



Monitoring and Controls of Intermediate DG systems

ITWG Discussion

December 19th, 2018

Basic Control Example

Background:

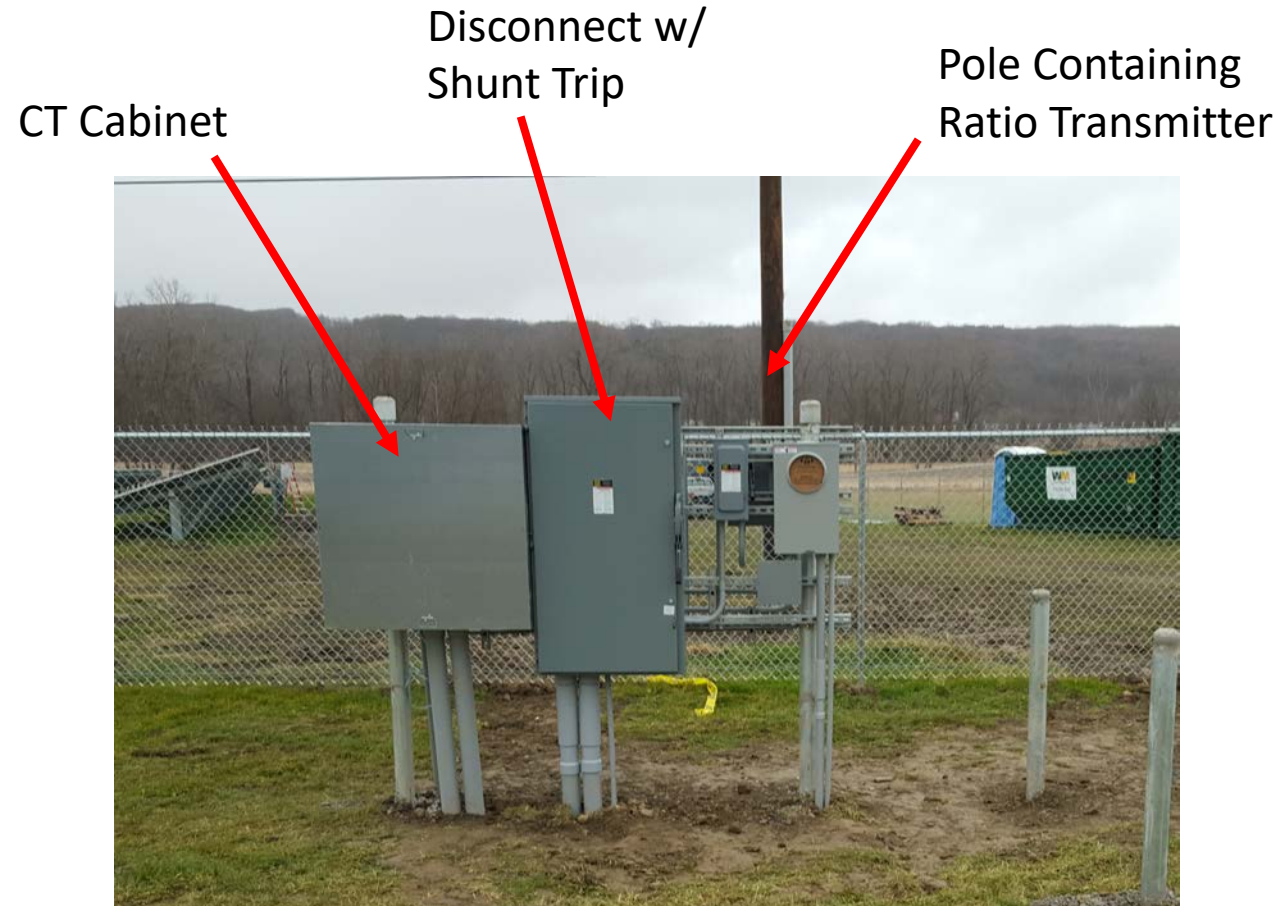
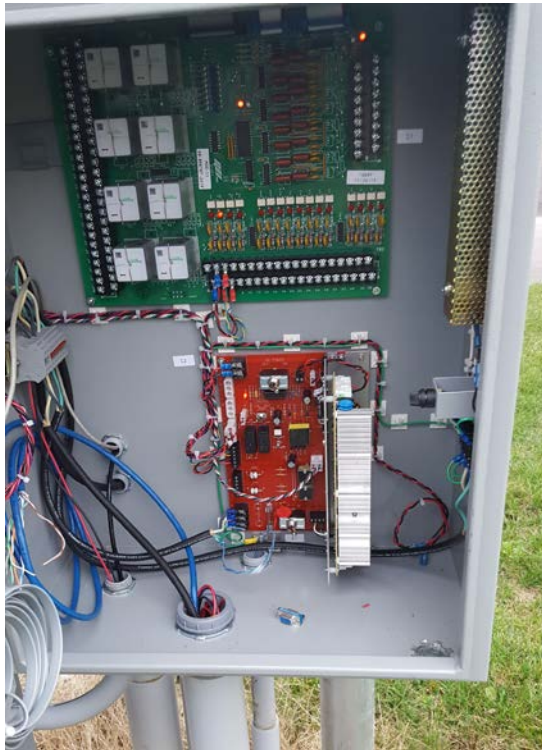
- For intermediate sized project, only 1 RTU based control system found in NY by NYSEIA, though there may be others
- 352 kW AC system connected to a 12.47kV Distribution Circuit with substantial load (3.7MW)
- Control was requested for Safety and Security – no specific standards considered

