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April 28, 2023

Hon. Michelle Phillips  
Secretary to the Commission  
New York State Public Service Commission  
Three Empire State Plaza  
Albany, NY 12223-1350

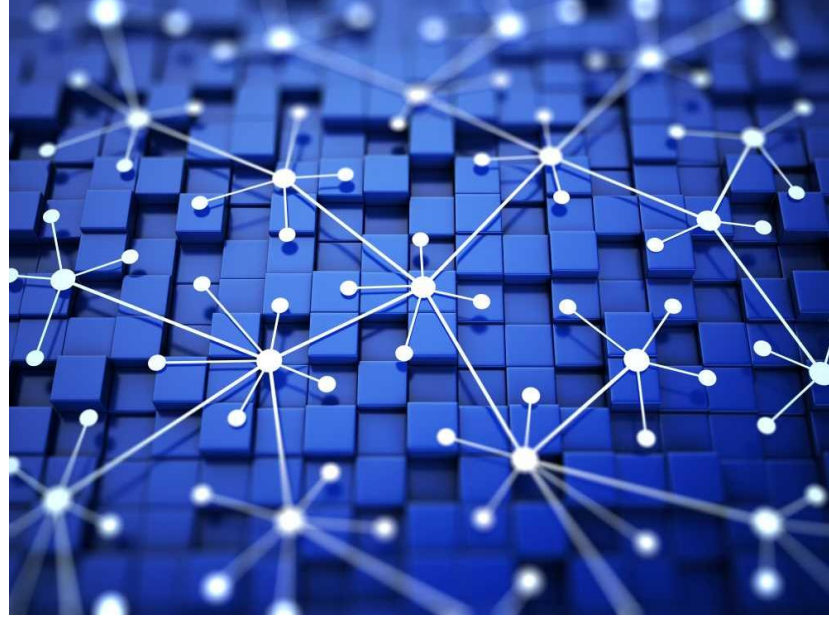
Re: Case 20-E-0197 – Proceeding on Motion of the Commission to Implement  
Transmission Planning Pursuant to the Accelerated Renewable Energy Growth  
and Community Benefit Act.

Dear Secretary Phillips:

Materials from the Advanced Technology Working Group technical conference held on  
April 27, 2023 are enclosed. A recording of the conference is available at  
<https://youtu.be/uSFM5R8k96I>.

Sincerely,

Jalila Aissi  
Assistant Counsel



# Advanced Technology Working Group Spring Technical Conference

April 27, 2023

# Welcome

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*Jason Pause, Department of Public Service*

# ATWG SPRING TECHNICAL CONFERENCE SCHEDULE

Topic	Lead	Time
1. Welcome	Jason Pause, DPS	10 minutes
2. Introduction to the ATWG and Program Plan Overview (membership, roles, and responsibilities)	King Look, Con Edison Dean Berlin, National Grid	30-40 minutes
3. Statewide Coordination	Mike Razanousky, NYSERDA	15-20 minutes
BREAK	-	15 minutes
4. Energy Storage Task Force Summary	Chris Schramm, Avangrid	15 minutes
5. Dynamic Line Rating (DLR) Task Force Summary	Ruby Chan & Pete Harpolis, Central Hudson	15 minutes
6. Power Flow Control (PFC) Task Force Summary	Chris Schramm, Avangrid	15 minutes
7. Wrap-up and next steps	Jason Pause, DPS	10 minutes

# Introduction

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*King Look, Con Edison*

*Dean Berlin, National Grid*

## BACKGROUND (PSC CASE 20-E-0197)

*"Proceeding on Motion of the Commission to Implement Transmission Planning Pursuant to the Accelerated Renewable Energy Growth and Community Benefit Act"*

**May 14, 2020  
PSC Order**

- Utility Transmission and Distribution Investment Working Group Report filed on November 2, 2020, addressing:
  - Transmission Policy
  - Technical Analysis of local reliability T&D projects (Phase 1) and projects interconnecting large scale renewables (Phase 2)
  - **Advanced Technologies**

**January 20, 2022  
PSC Order**

- Research and Development Plan for Advanced Transmission and Distribution Technologies filed on July 20, 2022, which:
  - Provides a framework for developing a common Statewide approach for vetting and deploying beneficial technologies
  - Initially focuses on dynamic line rating (DLR), power flow control (PFC), and energy storage (ES) technologies as alternatives to traditional T&D solutions

**August 9, 2022  
PSC Notice Soliciting  
Comments**

- Research and Development Plan for Advanced Transmission and Distribution Technologies – PROGRESS REPORT filed on January 20, 2023, which
  - Summarizes Research Plan activities in 2022
  - Outlines the 2023 activities, including addressing public comments almost exclusively on more expansive stakeholder engagement

