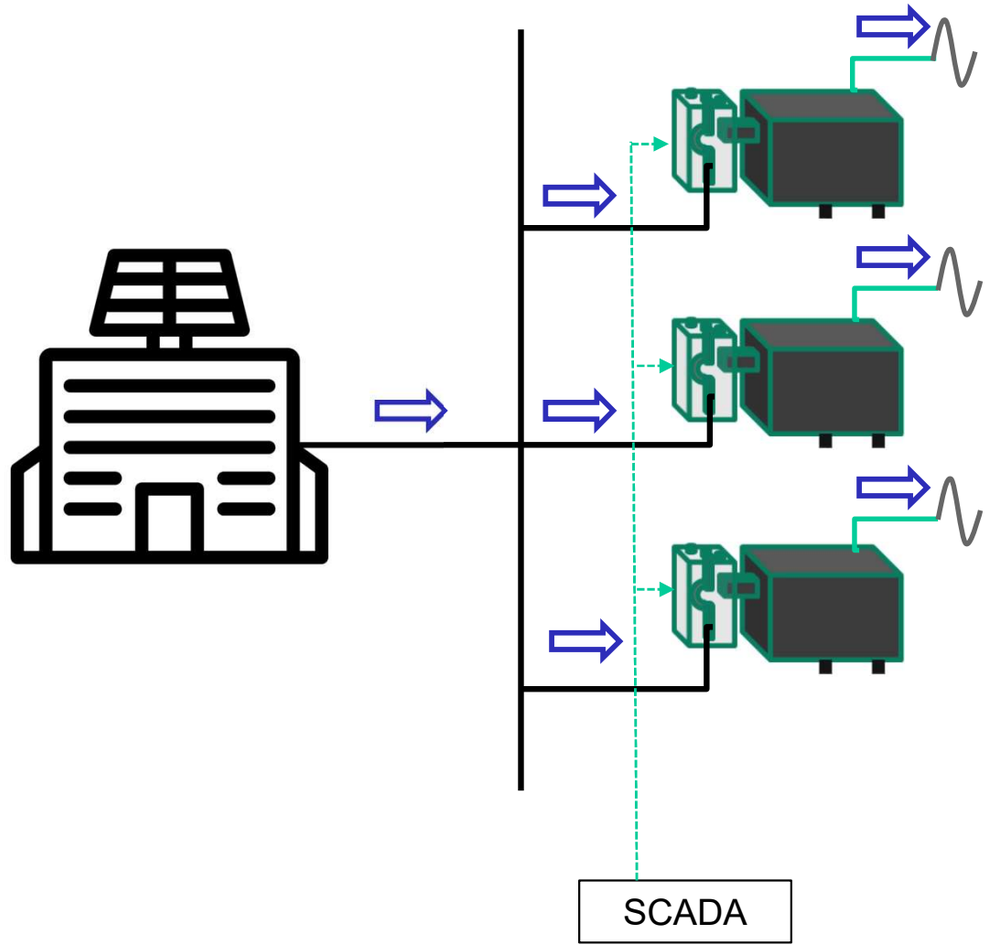
Actively monitor the system and have the capability to autonomously decide to trip or close the NWP based on reverse power flow seen by the relay.