Costs:

- Utility Protection Upgrades: **\$37,700**
 - RTU, 50' Pole, CT's, Radio Telemetry
- Customer Costs: **\$26,000**
 - \$4k Engineering, \$14k for equipment, \$10k for labor
- Operational Costs:
 - Power requirements, communications costs, maintenance

Basic Control Example

Customized RTU



Back Panel Contains: RTU, (2) UPS Units, Aux. Transformer

Basic Control Example

Instructive Example of what to avoid:

- Unclear Requirements: unclear standards and lack of justification for the M&C led to prolonged arguments
- Inefficient design and equipment selection
 - Highly customized RTU
 - 2 UPS units – one for the RTU, another for Communications
 - Expensive and cumbersome telemetry
 - Radio Signal for RTU
 - POTS line for Meter
 - Customer Owned Cellular
- Financial Assessment
 - This could work with a project at 300kW with incentives at 2015 levels

Less Restrictive M&C Thresholds

- **PSE&G**

- No Control Requirement, Monitoring over 1MW
- Approximate Cost: \$75-\$80k
- Can use Cellular Connection

- **APS – Arizona Public Service Utility Company**

- Monitoring and Control above 1MW

- **CA Rule 21**

- Monitoring required above 1MW
- Monitoring MAY be required above 250kW if connected to distribution systems below 10kV
 - *Only required if less intrusive / more cost effective measures are not available
- Quarterly Renewal of Justification for Monitoring

Intermediate M&C Thresholds

- **Tucson Electric**

- Above 300kW – RTU based SCADA
- 50kW through 300kW – RTU or Interval Data required situationally
- No specific information available on what situations trigger need for control
- Largest C&I PV installer in the area has not seen any RTU's required
- Approximate costs: \$10,000 – 15,000

- **HECO**

- Massive Distribution Capacity / High PV Penetration Grid
- Required for aggregate capacity above 1MW
- MAY be required above 250kW under specific conditions

- **Xcel (Minnesota)**

- Above 1MW – M&C Required
- Approximate Costs are \$10,000 – \$15,000
- 250kW - 1MW - Monitoring and Telemetry, not Control
- Xcel provides a complete monitoring package – customer / developer picks up from the Utility's facility.
- Monitoring systems connect to the site's LAN – no need for separate and expensive telemetry.

More Restrictive M&C Thresholds

- **Detroit Edison**
 - MAY be required 150kW – 550kW
 - Required above 550kW
 - No listed conditions that necessitate RTU
- **Toronto Hydro**
 - All DEG > 50kW require M&C
 - Customer owned package, with some Utility Standards
 - Estimated Cost: \$5,000

Originally JU Proposed Costs - From Presentation July 2017

Cost Components (Median Values) for 50kW – 300kW systems	Monitoring	Control	Engineering, Installation & Commissioning	Utility Total	Developer Costs to accommodate Utility Equipment	Total	Typical 50kW- AC system cost	Cost increase on typical <u>50kW</u> system	Typical 300kW- AC system cost	Cost increase on typical <u>300kW</u> system
Monitoring	\$7,000	-	\$22,000	\$29,000	\$5,000	\$34,000	\$150,000	<u>23%</u>	\$630,000	<u>5%</u>
Monitoring / Control (RTU)	\$7,000	\$7,000	\$22,000	\$36,000	\$26,000	\$62,000	\$150,000	<u>41%</u>	\$630,000	<u>10%</u>
Monitoring / Control (Recloser)	-	-	-	\$85,000	-	\$85,000	-	-	\$630,000	<u>13%</u>

- Proposed M&C costs for smaller projects are prohibitive – even exceeding cost of modules
- M&C costs for larger projects stifle otherwise successful projects
- A 10% cost increase Changes typical IRRs from 16% to 12% and changes paybacks from 6 years to 7-8 years

Recommended M&C Cost Goals

Cost Components (Median Values) for 50kW – 300kW systems	Utility Total	Developer Costs to accommodate Utility Equipment	Total	Typical 50kW- AC system cost	Cost increase on typical 50kW system	Typical 300kW- AC system cost	Cost increase on typical 300kW system
Monitoring	\$5,000	\$2,000	\$7,000	\$150,000	<u>5%</u>	\$630,000	<u>1%</u>
Monitoring / Control (RTU)	\$10,000	\$5,000	\$62,000	\$150,000	<u>10%</u>	\$630,000	<u>2%</u>

- **Intermediate Size Projects are already a challenged sector of the market**
- **Often these projects are for Small Businesses, Schools, Churches, etc. that need positive cash flows quickly**
- **Therefore, certainty on when these costs are applied is necessary**

Conclusions and Next Steps

Conclusions:

- Reclosers at 500kW and Control Systems at 50kW are some of the most stringent requirements in the country
- Utilities with lower thresholds for requiring M&C typically offer easy and low cost solutions
- The Industry needs consistency of standards and reduction of costs to incorporate M&C successfully

Next Steps:

- Seek funding or sponsors for Test Case
- Industry proposes a simplified Two-Tier approach
- Industry proposes target costs of \$10,000 or less
- Define 'Aggregate' - In all utility territories surveyed, this is meant only as combined interconnection, and NOT as aggregated along the circuit.