# ADVANCED TECHNOLOGIES WORKING GROUP (ATWG)

*Chair: King Look (Con Edison)*

*Secretary: Forrest Small (Concentric Energy Advisors)*

<b>Sector</b>	<b>Organizations</b>
Investor-Owned Utilities	<ul style="list-style-type: none"><li>• Avangrid (NYSEG and RG&amp;E)</li><li>• Central Hudson Gas &amp; Electric (Central Hudson)</li><li>• Con Edison (CECONY and ORU)</li><li>• National Grid</li></ul>
Power Authorities and Grid Operators	<ul style="list-style-type: none"><li>• Long Island Power Authority (LIPA / PSEG-LI)</li><li>• New York Power Authority (NYPA)</li><li>• New York Independent System Operator (NYISO)</li></ul>
New York State Entities	<ul style="list-style-type: none"><li>• Department of Public Service (DPS)</li><li>• New York State Energy Research &amp; Development Authority (NYSERDA)</li></ul>
Consultants	<ul style="list-style-type: none"><li>• Electric Power Research Institute (EPRI)</li><li>• Brookhaven National Laboratory (BNL)</li><li>• Concentric Energy Advisors (CEA)</li></ul>

# T&D RESEARCH PLAN

## *Approach for Vetting and Deploying Beneficial Technologies*



- Characterize attributes and functionality
- Identify supported grid services
- Determine maturity
- Identify constraints or development issues

- Select most promising solutions
- Assess performance with simulation or lab demonstration
- Compare benefits and costs against traditional solutions

- Coordinate analysis with the CGPP
- Identify best opportunities for cost savings with advanced technologies



# T&D RESEARCH PLAN

## Stage 1: Technology Survey and Screening

### Surveying

### Desktop Screening

### Stage 2 Candidates

Focus on grid enhancing technologies (GETs) that will:

- Alleviate T&D system bottlenecks to allow for better deliverability of renewable energy
- Unbottle constrained resources to allow more renewable hydro and/or wind imports and reduce system congestion
- Optimize the utilization of existing transmission capacity and rights-of way
- Increase circuit load factor

Criteria (examples):

- Commercial maturity
- Technology readiness level (TRL)
- Grid services
- Costs
- Any constraints, issues?
- Etc.

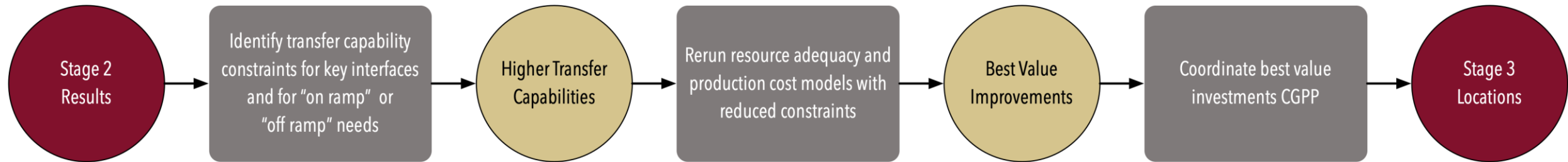
Recommend:

Two or three products from each technology area (DLR, PFC, energy storage) for evaluation by a simulation or laboratory demonstration

# T&D RESEARCH PLAN

## *Stage 3: Identify Locations for Deployment*

### Example coordination between ATWG and CGPP in Stage 3



# T&D RESEARCH PLAN

## *Activity and Budget Overview*

<b>Activity Type</b>	<b>Examples</b>	<b>Timeframe</b>	<b>NYSERDA Budget</b>
Program Support	<ul style="list-style-type: none"><li>• Program administration, facilitation, and reporting</li><li>• Develop guidance documentation</li><li>• Technology Scouting and Assessments for Beneficial Technologies</li></ul>	2022 - 2026	\$2 million
Studies and Analysis	<ul style="list-style-type: none"><li>• EPRI study to identify and develop/improve analytical tools for energy storage valuation</li><li>• System modeling</li></ul>	2023 - 2026	
Laboratory Testing	<ul style="list-style-type: none"><li>• Use of NYPA AGILe</li><li>• University or National Laboratory testing</li></ul>	2023 - 2026	
Demonstration Projects	<ul style="list-style-type: none"><li>• Long duration energy storage demonstration</li><li>• Thermal energy storage demonstration</li></ul>	2023 - 2026	\$15 million

# STAKEHOLDER ENGAGEMENT

## *Information Sharing and Opportunity for Collaboration*

### Information Sharing Venues

- ATWG General Meetings and Task Force Meetings
- Technical Sessions
- Joint Utilities Internet Website

### Opportunity for Collaboration

- Technical SME Advisory Role
- Joint Project Proposal in Response to NYSERDA / DOE Funding Opportunities
- Separate engagements with ATWG members outside the ATWG framework

## T&D RESEARCH PLAN

### *Planned 2023 Activities*

Continue to align with the Coordinated Grid Planning Process (CGPP) Working Group

Energy Storage Task Force (ESTF) – established in Q4 2022 – to:

- Initiate a T&D Energy Storage Potential Study
- Develop a set of common T&D Planning Tools
- Develop an Economic Analysis Methodology

Initiate a Dynamic Line Rating (DLR) Task Force and a Power Flow Control (PFC) Task Force, with each to develop detailed work plan by Q2 2023

Hold a Technical Conference with External Stakeholders in April 2023 (today)

# QUESTIONS



# Statewide Coordination

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*Mike Razanousky, NYSERDA*

*ESEERCO*



# BACKGROUND

## *ESEERCO*

The Empire State Electric Energy Research Corporation (ESEERCO) was organized from the Empire State Atomic Development Associates in 1973 to develop a coordinated research effort that involved all aspects of power systems. It is empowered to sponsor and support research and development programs in the technical and the environmental aspects of generation, transmission, distribution, and conservation of electricity. After the role of ESEERCO is described, its research and development for the New York Electric Utility System, its goals and objectives, and its research and development priorities and program recommendations.