Network Protector
Trip Modes

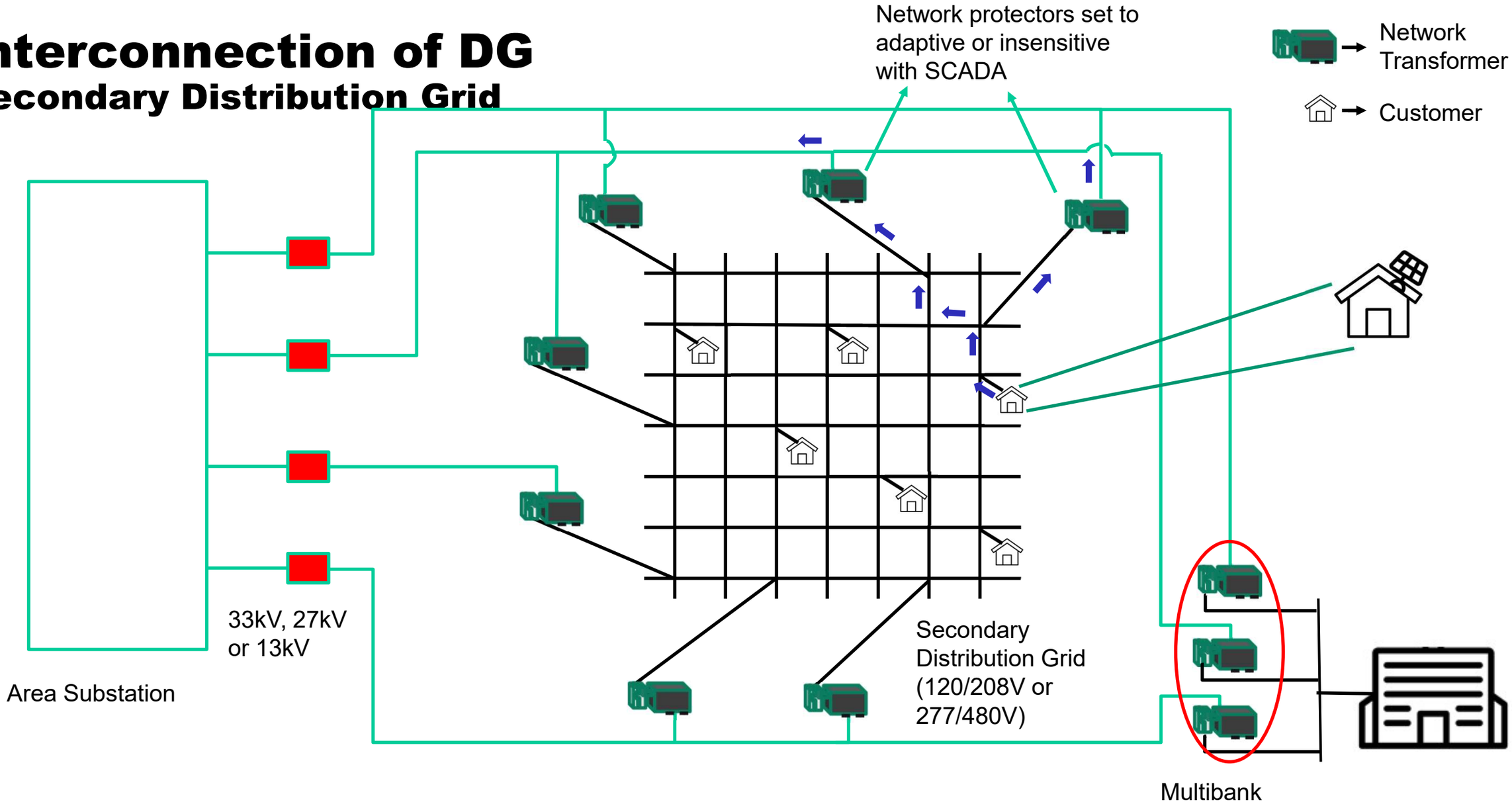
- Sensitive Trip
  - Relay will call for an instantaneous trip upon sensing reverse power flow.
- Time-Delay Sensitive Trip
  - Relay will initiate a trip delay of 2.5 minute up to a reverse power flow of 50% of Transformer nameplate.
- Insensitive
  - Relay will allow a reverse power flow of magnitude less than the instantaneous trip level of 50% of Transformer Nameplate
- Adaptive Trip
  - Allows a reverse power flow if the magnitude is less than the instantaneous trip level of 25% of Transformer Nameplate and rate of change does not exceed set limits.

Interconnection of DG
Multibank

- Network protectors are set to Insensitive with SCADA (Supervisory Control and Data Acquisition)
- SCADA is required to remotely operate the network protectors
- Depending upon the size of the DER and amount of back feed, Con Edison can also request for the following:
  - Customer Equipment Monitoring
  - Ability to trip Customer's equipment during network contingency



