Distributed Automation Use at We Energies

Val Werner
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Reasons for Implementation of DA

• Capacity Projects
  • Substation retirement in next few years
  • Delay installation of another station transformer
  • Delay addition circuit installation
  • Transition load based on thresholds

• Reliability
  • It is the right thing to do
  • Cost benefit is either not there or not as evident as with capacity projects
We Energies DA Statistics

• 33 DA Schemes installed
• 167 Switches
• Affect approximately 180,000 customers
Tracking

- All EMS alarms reviewed at the end of every month for DA related operations
- The DA scheme is either successful or not
  - The Customers Interrupted (CI) that experience a momentary interruption from a successful DA scheme are tracked
  - If any part of the scheme doesn’t work it is tracked as not successful
  - The CI that experience a momentary interruption from the successful partial operation of an unsuccessful DA scheme is also tracked
Tracking Reports

• Monthly and then at EOY
  • YTD operations from DA schemes
    • e.g.
      • 1 of 3 (33.33% Success Rate)
      • 2 of 3 (66.66% Success Rate)
  • CMI avoided due to DA scheme operations
    • e.g. 126,620 CMI
    • CMI avoided based on time to restore first set of customers experiencing a sustained outage
      • e.g.
        • Outage event began at 0840
        • 100 customers restored by DA “immediately”
        • First sustained customer restoration at 0930
        • \[ CMI_{\text{avoided}} = 50 \text{ Minutes} \times 100 \text{ Customers Interrupted} = 5,000 \]
Conditional DA: Load Relief
Defer Substation upgrades via DA

Resolve contingency overloads that might only occur hours per year.

Bus Transfer Occurs

DISTRIBUTION AUTOMATION OVERVIEW

Substation One

BDM5

BDM7

Substation Two

Substation Four

BDM6

SVR M5-13_DA

SVR M5-W4_DA

SVR M5-17_DA

SVR M7-T4_DA

SVR M6-H2_DA

Substation Three

Load On Bus

20.5 MVA

Transfers are made “closed-transition”. Each transfer is completed in 15 seconds on average so bus voltage regulation is not suspended at the substation during the transfer.

Load On Bus

At some time later…Load increases above the Emergency limit again. DA operates again to reduce load below acceptable levels. Transfers are made “closed-transition”. Each transfer is completed in 15 seconds on average so bus voltage regulation is not suspended at the substation during the transfer.
Reliability Improvement

- Analyze fault data
- Isolate the fault by sectionalizing the feeder
- Restore sections without Faults
- All DA switching is completed within 1 minute of a lockout condition