### **Abstract**

The New York Power Authority (NYPA), and the other Empire State Electric Energy Research Corporation (ESEERCO) member utilities, initiated deployment of a high voltage transmission harmonic measurement system (HMS) in 1992. The HMS consists of hardware and software, which determine the harmonic state of a transmission system, in real time, and stores the acquired data in a historical harmonic database. The HMS hardware consists of GPS synchronized digital event recorders linked to on-site computers, and a master station computer. The present installation includes instrumentation for a total of 150 measurements of which 138 are three phase quantities (voltages or currents) resulting in 46 phasors. The system performs synchronized waveform data acquisition every 15 minutes. The captured data are processed at the on-site computers to correct for error from the nonideal characteristics of the instrumentation, and to compute the harmonics. The computed harmonics (magnitude and phase) are transmitted to the master station computer where the system wide harmonic flow is constructed, using a harmonic state estimation technique. This paper describes the HMS hardware and software as well as HMS applications.

**Date of Conference:** 14-16 October 1998  
**Date Added to IEEE *Xplore*:** 06 August 2002  
**Print ISBN:**0-7803-5105-3  
**INSPEC Accession Number:** 6258584  
**DOI:** [10.1109/ICHQP.1998.759956](https://doi.org/10.1109/ICHQP.1998.759956)  
**Publisher:** IEEE

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# NYSERDA ELECTRIC POWER T&D (EPTD) R&D PROGRAM

*To date: Awarded approximately 200 Projects*

## **Energy Storage**

Batteries, Flywheel, Thermal, Compressed Air Energy Storage (CAES), Geo-Mechanical (Pumped Hydro), Hydrogen

## **Transmission / Sub-Transmission**

Phasor Measurement Units/ Situational Awareness / State Estimation), Volt-Var Optimization, Optical Sensors, Flexible Alternating Current Transmission Systems (PFC), DLR (Temperature, Tension, Weather, Lidar), Power Electronics, Off-Shore Wind analysis

## **Distribution Automation**

Integrated System Models (ISM), Advanced Distribution Management Systems (ADMS) Applications (Fault Location Isolation & System Restoration (FLISR) / Conservation Voltage Optimization (CVO) / Switch Order Management (SOM) / Distributed Energy Resources Management System (DERMS), Forecasting (Weather / Load - Electrification)

## **DER Integration**

Grounding, Ground Fault Over-Voltage (GFOV), Unintentional Islanding, Hosting Capacity, Reclose Blocking, Direct Transfer Trip Alternative, Smart Inverters

# NYSERDA EPTD R&D PROGRAM

*Support the Advanced Technology Working Group (ATWG) effort*

## **Future Grid Solicitation**

(Program Opportunity Notice (PON) 4393) - Open / Targeted (\$3-5 million/challenge) Demonstrations / Product Developments / Studies

- **Power flow control devices**
- **Energy storage for Transmission and Distribution services**
- Tools for improving operator situational awareness
- Transformer monitoring
- **Advanced conductors**
- Compact tower design
- **Distribution Energy Resource Management Systems (DERMS)**
- **Offshore wind analysis**

## NYSERDA EPTD R&D PROJECTS

Project	Description	Sched Comp
EPRI – DERMS	Electric Power Research Institute and its partners Smarter Grid Solutions, and General Electric plan to demonstrate a Distributed Energy Resources Management System (DERMS) logic controls in Central Hudson Gas & Electric’s territory that has existing Distributed Energy Resources (DER) in the New York Independent System Operator interconnection queue. With the potential for DER participation in wholesale markets, concerns have emerged that the NYISO dispatch instructions to DER’s may result in violations of grid constraints compromising grid safety and reliability.	2024
ConnectDER - Metering	Project supporting distributed energy resources monitoring & control, data analytics and advanced forecasting for Consolidated Edison, installing new data acquisition endpoints within their territory. System production data will be provided for all endpoints; forecast data will be provided. The goal of the project is to provide photo-voltaic (PV) production measurements at residential sites, as well as integrate PV forecasting into its planning systems. Deploying up to 2,400 cellular smart devices at residential sites within Con Ed’s service territory.	2023