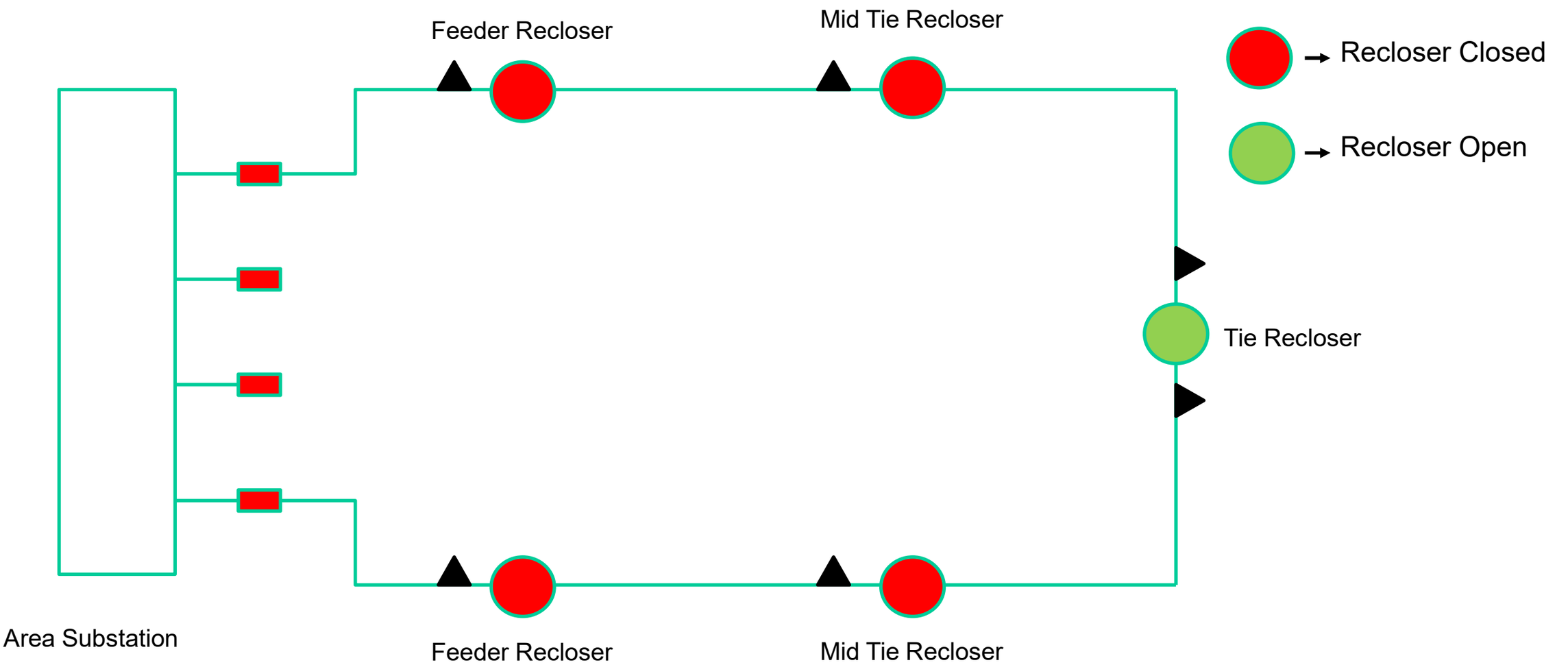
Interconnection of DG
Secondary Distribution Grid



