# *DISTRIBUTION PLANNING*

## *IRP CONTEMPORARY ISSUES*
## *IURC TECHNICAL CONFERENCE – APRIL 15, 2019*

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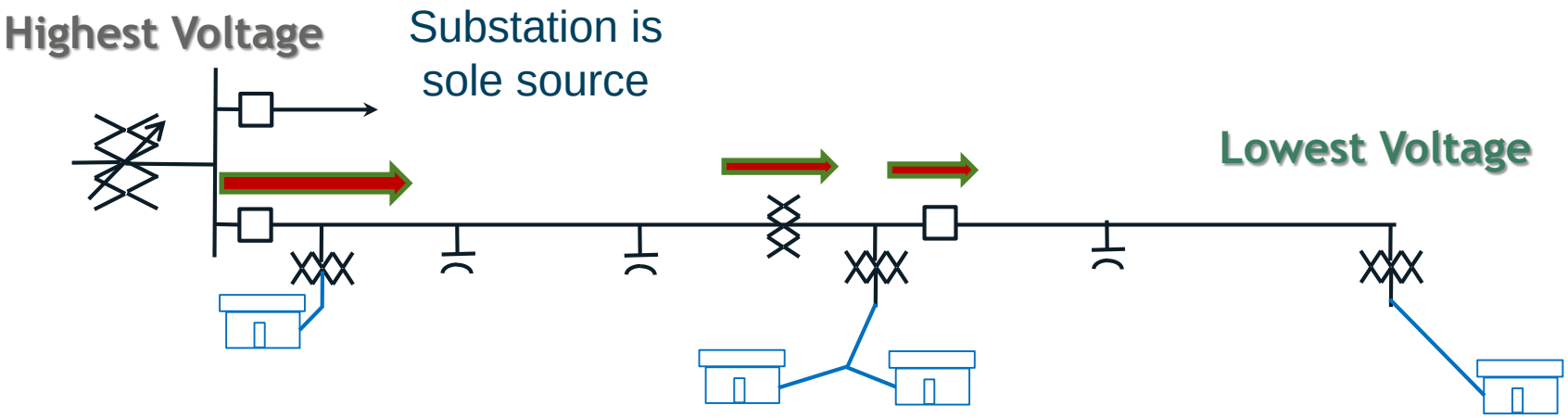
# TOPICS

***Distribution Planning will become one of the most challenging jobs in the utility industry***

- Distribution System Design – Current State
- Distribution System Design – Future State
- Distribution System Changes
- Future Planning Considerations

