DERs’ Best Practices
Preparing for the 100% Renewable System

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Futuristic T&D and DER Integrated Systems
Business Not as usual

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Agenda

- The power triangle
- Solar penetration
- Duck curve
- Solar performance during peak day
- Various distribution designs
- Voltage control equipment
- DER interconnection requirements
- Advanced energy control center
Going **Green** is Great

Going **Black** is not that Great

Achieve highest level of reliability while connecting more DERs, building a **100% renewable system**
The Power Triangle

\[
\cos (\Phi) = \frac{MW}{MVA}
\]
Good Duck Bad Duck

- Ramp down
- Ramp up
- Cloud (speed)
- EVs
- Storage
- Generation/stability
- Voltage control
Summer Peak Day
Solar Farm Performance
Where we stand

• ~1.4 GW
• Transmission
• 26 kV sub-transmission
• 13 kV auto-loop
• 4 kV radial
• Secondary network
Voltage Control
DER Interconnection Support

- DER Critical path: voltage and system protection.
- Residential
- 26 kV
- 13 kV
- 4 kV

- IEEE1547/UL1741
- Prerequisite:
  - Robust transmission system
  - Asset life cycle programs
- SCADA: data & weather data
- Smart inverter settings:
  - VVC 1.04 p.u. voltage
  - Future ride-thru
  - Electronics, i.e. STATCOM
Advanced Energy Control Center
Renewable Desk

• Distribution is the new transmission
• Voltage control
• Voltage control:
  • LTCs
  • 4 kV regulators ... remote control
  • Inverter settings
  • STATCOM
  • Capacitor banks
  • Machine learning pilot
• Employee protection & set-up for work.
• Distributed System Platform
• NJ Governor’s mandates
Questions/Discussion