Autoloop

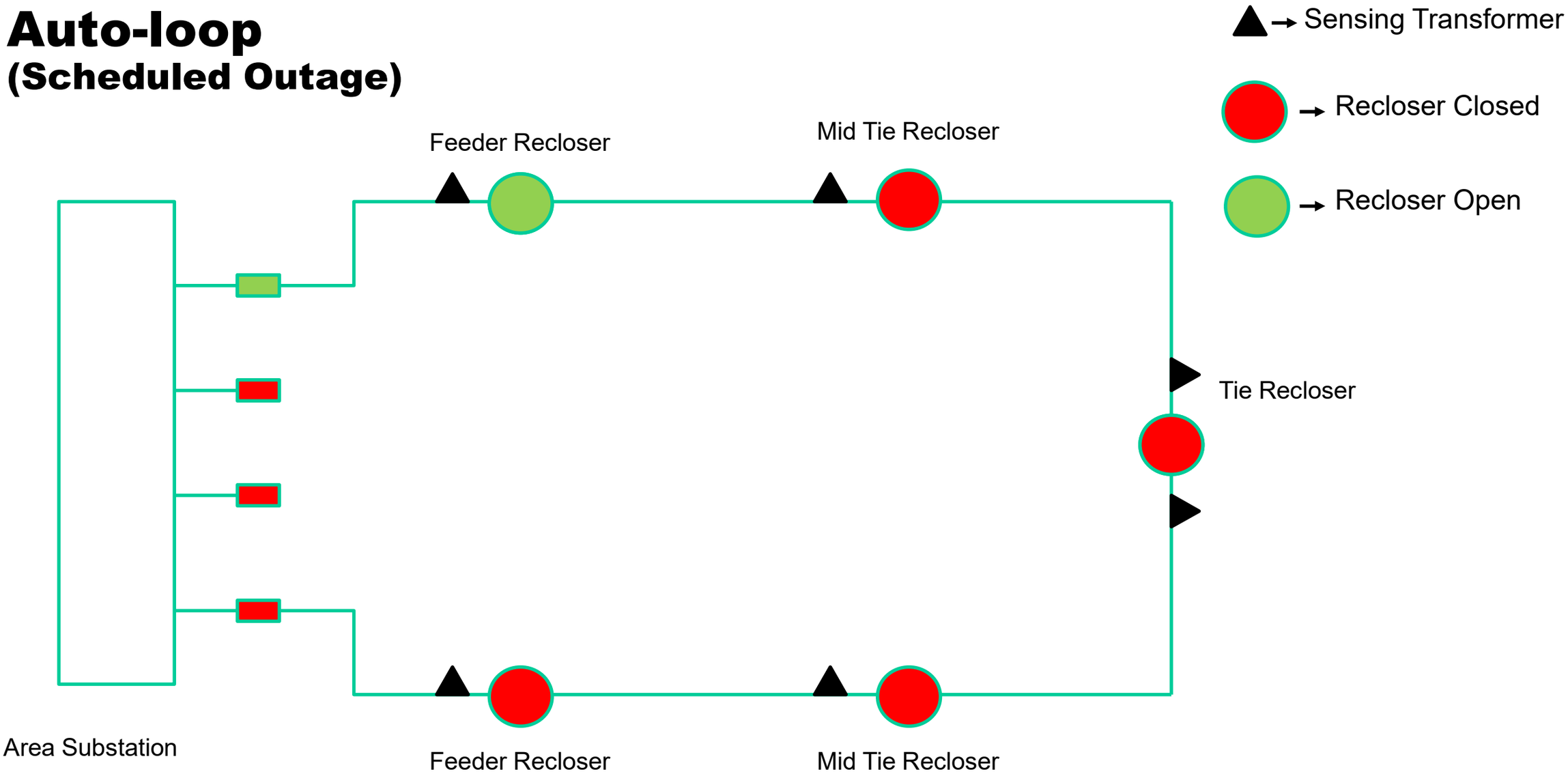
- Non-Network Design
- Overhead System
- N-1 Contingency
- Consist of 3, 5 or 7 reclosers or automatic sectionalizing switches
- During a fault condition, the reclosers go through a sequence of open and close operation to isolate the fault