# DISTRIBUTION SYSTEM DESIGN CURRENT STATE TODAY



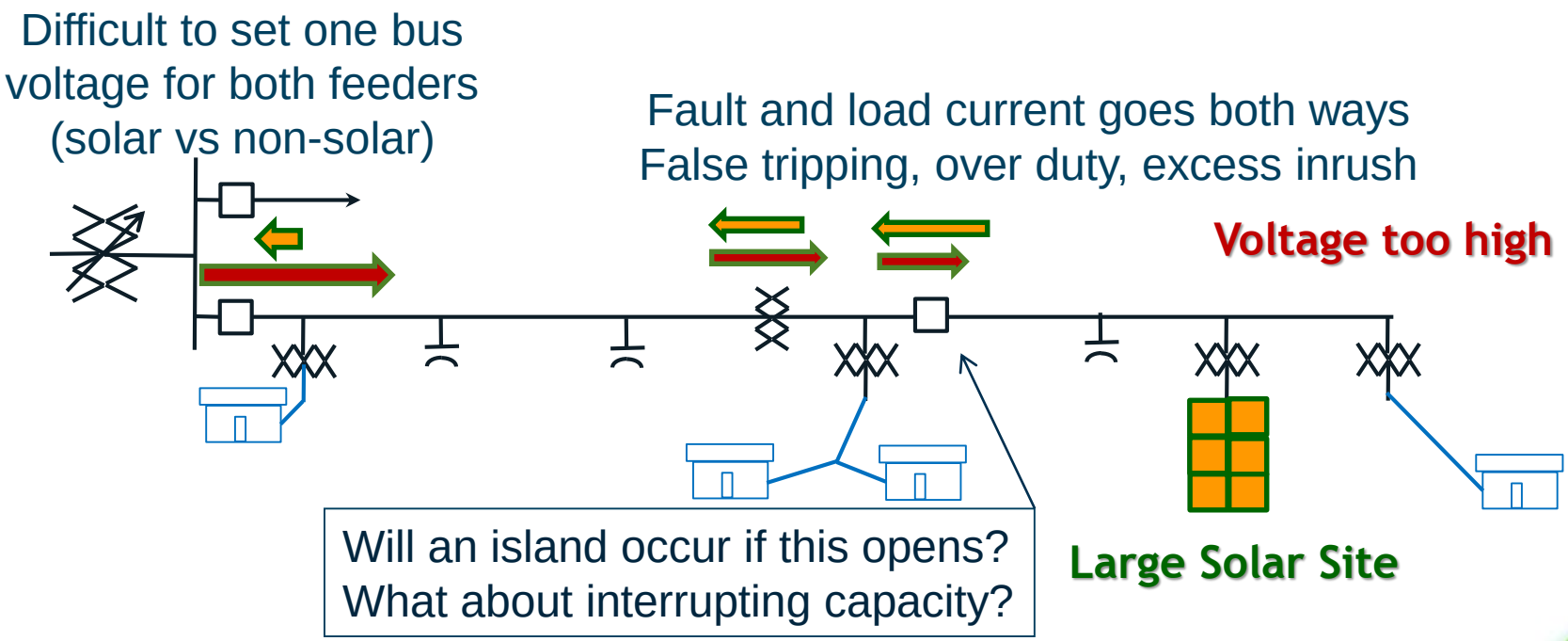

- Radial from the substation to the last end use customer, one way power flow

# *DISTRIBUTION SYSTEM DESIGN CURRENT STATE TODAY*

- Voltage profile designed to be higher at the sub and drop as you get further out on the circuit
- Ampacity across the circuit will vary, usually higher towards the sub

# DISTRIBUTION SYSTEM DESIGN FUTURE STATE

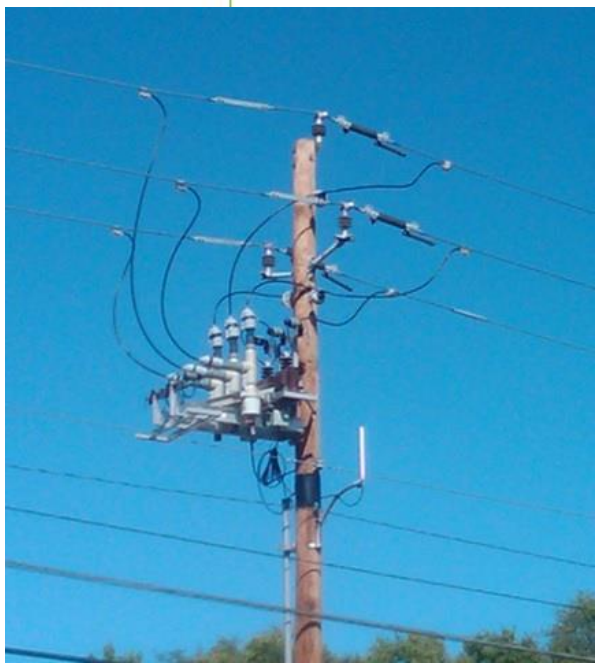
- Many New Challenges
- Will Need to be Designed for Two Way Power Flow



# *DISTRIBUTION SYSTEM DESIGN FUTURE STATE*

- Flatter voltage profile across the circuit from the substation out
- Distributed Energy Resources (DERs) located throughout the circuit
- Risk of creating islands, how to reconnect
- Circuit ampacity at least the same across the circuit

# SYSTEM DESIGN CHANGES



- Smart Volt-VAR Control (IVVC)
  - Smart ULTC[1] controls
  - Smart Line Capacitor Controls
- Smart Feeder relays
- Smart Switches/Reclosers
- Smart Meters

[1] ULTC – Under Load Tap Changer

# SYSTEM DESIGN CHANGES

- FLISR – Fault Location, Isolation, System Restoration (automatic)
- ADMS – Advanced Distribution Management System to make it all work.
  - Monitor/Control Devices
  - Needs Detailed Circuit Model

# SYSTEM DESIGN CHANGES


- DERs at the distribution level
  - Solar (Utility Scale & Rooftop)
  - Wind
  - Energy Storage
  - Combined Heat & Power (CHP)
- Electric Vehicles
  - Charging Requirements, type slow/fast
  - Energy Source
  - Time of Day
- Future things we haven't thought of yet

# *FUTURE DISTRIBUTION PLANNING CONSIDERATIONS*

- Will be more complicated going forward
- Will likely look more like transmission planning does today
- Will require more detailed circuit level models
- Will require considering not only load profiles but DER dispatch patterns, not just peak load

# *FUTURE DISTRIBUTION PLANNING CONSIDERATIONS*

- How to treat DERs
  - As Load off set
  - As Capacity Resource
- Monitoring and control of DERs through Utility's ADMS
- Utility's obligation to serve, how to calculate capacity requirements if DERs off line or unavailable

# *FUTURE DISTRIBUTION PLANNING CONSIDERATIONS*


- EV Charging
  - Transformer Sizing
  - URD cable sizing
- System Protection & Coordination of DERs
- Impact to Bulk Electric System

**None of the issues mentioned are road blocks or “show stoppers”, but things the industry is and will work through as we move forward together**

# *QUESTIONS/PANEL*