## NYSERDA EPTD R&D PROJECTS

Project	Description	Sched Comp
Utilidata – Smart Inverters	Project integrates Utilidata software and National Renewable Energy Lab (NREL) software with smart inverter data and communications to evaluate various smart inverter control strategies for grid support, to understand decreased energy consumption, impact on DER hosting capacity, and solar developer business models. The results of the project will be a demonstration of the efficacy of the solution, integration of the solution into existing volt-var optimization at National Grid, as well as recommendations for compensating and ensuring solar developers and owners for using advanced inverters for grid support.	2024
Prosumer Grid & Siemens – Electrification Forecasting	Avangrid plans to develop technical solutions that forecast and assess system impacts of new electric loads and distributed energy resources in parts of the Southern Tier. The two projects selected are Siemens PTI, working in partnership with Streetlights Data and Cornell University for a demonstration project hosted by the City of Ithaca to forecast scenarios for community adoption of electric vehicle charging, building electrification, and distributed solar generation, and Prosumer Grid to develop tools that can analyze equipment loading and optimize electric system planning in Binghamton.	2024

## NYSERDA EPTD R&D PROJECTS

Project	Description	Sched Comp
Line Vision & Wind Sim – Dynamic Line Rating	Avangrid plans to demonstrate a dynamic line rating system. This project intends to validate a non-contact, advanced transmission line monitoring system on transmission lines along Avangrid’s four 230 kV lines in the Hornell area to increase resiliency and reliability, reduce grid congestion, and provide real-time data that could aid in more renewable energy resources into the New York State electrical grid.	2025
Manifold Robotics - Drones	Collaborate with Manifold Robotics on a project to develop, field test and demonstrate an innovative Electro-magnetic field (EMF) sensing system that will be integrated into an unmanned aircraft system (UAS) aka drone, to detect and avoid power lines or to autonomously follow power lines. The system will be demonstrated on NYPA’s transmission lines. The technology will be the basis of an application to the Federal Aviation Administration for a Beyond Visual Line of Sight waiver.	2023

# NYSERDA ENERGY STORAGE R&D PROGRAM

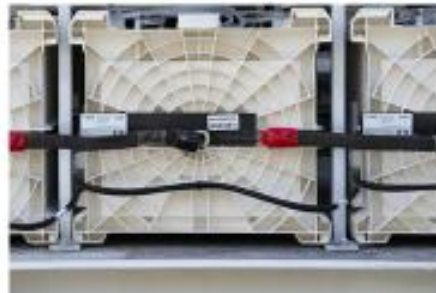
*Long duration energy storage (LDES) 8+ to 100+ hour solution development and commercialization for NY*

## Long Duration Energy Storage Solutions

Compressed Air Energy Storage



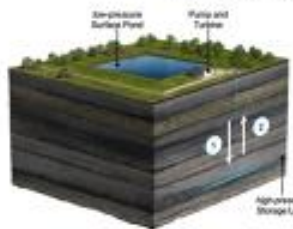
Alternative Energy Storage



Electrochemical storage



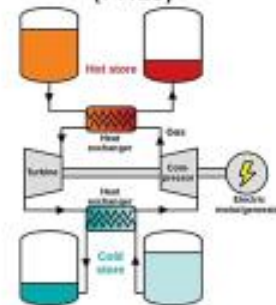
Geomechanical Storage



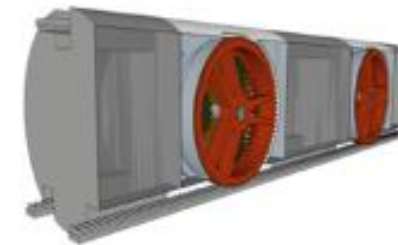
- Modular, long-duration storage**  
1-10 MW per well, 10+ hours
- Structural cost position**  
~50% capex of battery & pumped hydro, ~4¢/kWh marginal kWh
- Broad geological footprint**  
100+ TWh across multiple US basins
- Mature execution supply chain**

- 1 **Charge:** Water pumped down the well into high-pressure storage layer
- 2 **Discharge:** High-pressure water flows up the well to spin a turbine

Pumped heat energy storage (PHES)



Mechanical/Gravity Energy Storage



RDA



# NYSERDA ENERGY STORAGE R&D PROJECTS

Project	Description	Sched Comp
Constellation – LDES	Constellation, Nine Mile Point Nuclear Station will demonstrate long-duration energy storage co-located with a baseload nuclear resource by installing a 2MW-10MW hydrogen fuel cell using 100% clean hydrogen for peak power generation and storage unit at Exelon’s Constellations Nine Mile Point (NMP) nuclear site in New York. The project will be an add-on to NMP’s DOE funded 1.25 MW electrolyzer project and participate in NYISO’s competitive power markets including energy and capacity.	2025
Power to Hydrogen - LDES	Power to Hydrogen is developing a reversible fuel cell technology that can cost effectively and efficiently produce and store high-pressure hydrogen, then convert that hydrogen back into electricity. The technology is based on an innovative hybrid Anion Exchange Membrane / liquid alkaline cell and stack design that enables systems to operate both as an electrolyzer converting water and electricity to H2 and oxygen, and as a fuel cell to generate energy from hydrogen and oxygen.	2025