Five Recloser Auto-loop

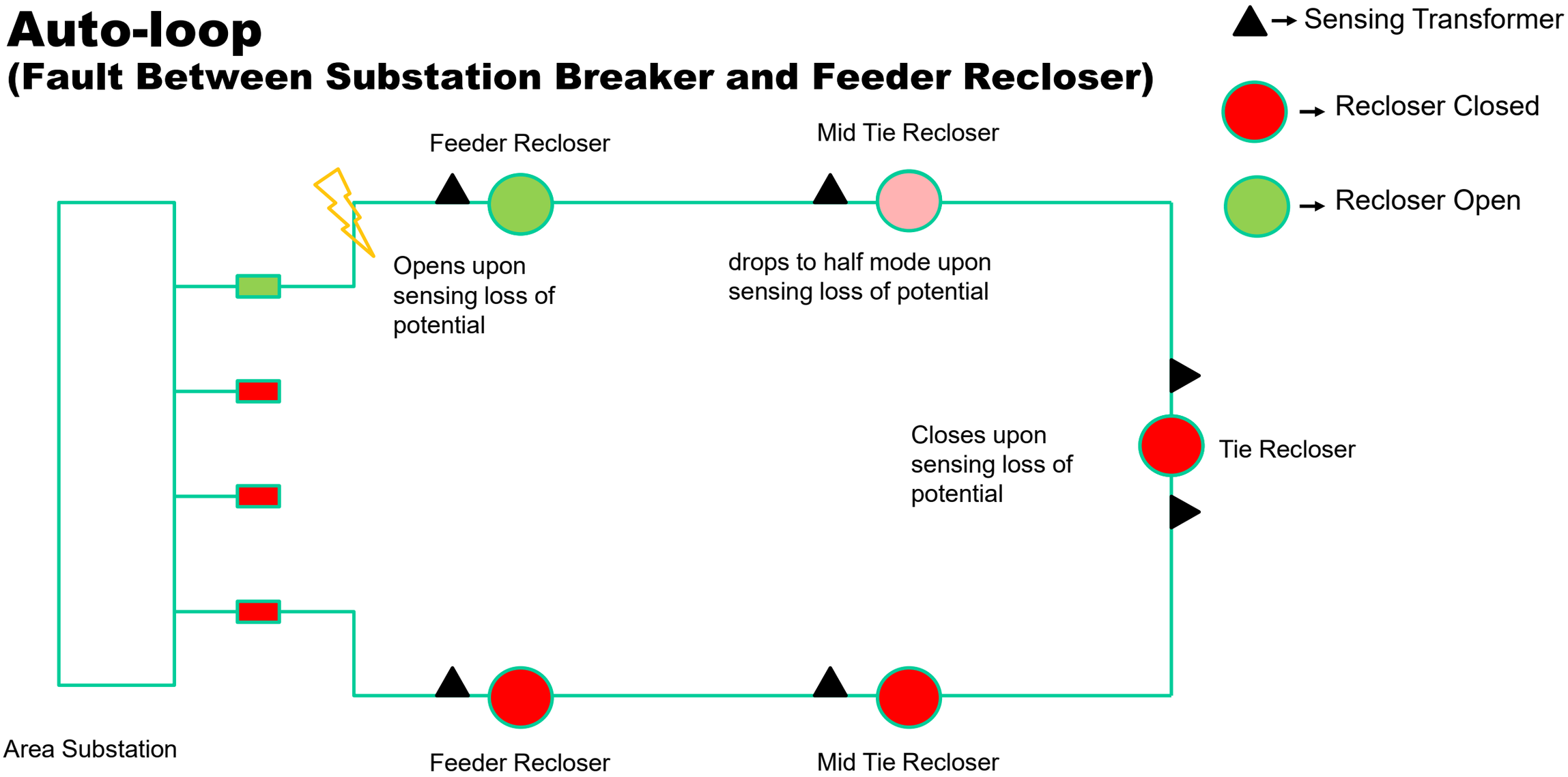


Components of an Auto-Loop Recloser

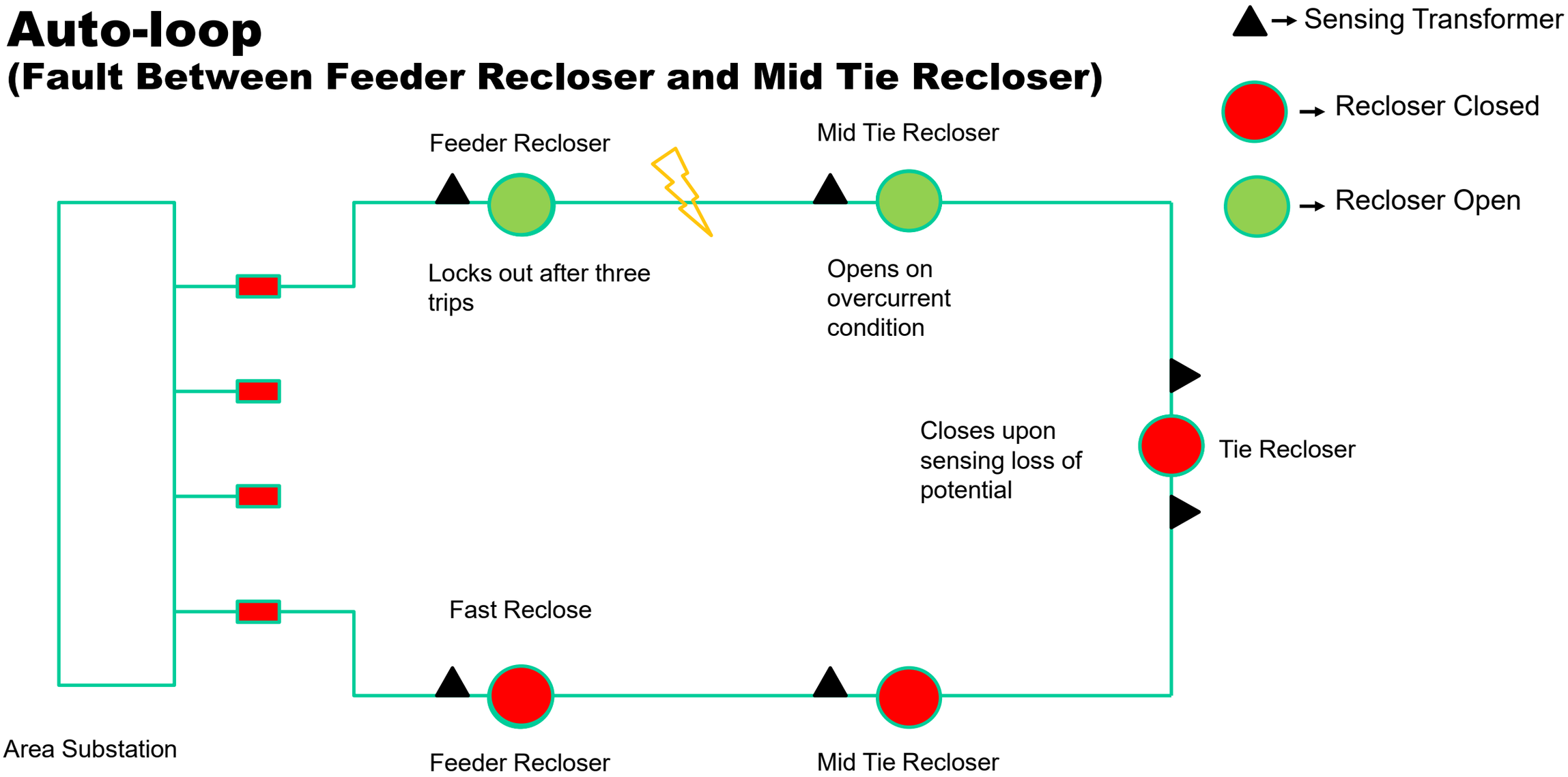
Auto-loop
(Scheduled Outage)



