Some Thoughts About Conservation Voltage Reduction

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Flat voltage profile along the primary feeder is not always the best solution for CVR

- The secondary voltage profile is not flat
  - Different loads
  - Different distribution parameters
  - Different secondary lines
- Variable injections of DER change the profiles
- Variable states of capacitors change the profiles
- Flattening the primary voltage profiles may be to costly without justifying benefits.

Reasonability of CVR factors

- If the results of measurements suggest that the CVRwatts is > 1, especially about or > 2, most likely either the test, or the data processing are not credible, or some loads were lost.
- Feeder CVR and end-use CVR are not the same:
  - Losses, especially reactive
  - Intermediate regulators
  - Feeder Capacitors and customer sources of reactive power
  - DERs
- Different CVR at different times of day, week, season

Reasonability of CVR factors (Cont)

- The CVRamp is an exact function of CVRwatts, CVRvars, and PF: ***AMP(V=1.01)~= AMPin*[(0.99+0.01*CVRwatts)+j*tan(φ)*(0.99+0.01*CVRvars)]***
- If the measurements show inconsistency with the dependency, some of the measurements are inaccurate.
  - Typically one is interested in the amps through feeder segments:
    - Downstream Cx, DER, VR change the CVR and PF of the segment

More var compensation is not always better

- Not all var sources reduce more losses than they increase loads
- If a higher PF in the primaries increases voltage at the customer terminals it increases load and reduces power factor on the customer side
- While in voltage-critical feeders higher PF increases room for optimization, in the lightly loaded feeders – higher PF reduces the affect of CVR

Near real-time measurements from AMI meters are insufficient for IVVO

- Cannot support solutions for coordinated optimization of multiple controls taking into account multiple impacts of IVVO
- Significant fluctuations and latency
- Variations of voltage-critical points.

➢ AMI should be used for generating adequate models of load and circuits

For the IVVC, the actual voltage tolerance at the customer terminals is smaller than the standard one

- Bandwidth of the controlling devices
- Errors in measurements
- Uncertainty of the models
- Voltage imbalance in the primaries and in the secondaries
- Special needs customers (margins for sags)
- Narrower tolerances imposed by conservative personnel

Think about customer adjustment

- Undersized appliances
- Loss of useful outcome
  - Incandescent lamps – 3.6%Lm/%Volt
  - Undersized heater/coolers
  - Extreme ambient conditions

Thank you!

Questions?