# NYSERDA ENERGY STORAGE PROJECTS

Project	Description	Sched Comp
212 Solar – Energy Storage	Objective of this project to perform two field demonstrations of a six hr zinc hybrid cathode energy storage system with differing use cases in a densely populated or urban environment that co-optimize Value of DER (VDER) revenue streams. The project will also demonstrate VDER use cases using battery technology with vastly greater thermal stability than the incumbent chemistry and prove that zinc hybrid technology is economically competitive with lithium-ion on a Net Round Trip Efficiency basis.	2025
Zinc 8 – Energy Storage	The primary objective is to install and operate a 100 kW, 1500 kWhr zinc air battery system from Zinc 8 at a multi family residential facility in Queens, New York. The energy storage system will be paired with the facility’s existing Combined Heat and Power (CHP) and photovoltaic systems and will be charged from the grid, the CHP system or the PV system.	2025

## NYPA R&D PROJECTS

Project	Description	Sched Comp
Prisma – Tower Sensing	OPGW (Optical Ground Wire) distributive sensor-based monitoring technology demonstration with the goal of verifying the feasibility of using OPGW distributed fiber optic sensor to detect activities on the overhead transmission line and tower, including vandalism and tower climb, extreme winds, temperature changes – ice and fire, lightning strikes, partial discharges, corona, flashovers, drones above the lines, etc..	2023
ZOOZ- Fast Electric Vehicle Charging	Demonstrate capability of a flywheel-based energy storage device to provide supplemental power to an Electric Vehicle (EV) fast charger in a load constrained application. The device will enable fast charging in locations with lower voltage. Successful outcome would enable replicating this solution at additional sites. Project will install one ZOOZ 100kW booster with a 150kW DC Fast Charger at the Clark Energy Center for employee and fleet charging.	2023

## NYPA R&D PROJECTS

Project	Description	Sched Comp
Brenmiller Energy – Thermal Energy Storage	Project to develop a 450kWt/400kWh thermal energy storage unit paired with a 200kW CHP that will be demonstrated at State University of New York - Purchase to assess the decoupling of the time and amount of electricity generated, from the time and amount of heat supplied resulting in overall system efficiency.	2023
Zinc 8– Long Duration Energy Storage	Project to develop and demonstrate a 90kW/900kWh commercial scale zinc-air energy storage system of low cost, long duration (8hrs+) and inherent safety. The system will be demonstrated at the University at Buffalo.	2024

# NYPA AGILE

## *Advanced Grid Innovation Lab for Energy (AGILE)*

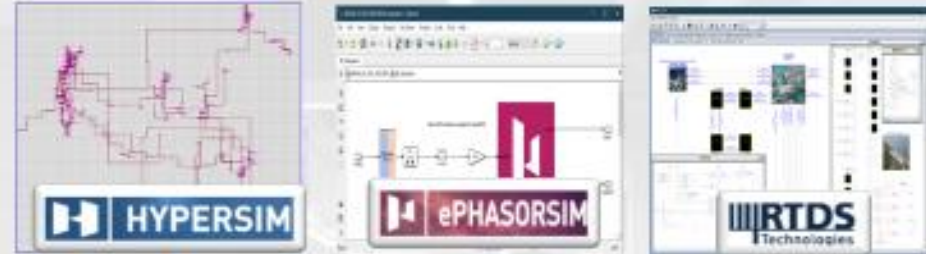
### **AGILE Enabling Infrastructure**

The Lab is a state-of-the-art collection of technologies, devices and systems. The tools in AGILE support various studies on planning and operation of power grids with high penetration of renewables

#### **Modeling Tools**



#### **NYS Grid Models**



#### **Hardware**



# AGILE Use Cases and Applications

A cross-section of Lab-enabled capabilities that the Lab is providing



## Equipment Configuration and Testing

- Test equipment in realistic field conditions
- Validate the performance of novel technologies



## Novel System Protection Schemes

- Validate protective relaying behavior and settings
- De-risk novel protection schemes



## Digital Substation and IEC 61850

- Create replicas of substation intelligent electronic devices
- Perform closed-loop testing using communication protocols



## Distribution Automation and DERMS

- Simulate the performance of distribution automation system
- Integrate distributed energy resources and storage



## Cyber Security

- Create testbeds used for tabletop exercises
- Evaluate and test intrusion detection and mitigation schemes



## FUTURE EFFORTS

### *Planned 2023 Activities to support ATWG*

Continue to work with other Groups: Interconnection Technical, Market Development, CGPP, ESTF, DLRTF, PFCTF, Organizations: National Labs (e.g., BNL), Universities, Research, (e.g., EPRI), NYISO and Utilities; Investor Owned, Authorities, Municipals, Cooperatives

### Pursuing Department of Energy (DOE) Funding

- Bipartisan Infrastructure Law (BIL)
- Infrastructure Investment Jobs Act (IIJA)
- Inflation Reduction Act (IRA)

### Support NYPA's AGILe work

## NYSERDA RESEARCH INFORMATION

### Interconnection Technical Working Group (ITWG)

<https://www3.dps.ny.gov/W/PSCWeb.nsf/All/DEF2BF0A236B946F85257F71006AC98E>

### Electric Power Transmission & Distribution (EPTD) Reports

<https://www.nyserda.ny.gov/About/Publications/Research-and-Development-Technical-Reports/Electric-Power-Transmission-and-Distribution-Reports>

