

**C6 - ACTIVE DISTRIBUTION SYSTEMS AND DISTRIBUTED ENERGY RESOURCES**  
**PS2 – INNOVATIVE PLANNING AND OPERATION OF ACTIVE DISTRIBUTION SYSTEMS**  
**Paper ID\_10298**

**Utilizing DERMS and Utility Owned Weather Stations for High DER Penetration on the Distribution System**

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### Motivation

- Increasing installations of Distributed Energy Resources (DER) in Northern Illinois
- Providing Safe and reliable utility electric service while allowing new DER interconnections
- Allow as many DER customers as possible to connect

### DER Penetration Challenges

- Reverse power flow
- High voltage and voltage fluctuations
- Significant losses that limit DER operation
- Need for system upgrades

### Approach

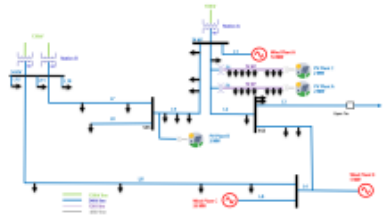
- Develop DER Management Systems (DERMS) to mitigate DER issues on Distribution Utility System
- Mitigate both Loading and Voltage concerns
- Additional hardware to optimize management system

### Objects of Investigation

- Ways to mitigate various DER types and operations
- Software and method to manage DER
- Communication platforms and additional hardware to operate DERMS effectively

### DERMS Load Relief Demonstration

- DERMS software designed to manage the overloaded asset (Station Transformer)
- Various assets monitored on the sub-transmission, distribution and customer systems



### DERMS Load Relief Design

- 15-minute rolling average of Station Transformer monitored for overload
- Optimal Power Flow utilized to calculate curtailment in DERMS software
- Maximum output limits issued to customers DER

### DERMS PV Customer Curtailment

- Curtail PV output to mitigate system overloads and limit customer financial impact
- Ordered approach based on application number

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## Utilizing DERMS and Utility Owned Weather Stations for High DER Penetration on the Distribution System

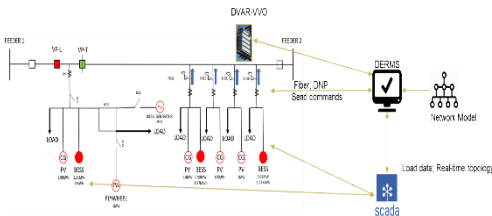
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### DERMS Voltage Management

- Proof of concept to demonstrate the use of DERMS for High Voltage Mitigation (HVM) and Voltage Fluctuation Mitigation (VFM)

### DERMS Voltage Solution

- Tiered Approach to mitigate voltage violations utilizing: DVAR, Volt-Var, Volt-Watt
- Using sensors located at nearby stations, residential/commercial taps and customer POIs, DERMS will monitor voltage readings and send control signals to DVAR & customer site controller



### DERMS Communication

- Data from the weather sensors will be transmitted over a cellular network to the DERMS platform
- An encrypted modem was selected to prevent unauthorized access.

### Discussion

- Two different DERMS solutions developed at ComEd are presented in addition to how utility weather station data would be used by DERMS enabling greater accuracy in future load predictions, weather forecasting and outage modelling

### Future Work

- Microgrid control
- Coordination of DERs in energy markets
- Managed EV charging
- Load unmasking
- Distribution Automation

### Weather Stations

- ComEd plans to mitigate the risks and gaps to publicly available data by installing its own weather stations
- Each of the weather stations will take measurements at one-minute intervals and report temperature, sustained wind speed, wind direction, wind gust, precipitation, air pressure, irradiance, and humidity

### Conclusion

- DERMS solutions will alleviate the need for carrying out traditional system upgrades, enabling more DER interconnections, and therefore facilitate in expanding our clean energy footprint
- DERMS can be utilized as a paradigm for other locations, where similar problems exist

### Weather Station Placement

- ComEd plans to initially install 70 weather stations
- 40 stations will be evenly spaced throughout the territory and 30 will be placed in six separate "pockets" of 5 in areas of chronic poor reliability and high DER penetration