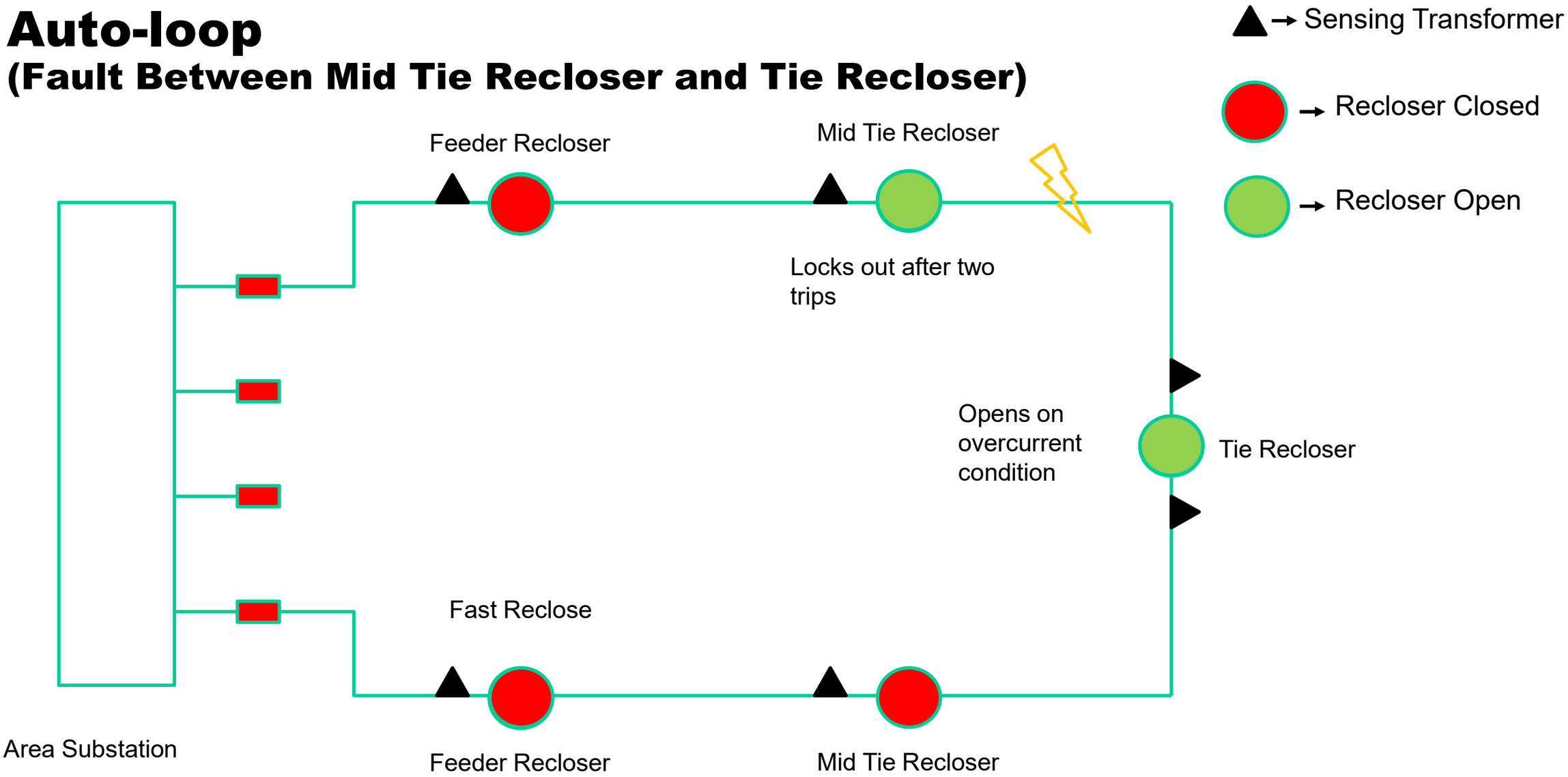
Auto-loop
(Fault Between Substation Breaker and Feeder Recloser)