### EPTD Projects

<https://www.nyserda.ny.gov/Researchers-and-Policymakers/Research-Project>

### EPTD Smart Grid Program

<https://www.nyserda.ny.gov/All-Programs/Programs/Smart-Grid-Program>



# QUESTIONS



# ATWG Energy Storage Task Force

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*Chris Schramm, Avangrid*

# MISSION AND GOALS

*This Task Force is exploring energy storage tools in transmission and distribution applications.*

## **Energy Storage Task Force Lead**

Chris Schramm, Avangrid

## **Participant Organizations:**

- Avangrid (NYSEG & RG&E)
- Brookhaven National Lab
- CHG&E
- Con Edison
- EPRI
- LIPA/PSE&G Long Island
- National Grid
- NYSERDA
- NY-BEST
- Orange & Rockland

## **Mission:**

The Energy Storage Task Force aims to determine the potential for energy storage to support the Utilities' transmission and distribution (T&D) systems and unbottle renewable energy to help meet State goals by 2030 and 2040.

This task force will explore different technologies, use cases, and benefits from energy storage then make recommendations to the utilities and other Stakeholders on how to best deploy each technology.

# TECHNOLOGY EVALUATION STATUS

*The ESTF is in the technical and economic assessments section of the 3-stage technology evaluation process.*



## **Q4 2022-Q1 2023 (*completed*)**

- Presentations, discussion, and review of existing energy storage technology
- Organize T&D use cases and applications

## **Q2–Q4 2023 (*ongoing*)**

- Detailed evaluation of T&D storage potential through RFP
- Develop unified planning guidelines

## **2024 (*upcoming*)**

- Provide recommendations for optimal technology deployment based on surveying and assessments

# FOCUS AREAS

*The ESTF is covering technical and economic assessments starting with a study of T&D energy storage potential.*

## T&D Potential Study RFP

- Explore potential T&D energy storage applications
- Develop T&D use cases including core technologies, configurations, sizing, and market considerations
  - Reference existing projects for best practices
- Identify "stacked" benefits for storage projects and multi-use systems
- Estimate the installed capacity potential for each use case

## Unified Planning Guidelines

- Gather input from non-utility stakeholders
- Identify processes and tools
  - DER-VET & BCA analyses
  - Charging/discharging assumptions
  - EMT modeling for inverter-based resources
  - Input from EPRI T&D planning groups
- Coordinate planning with CGPP

## Economic Analysis Methodology

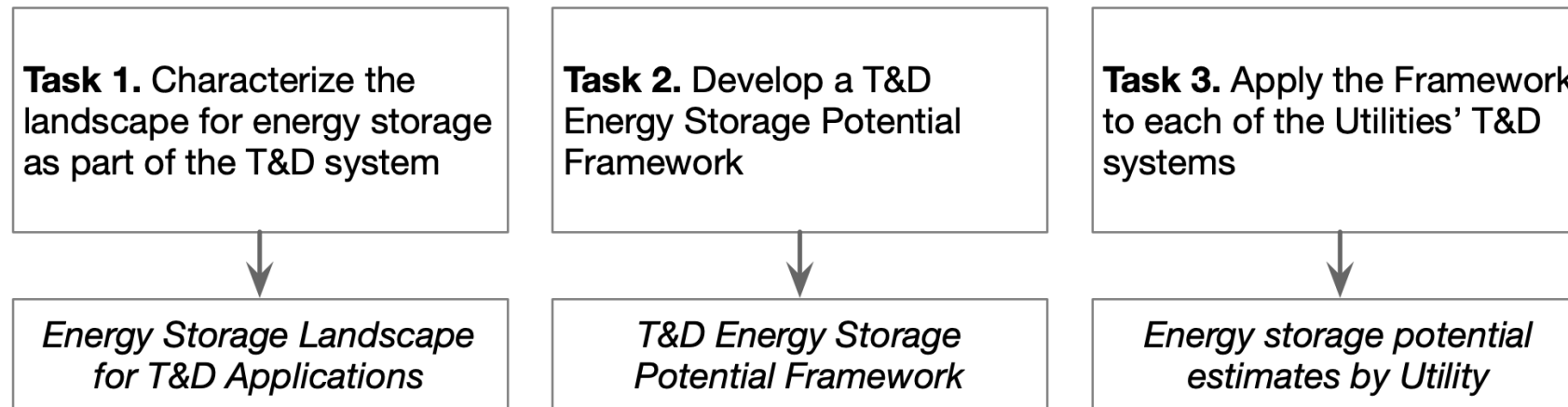
- Gather input from non-utility stakeholders to inform key metrics
- Develop a standardized evaluation methodology for energy storage
- Develop NY-specific cost estimates for storage technologies including:
  - Cost/kW
  - Price for deployment
- Leverage cost estimates from NY-BEST or other utilities
  - Develop desired range for each use case

# T&D ENERGY STORAGE POTENTIAL RFP

*The ESTF will issue an RFP to study T&D energy storage potential between June and December 2023.*

## Goals:

- Assess existing and proposed implementation of T&D energy storage use cases domestically and internationally
- Identify T&D energy storage use cases that could be employed to help meet the State's goals
- Develop economic framework for the Utilities to use when assessing use cases
- Assist the Utilities when applying this framework to assess the energy storage potential

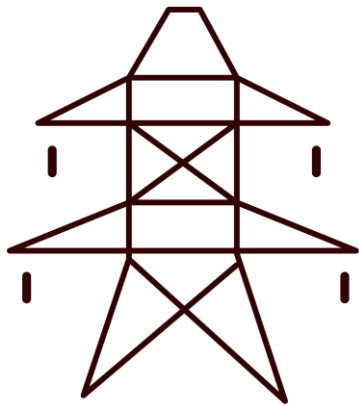


# T&D ENERGY STORAGE POTENTIAL RFP AREAS OF FOCUS

*The T&D energy storage potential study will focus on some of the following use cases and possible benefits.*

## TRANSMISSION

- Transmission Infrastructure Investment Deferral
- Renewable Energy Integration
- Curtailment Reduction
- Voltage and Frequency Support



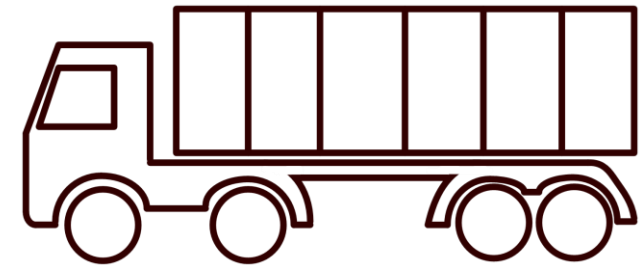
## DISTRIBUTION

- Distribution Infrastructure Investment Deferral
- Distributed Energy Resources Integration
- Peak Shaving
- Distribution Resiliency



## MOBILE

- Temporary Energy Storage for generation interconnection prior to permanent upgrades
- Backup in the event of an extended outage or attack
- Temporarily offloading circuits during construction outages



# UPCOMING WORK

*The task force will begin developing unified planning guidelines for T&D energy storage applications starting in June 2023.*

## **Unified Planning Guidelines and Economic Methodology**

- All utilities should be planning for energy storage using similar guidelines
  - Charge/Discharge Assumptions
  - Different guidelines for existing and future technologies
- A unified set of rules will benefit the Coordinated Grid Planning Process, especially with the new cost allocation directive
- The economic benefit analysis should be closely coordinated
- Leverage work done in the T&D Energy Storage Potential Study and other studies by EPRI, NY-BEST, NYSERDA, and the Energy Storage Roadmap





# QUESTIONS



# ATWG Dynamic Line Ratings (DLR) Task Force

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*Ruby Chan & Pete Harpolis, Central Hudson*

# MISSION AND GOALS

*This Task Force is exploring Dynamic Line Rating (DLR) technology to integrate more renewable generation.*

## DLR Task Force Leads

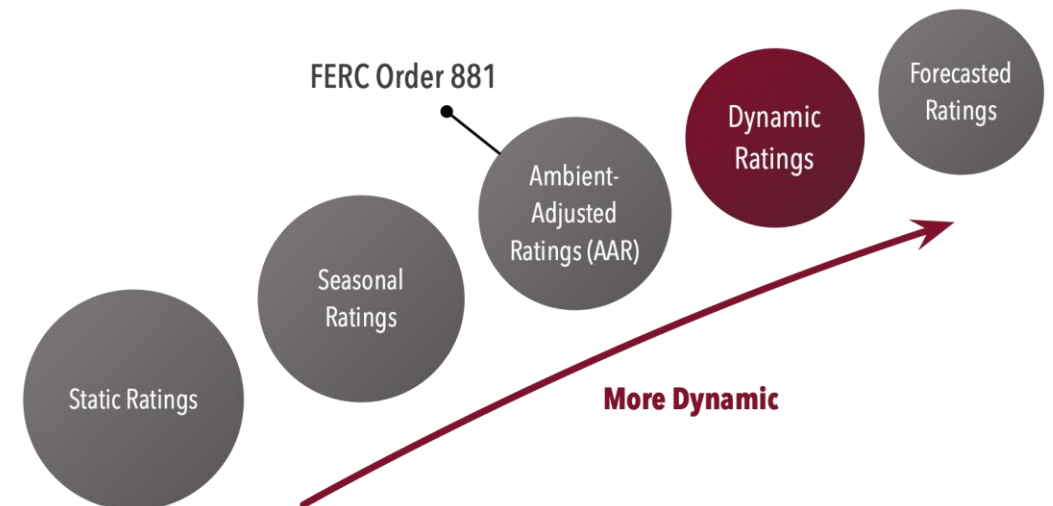
Ruby Chan and Pete Harpolis, Central Hudson Gas & Electric

### Mission

- Identify and reduce barriers to deploying DLR
- Unbottle renewable generation to meet NY Statewide CLCPA Policy Goals

### 2023 Goals

- Review industry practices for implementing DLR technologies
- Develop guidelines for cost-effective applications of DLR technologies in New York



Source: Advanced Technology Working Group, *Research and Development Plan for Advanced Transmission and Distribution Technologies*, July 20, 2022.