Auto-loop
(Fault Between Feeder Recloser and Mid Tie Recloser)

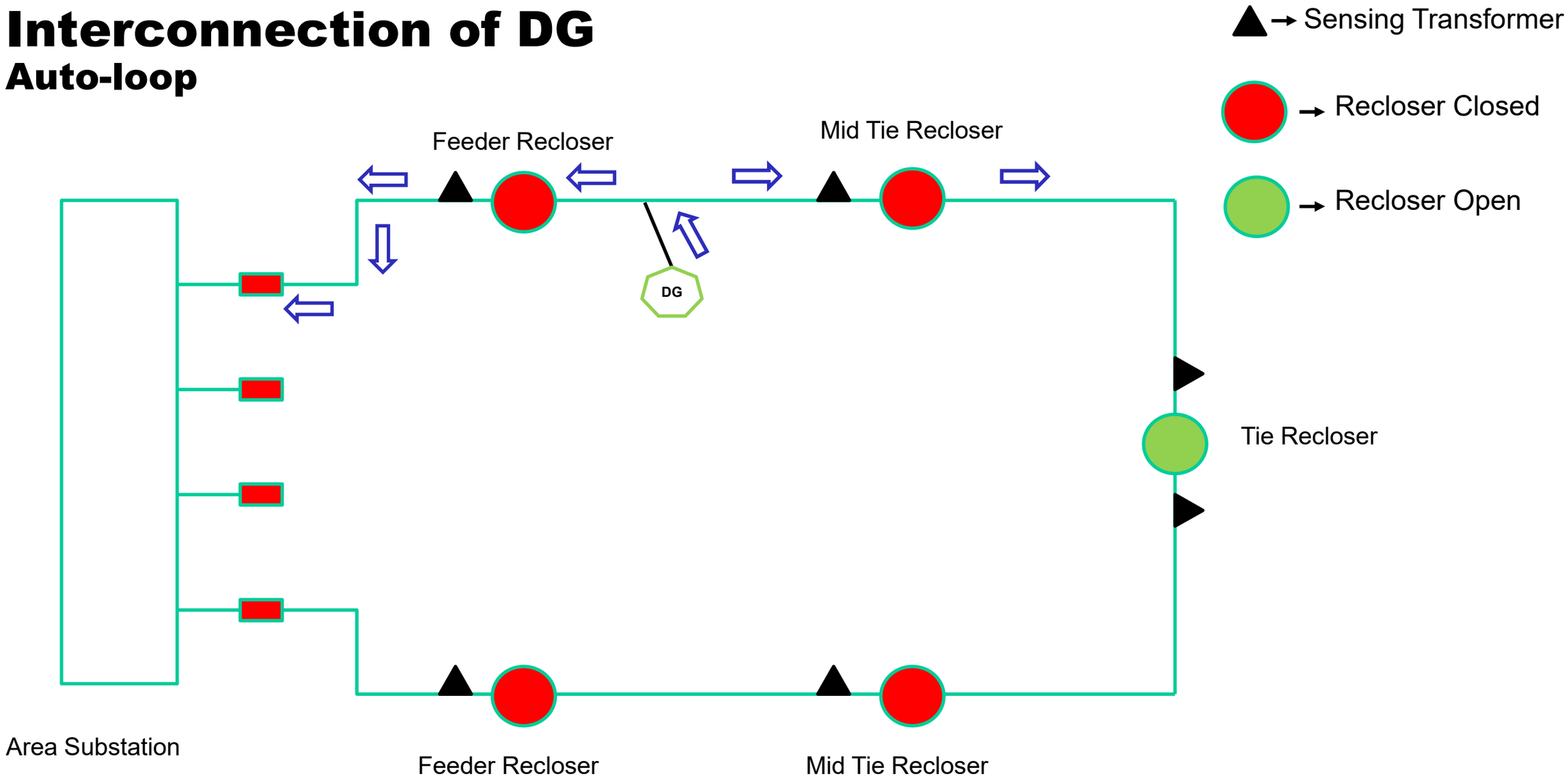


Auto-loop
(Fault Between Mid Tie Recloser and Tie Recloser)