# UPCOMING WORK

*The DLR Task Force is currently in the technology surveying section of the 3-stage technology evaluation process.*



## Q2 2023

- DLR technology review
- Organize use cases and develop working definition for DLR technology

## Q3–Q4 2023

- Review and build from existing assessments and evaluations
- Develop of DLR ratings methodology
- Evaluate coordination with AAR and incremental benefits

## 2024

- Provide recommendations for technology deployment based on surveys and assessments

# ONGOING PROJECTS AND TECHNOLOGIES

*Several NY Utilities are currently testing DLR technologies, which include a range of offerings.*

## **UTILITY DLR PILOTS UNDERWAY**

**AVANGRID (NYSERDA):** evaluating transmission lines in the New York Southern Tier region

**NYP&A (NYSERDA):** exploration of direct SAG measurements with results transmitted to the data center; additional Line Vision pilot exploring congestion challenges

**National Grid:** will install DLR monitors on three different lines with integration of line ratings into the EMS

## **DLR TECHNOLOGIES**

- Live line conductor monitoring
- Weather-based line capability forecasts
- Light Detection and Ranging (LiDAR)
- Ratings forecasting using data processing and analytics

## TASK FORCE ACTIVITIES

*The DLR Task Force has already engaged with many DLR technologies, studies, and developers.*

<b>Topic</b>	<b>Key Learnings</b>
<b>Line Monitoring Technology</b>	Line monitoring technology has been successfully piloted by NYTOs and shows promise for ease of installation and data evaluation and response.
<b>NY Tie-Line Report</b>	NYTOs utilize this report to develop static line ratings and can serve as a baseline for AAR and DLR.
<b>NYISO DLR Protocols</b>	The NYISO is developing procedures to facilitate voluntary DLR implementation by TOs consistent with FERC Order 881.
<b>EPRI DLR Activities</b>	DLR is a logical solution to implement after evaluating static ratings and AAR but lack clear industry standards for integration.
<b>International DLR Pilots</b>	DLR technology has been successfully deployed in Belgium and the United Kingdom to possibly increase transmission capacity.

# QUESTIONS



# ATWG

# Power Flow Control (PFC)

# Technologies Task Force

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*Chris Schramm, Avangrid*



# MISSION AND GOALS

*The New York Utilities are exploring PFC technology as a tool for increasing transmission capacity.*

## **PFC Task Force Members**

Jointly facilitated by ATWG participants

## **Mission**

- Identify practical applications for power flow control technology and reduce barriers to deployment
- Improve transmission system capacity and defer costly upgrades where possible

## **2023 Goals**

- Review existing PFC technologies and understand challenges to overcome
- Evaluate large-scale PFC utilization and systems needed to ensure coordinated operations
- Inform CGPP Planners of best use cases for PFC Technology



# ONGOING PROJECTS AND TECHNOLOGIES

*The New York Utilities are exploring a range of PFC technologies through ongoing pilot projects.*

## UTILITY EXISTING PFC AND PILOTS UNDERWAY

**SmartValve technology** is being studied by Central Hudson under a pilot test with commercial deployment anticipated in 2023.

**Switched Source Tie Controller** pilots are being developed by NYSEG is on its distribution system.

**Phase Angle Regulator (“PAR”)** technology is currently being used by several utilities in New York state.

**Series Reactors and Capacitors** also already used by several utilities in New York state.

**Additional review** is focused on unified power flow controllers, series compensation, and variable frequency transformers.

## PFC TECHNOLOGIES

- Distributed Series Compensator (DSC)
- Unified Power Flow Controller (UPFC)
- Transformer-less Unified Power Flow Controllers (TUPFC)
- Back-to-back HVDC

# TASK FORCE ACTIVITIES

*The PFC Task Force has begun engaging with many PFC technologies, studies, and developers.*

Topic	Key Learnings
<b>Switched-source Tie Controller Pilot</b>	<ul style="list-style-type: none"><li>• Switched source tie controller system can increase feeder and substation hosting capacity, improve reliability and voltage regulation, and defer system upgrades</li></ul>
<b>Modular Power Flow Control (MPFC)</b>	<ul style="list-style-type: none"><li>• MPFC technology can meaningfully reduce wind power curtailment</li><li>• Automatic, coordinated responses from multiple locations improve cost savings and congestion reduction</li></ul>
<b>EPRI Survey of PFC Technologies</b>	<ul style="list-style-type: none"><li>• Existing PFC technologies fall under a range of readiness levels and designs</li><li>• PFC systems can complement conventional transmission solutions through prioritizing scheduled flows and facilitating flexible expansion</li><li>• PFC-based solutions should be designed for specific use cases and correlated with relevant device characteristics</li></ul>

## PFC TASK FORCE – UPCOMING WORK

*The Task Force is leveraging existing studies and surveys in the first stage of the technology evaluation process.*



### **Q1–Q2 2023 (ongoing)**

- Comprehensive review of past studies and existing technologies

### **Q3 2023-beyond (upcoming)**

- Confirm any additional evaluation needed of PFC-specific barriers to deployment
- Initiate assessment of PFC applications in alignment with timeline for statewide coordinated planning

# QUESTIONS



# Wrap-up and Next Steps

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*Jason Pause, Department of Public Service*

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