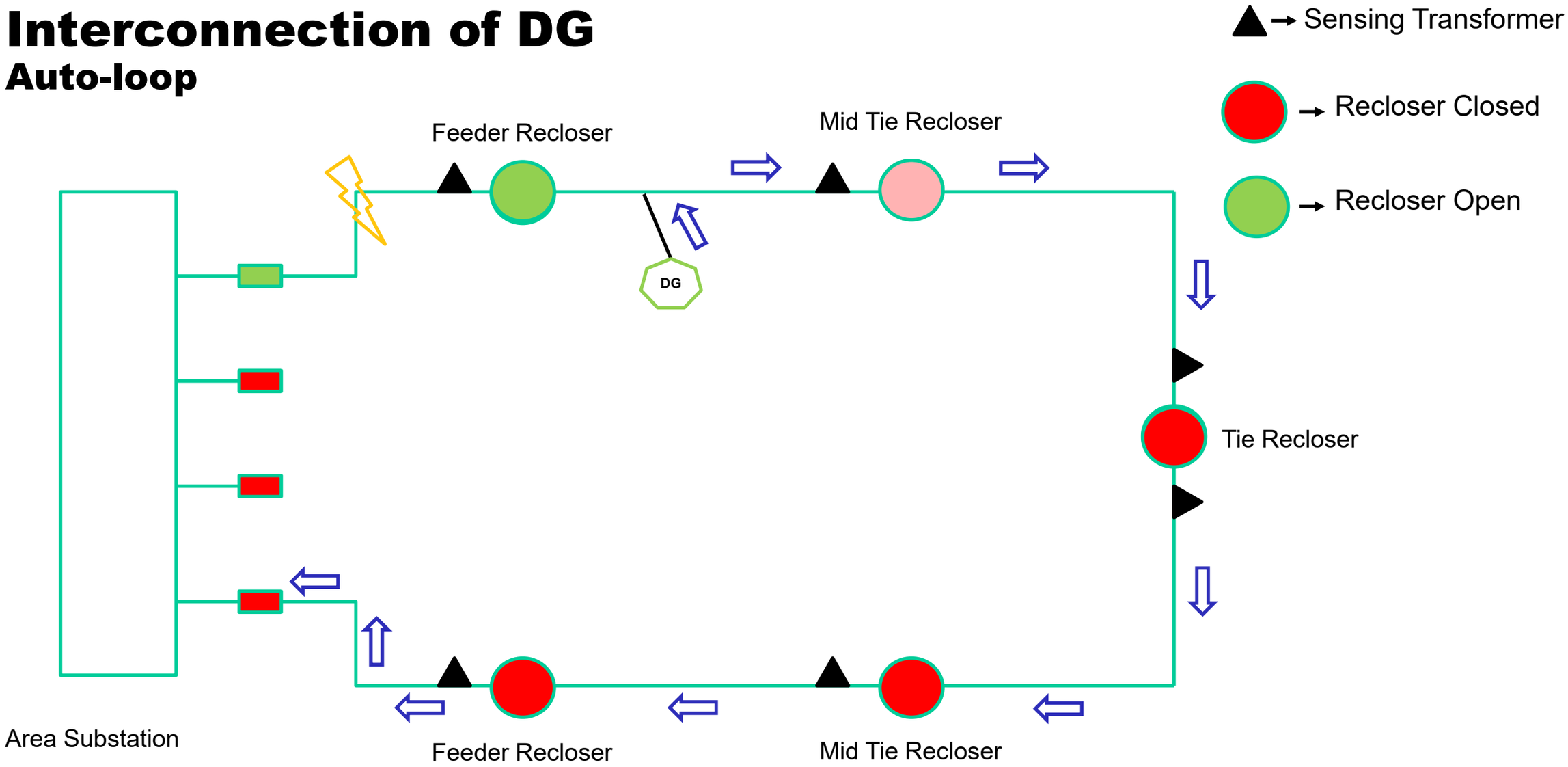
Interconnection of DG

Auto-loop



Interconnection of DG

Auto-loop



Summary
Analysis for DG Interconnection on Autoloops

- Ensure that the back feed from DER and charging current does not trigger over current protection at reclosers.
- Analyze impact of DER penetration and charging current during N-1 contingency
- Feeder Section upgrades required to accommodate the DER.
- Substation upgrades required to allow back feed into the Area Substation.

Thank You

Visit our website @ www.coned.com/dg or contact dgexpert@coned.com for any DER related questions.